Summer 2022

A Nursing-Driven Delirium Protocol

Alexandria Gray Bridges
University of South Carolina

A NURSING-DRIVEN DELIRIUM PROTOCOL

by

Alexandria Bridges, MSN, APRN, FNP-C

Bachelor of Science in Nursing
University of North Carolina at Chapel Hill, 2007

Master of Science in Nursing
University of North Carolina at Chapel Hill, 2015

Submitted in Partial Fulfillment of the Requirements

For the Degree of Doctor of Nursing Practice

College of Nursing

University of South Carolina

2022

Accepted by:

Rhonda R. Johnson, DNP, APRN, CNM, Committee Chair

Joan M. Creed, DNP, APRN, CCM, Committee Member

Paul A. LaPenna, DO, Committee Member

Abstract

Problem Statement: Delirium is a common, often preventable, condition in hospitalized patients and is associated with increased complications, worse outcomes, increased risk of death, and increased health care costs. **Purpose:** The purpose of this project was to determine if, utilizing a nursing-driven, non-pharmacological intervention, based on the NICE Guidelines, can decrease the incidence of delirium. **Methods:** Using the Iowa Model of Evidenced Based Practice to Promote Quality Care (Iowa Model), an EBP project was implemented. Patients were identified as being at risk of delirium using The Confusion Assessment Method (CAM) and these patients received the non-pharmacologic intervention as part of their nursing care. **Inclusion Criteria:** All patients on an adult medical/surgical floor who were identified at risk of delirium were included. **Analysis:** CAM scores were evaluated using a two-tailed Wilcoxon signed rank test. The presence of delirium decreased from 7 percent to 3 percent. This was statistically significant (p=.03). **Implications for Practice:** The implementation of the non-pharmacologic delirium protocol led to a significant decrease in delirium, and it should be implemented into practice.

*Keywords***:** Delirium, delirium treatment, delirium prevention, Confusion Assessment Method

Table of Contents

Part B:

List of Figures

List of Tables

List of Abbreviations

NICE- National Institute for Health Care Excellence

CAM- Confusion Assessment Method

HELP- The Hospital Elder Life Program

Iowa Model- The Iowa Model of Evidenced Based Practice to Promote Quality Care

EBP- Evidenced-based practice

EHR- Electronic health record

IRB- Institutional Review Board

RN- Registered Nurse

TIA- Transient ischemic attack

IT- Information Technology

A Nursing-Driven Delirium Protocol

Delirium is defined as a disturbance in attention and awareness. It develops acutely and has an underlying organic cause (Marcantonio, 2017). It is quite common in hospitalized older adult patients and is directly associated with increased complications and worse outcomes (Marcantonio, 2017).

An evidenced-based project addressing delirium was conducted in a 245-bed community hospital, located in an urban setting in the southeast. There is a high frequency of patients with delirium and management often involves use of antipsychotics, benzodiazepines, and restraints. There have been multiple instances of adverse outcomes in patients with delirium, especially related to medications. It was noted that delirium was a frequent reason for neurology consults and that use of antipsychotics to treat delirium led to adverse events. These factors led to the idea for a project focusing on delirium.

Restraints are often used in agitated patients with delirium, but studies have shown that use of restraints increases the risk of injury (Mercantonio, 2017). The use of antipsychotics is indicated if the patient is a danger to themselves or others, but it carries risk and can lead to fatal reactions in patients with Parkinson's Disease or Lewy body dementia (Ebersbach et al., 2019; Young et al., 2010). During a quality review meeting in 2021, it was noted that in the past year, five patients with neuroleptic malignant syndrome had been given antipsychotics (P. LaPenna, personal communication, October 22, 2021). Since the unit lacked a protocol for delirium, an evidenced-based practice (EBP) treatment plan was developed and implemented to help address the negative outcomes associated with delirium.

Background

One third of hospitalized patients over seventy have a diagnosis of delirium. It is a frequent surgical complication, with up to 75 percent of surgical patients developing delirium and up to 50 percent in high-risk surgeries (Marcantonio, 2017). Delirium is associated with worse hospital outcomes, including longer length of stay, increased likelihood of requiring post-acute care after discharge, and increased risk of death. In one study, mortality was 28 percent higher in patients with delirium (Pauly et al., 2015). It accounts for $164 billion in healthcare expenditures annually (Oh et al., 2017). Delirium has a significant impact on quality of life and functionality, which has effects on the individual, family, and the health care system.

There are risk factors associated with delirium. Predisposing factors include dementia, older age, functional disability, and high number of medical conditions (Marcantonio, 2017). Precipitating factors include medications, infection, surgery, anesthesia, pain, anemia, acute illness, and exacerbation of chronic illness (Marcantonio, 2017). Patients with underlying neurological disorders, such as dementia or Parkinson's disease, are more predisposed to delirium and have worse outcomes (Marcantonio, 2017).

Delirium is often preventable, but since it is frequently unrecognized, patients are treated for the observed symptoms, such as agitation (Gou et al., 2021). Common treatments include medications (benzodiazepines or antipsychotics) and the use of restraints (Marcantonio, 2017). Unfortunately, both treatments worsen delirium, and no pharmacologic treatment has been identified to treat delirium (Marcantonio, 2017). The mainstays of delirium prevention and treatment are non-pharmacologic, but these treatments are often not implemented (Marcantonio, 2017). Current delirium practice guidelines recommend instituting a tailored, multi-component, non-pharmacological delirium intervention (Aldecoa et al., 2017; Hshieh et al., 2018; Siddiqi et

al., 2016; Young et al., 2010). Components include frequent re-orientation, early mobilization, addressing sensory deprivation, maintaining sleep-wake cycle, treating pain, addressing underlying causes, and identifying precipitating medications (Aldecoa et al., 2017; Brown et al, 2019; Inouye et al., 1999).

Problem Statement

At this community hospital, there is a high frequency of delirium among admitted patients. Over a six-month period in 2021, 671 patients at this hospital were diagnosed with delirium or encephalopathy (M. Berry, personal communication, September 20, 2021). Management of delirium often involves use of antipsychotics, benzodiazepines, and restraints. Frequent use of benzodiazepines and restraints has led to prolonged cases of delirium and use of antipsychotics has caused neuroleptic malignant syndrome, which can be fatal. Because of the frequent delirium diagnoses and identified adverse outcomes, an evidenced-based delirium protocol was implemented.

The EBP project was implemented on a medical/surgical unit. The patient population of this unit consisted of neurology and post-operative orthopedic patients, both of which are at increased risk of delirium (Marcantonio, 2017). On this unit there was no protocol in place for prevention or management of delirium.

The goal of this project was to implement an EBP project to improve patient outcomes related to delirium. The following evidenced based practice question was developed to address this problem in the form of a PICOT question (Figure 1). In hospitalized patients on a medical-surgical floor, does the use of a non-pharmacological delirium intervention decrease the incidence of delirium, compared to management of patients before intervention implementation, after three months? The intervention is based on The National Institute for Health Care

Excellence (NICE) Guidelines for Delirium and focuses on frequent reorientation, addressing sensory deprivation, early mobilization, and maintaining sleep/wake cycle (Appendix A).

Figure 1

PICOT Question

Population	Hospitalized patients on a medical-surgical floor
Intervention	Non-pharmacological delirium intervention
Comparison	management before intervention implementation
Outcome	decrease incidence of delirium
Time	Three months

Review of Literature

A multi-database literature search identified evidence related to in-hospital delirium management. Twenty-five articles were initially identified and was refined to fifteen after closer review. The articles identified through this search can be found in Appendix E.

Interventions

The Confusion Assessment Method (CAM) is a validated tool frequently employed by nurses as a screening tool for delirium (Brown et al., 2018; Oh et al., 2017). While there are multiple delirium assessment tools available, most studies reviewed used CAM. Multi-component, non-pharmacologic interventions are the mainstay of both prevention and treatment. No medication has been effective for prevention or treatment of delirium and many medications can prolong or worsen the condition (Ebersbach et al., 2019; Siddiqi et al., 2016). The most frequently cited inciting medications were benzodiazepines, opioids, anticholinergics, and anesthesia agents (Ebersbach et al., 2019; Siddiqi et al., 2016).

Studies by Aldecoa et al., Brown et al., and Inouye et al. have investigated interventions for delirium and guidelines have been developed for the prevention and treatment of delirium.

The Hospital Elder Life Program (HELP), the NICE Delirium Guideline, and European Society of Anesthesiology guidelines are frequently used. All three guidelines have similar recommendations for non-pharmacologic interventions to prevent and treat delirium. This includes frequent re-orientation, early mobilization, addressing sensory deprivation, maintaining sleep-wake cycle, treating pain, and addressing underlying causes and precipitating medications (Aldecoa et al., 2017; Brown et al, 2019; Inouye et al., 1999). The HELP guideline uses trained volunteers for implementation and focuses on an extensive multi-modal regimen, which can be time and cost prohibitive. Studies by Brown et al., and Chen et al. use a non-pharmacologic intervention based on the HELP guideline, focusing on a few key elements, and tailoring this to the patient population (Brown et al., 2019; Chen et al., 2017). The European Society of Anesthesiology guidelines specifically address post-operative delirium (Aldecoa et al., 2017)

Intervention Benefits

Multi-component non-pharmacologic interventions have been shown to reduce delirium by 30 to 56 percent (Chen et al., 2017; Gode et al., 2021; Hshieh et al., 2018; Siddiqi et al., 2016). In addition, length of stay is positively affected, with an average decrease of two days after implementation (Brown et al., 2019; Chen et al., 2017; Friedman et al., 2021; Ogawa et al., 2019). Multiple studies have demonstrated cost savings with delirium interventions, with a savings of $1,600 to $10,000 per patient (Chen et al., 2017; Gode et al., 2021; Hshieh et al., 2018; Ogawa et al., 2019). This compares to the cost of intervention implementation of $327 per patient (Inouye et al., 1999). Implementation of a delirium intervention also leads to a decrease in prescribing of sedating medications, such as benzodiazepines and antipsychotics (Friedman et al., 2021; Inouye et al., 1999; Ogawa et al., 2019). Finally, a non-pharmacologic delirium

intervention was shown to have positive effects on morbidity, with an associated reduction in falls and increased independence after discharge (Hshieh et al., 2018; Ogawa et al., 2019).

Theoretical Framework

This projected was guided by The Iowa Model of Evidenced Based Practice to Promote Quality Care (Iowa Model). The Iowa Model is a guide for creating organizational change and implementing evidence into practice. The model acts as a step-by step guide to address a clinical problem with an intervention based on current research. The Iowa Model was vetted in several academic and health care settings to promote change (Brown, 2014; Buckwalter et al., 2017). The Iowa Model also provides guidance on creating sustainable change, which is important to the success of this evidence-based project.

The first step of the model is identifying a problem where EBP change may be warranted. The researcher or team then determines if the problem is a priority for the organization or department. The next step is to create a team who will develop and implement the EBP change. Then the team will gather research related to the desired practice change. The team then evaluates and critiques the literature to decide if the desired practice change is scientifically based. At this point, the team will decide if sufficient evidence exists to enact the practice change. If so, the next step involves implementing a pilot of the practice change. If the intervention is successful, it can be permanently implemented into practice and spread to other areas (Brown, 2014).

Project Purpose, Objectives, and Expected Outcomes

The purpose of this project was to implement and evaluate the adoption of an EBP protocol for delirium on one medical-surgical unit. The aim was to determine if the implementation of a delirium protocol would decrease the incidence of delirium. The protocol

was nursing-driven, with nurses both recognizing risk for delirium and initiating the intervention in these patients. The goals of this project were to increase the use of the delirium intervention and decrease the incidence of delirium by 25 percent after three months, measured by a decrease in positive CAM scores.

Project Design

The project was an EBP project. It was conducted on one unit in a 245-bed community hospital located in an urban area in the southeast. It is part of a multi-state health care system. The unit of interest was a 36-bed medical-surgical unit. This is an adult unit, which houses neurology and orthopedic patients, but does take patients with other diagnoses as well. The population for this project included adult patients located on the medical-surgical unit. Patients with a positive CAM scale received the non-pharmacologic interventions (Appendix A).

A feasibility assessment was completed for this project. Permission and resources for the project were received from nursing administration, the neurology department, and the nursing supervisor of the unit of interest. Data for the project was accessed from the electronic health record (EHR), Epic. The unit supervisor assisted in creating the documentation within the EHR. This included a smart phrase, which allowed nurses to document the presence of delirium and choose the interventions used from a pre-populated list.

The cost of the project was low. The only indirect costs identified were the cost to train staff, which took place at a staff meeting lasting less than one hour during their usual work shift, and the personnel cost of those who participated in the project during their normal work hours. These indirect costs are estimated to be around $1695 (Table 1). It is expected that the return on investment, experienced through patient cost savings, was greater than the cost to train staff.

The time required for this project was manageable and the timeline was discussed with those participating before the project began. The project was completed in less than six months. The main time requirements were the training of nursing staff and project team meetings. Staff training took place at staff meetings over a one-week period. There was a slight increase in charting time for nursing staff. It is estimated that an average of 30 seconds to two minutes of charting time was required. Patients that scored positive on the CAM scale would require up to two minutes of additional charting to document interventions, while charting the CAM scale alone takes about ten seconds. Many of the required documentation items were already charted by the nurses, either on a flowsheet or free-text note. This included patient mental status, which was included in the neurological assessment. Nurses also often created free text notes to informally document symptoms of delirium, such as agitation, and any interventions they used to address this. Charting utilized a smart phrase form in the EHR, which streamlined and standardized documentation.

Access to review patient data through the EHR was required and was granted by the hospital administration after Institutional Review Board (IRB) exemption was obtained (Appendix B). Retrospective access to patient data was not granted and all data obtained from patients currently admitted to the unit of interest. All data was extracted from the EHR, and all identifiable patient information was removed.

Implementation Plan

The project is an EBP project and was guided by the Iowa Model. As mentioned previously, poor patient outcomes, related to delirium, were identified on the medical/surgical unit at the community hospital. This included frequent use of benzodiazepines, which prolonged delirium

and increased length of stay, and use of antipsychotics, which led to neuroleptic malignant syndrome. Delirium was also identified as a frequent reason for neurology consults on this unit.

The idea for the project was discussed with nursing and provider leadership and there was agreement that addressing delirium was a priority for the organization. A project team was formed and included a neurologist, a neurology nurse practitioner, and the unit nursing director.

After a thorough review of the literature, the NICE guideline for delirium was chosen and the non-pharmacologic measures from this guideline were implemented on the medical/surgical unit (Appendix A). This scholarly project followed the Iowa Model for EBP.

A medical/surgical unit was chosen at a community hospital in upstate South Carolina to pilot the practice change. This unit was chosen because its patients are at elevated risk of delirium and the patients there frequently develop delirium. A delirium intervention was created based on the NICE Guidelines (Appendix A). The intervention focused on frequent reorientation, addressing sensory deprivation, early mobilization, and maintaining sleep/wake cycle. Sensory deprivation was addressed by providing hearing aids and glasses, if applicable, and by providing appropriate daytime stimulation in the room. Early mobilization included ambulating patients, if appropriate, or involving physical therapy and utilizing in-bed mobilization. Sleep/wake cycle was maintained by minimizing stimulation and interaction at night and increasing stimulation during the day. CAM was used as the primary measure for delirium (Appendix D).

Staff education on the new intervention took place over a two-week period during normal working hours. Education was initially held for charge nurses, then there was separate education for staff nurses. CAM was measured for a two-week period prior to implementation of the intervention for baseline data. Once baseline data was collected, the full intervention was implemented. Registered nurses (RNs) performed the CAM on each patient on the unit every

shift. For those patients that scored positively on CAM, the intervention, based on the NICE Guidelines, was implemented.

The progress of the project was assessed weekly. This included reviewing the applicable data as well as how implementation of the project was going. This allowed adjustment of the project as issues arose. Use of CAM was adopted very quickly and was used consistently throughout the project. Initiation and documentation of delirium interventions was much lower in the initial phase of the project. For this reason, additional education was added over a three-week period. This involved short interactions with each RN to remind them to use and document interventions. The charge nurses also communicated reminders to staff RNs during this time.

After a three-month period, data was evaluated to see if the goal of the project, decreasing incidence of delirium, was reached. A statistical analysis of the data was completed, with the goal of seeing a 25 percent decrease in positive CAM scores.

Project Measures

For this project, the primary measure was CAM (Appendix D). CAM is a standardized, evidenced-based tool that can be used by non-psychiatrically trained clinicians to quickly detect delirium (Wei et al., 2008). It focuses on the four key features of delirium: acute onset, inattention, disorganized thinking, and altered level of consciousness (Wei et al., 2008).

CAM has a sensitivity of 94 to 100 percent and a specificity of 90 to 95 percent (Inouye et al., 1990). Interrater reliability was 100 percent in the original study (Inouye et al., 1990). Validity was 90 to 100 percent and was assessed by comparing the results of CAM to diagnosis by a psychiatrist (Inouye et al., 1990). Validity was confirmed with further studies on CAM efficacy (Wei et al., 2008). Because of its ease of use and high level of accuracy, the CAM has

become the most widely used tool for assessment of delirium (Wei et al., 2008). For this reason, CAM was chosen as the primary outcome measure.

For this project, CAM was assessed every 12 hours (each shift) by the RN. CAM was performed on all patients on the medical-surgical unit. For those patients that scored positively, the non-pharmacologic delirium intervention was implemented. A description of this intervention can be found in Appendix A. The intervention focused on frequent reorientation, addressing sensory deprivation, early mobilization, and maintaining sleep/wake cycle. The RN tailored the intervention components based on patient needs and condition. The nurse documented the specific interventions employed in the EHR.

Frequency of positive CAM (indicating the presence of delirium) was collected prior to project implementation as baseline data and then was assessed throughout the project. The data was obtained from the EHR. This data was displayed on a graph, which indicated if there is a change in CAM through the course of the project. The goal of the project was to see a decrease in the frequency of positive CAM scores.

It was initially planned to also collect data on restraint and antipsychotic use as a secondary measure. Once the project was implemented, it was decided that this was not feasible. Based on the limited access to patient data, it was determined that restraint and antipsychotic use could not be accurately collected with the EHR access that was granted.

The findings of the project were disseminated to the project team through emails and in-person meetings. This allowed the team to constantly evaluate the effectiveness of project implementation and goals. Final data was shared with the organization leadership, as well as all stakeholders for the project. Stakeholders included the hospitalists caring for the patient

population, RNs who work on the unit, and medical and nursing leadership. Information was disseminated to the stakeholders through email.

Data Monitoring Plan

CAM scores were kept in a data log. Data from the EHR was abstracted weekly and managed in Excel. During abstraction, data was double verified to ensure accuracy. The data collected included CAM scores, interventions employed, and demographic data. This data was tracked in Excel, which allowed the researcher to track the progress of the project and see change in the measures over time.

Data Analysis Plan

The data was analyzed using Intellectus Statistics, a cloud-based software application. Descriptive statistics were used for demographic data. A two-tailed Wilcoxon signed rank test was used to evaluate CAM for a statistically significant change. These tests were used to evaluate the primary outcome of the project, with the goal of seeing a statistically significant decrease in positive CAM score. If a statistically significant decrease in CAM is seen, this would indicate the project has been effective and the intervention should be permanently implemented into practice. Potential limitations to this project include bias or error in data reporting, as well as the project length. The frequency of delirium was lower than expected. The small sample size may affect the validity of the results. The results were continuously assessed throughout the project to limit bias or errors. Reassessment throughout the project also allowed for improvements to be made as needed.

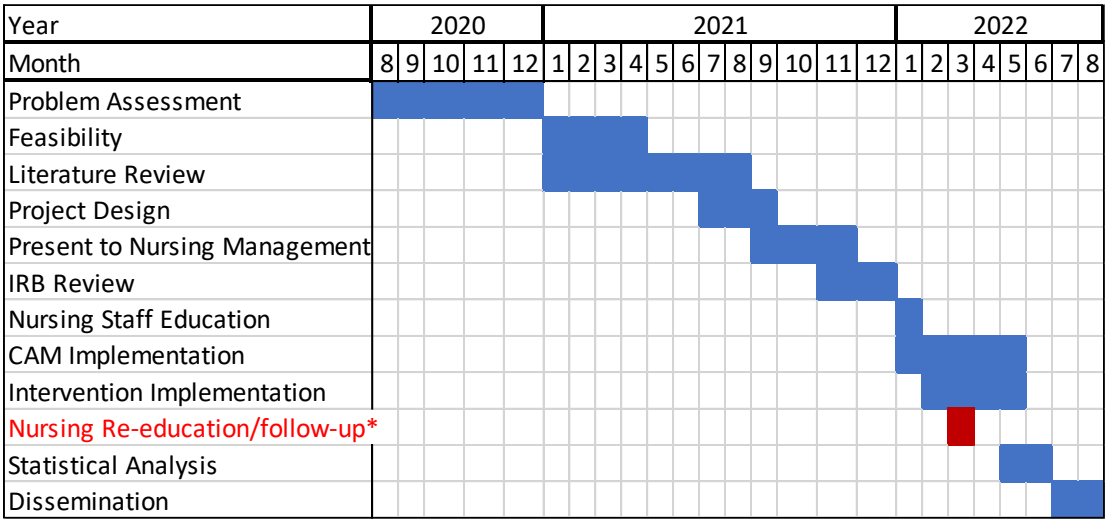
Project Timeline

Evaluation of the problem and project design took place from August 2020 to November 2021. Implementation of the project began in January 2022 after IRB exemption was received.

The implementation timeline was as follows: January 11, 2022: charge nurse education was conducted. Staff RN education was then conducted from January 25, 2022- January 27, 2022. On January 21, 2022, nurses begin documenting CAM on all patients each shift. This served as a period to allow for adoption of the new scale and to obtain baseline data. From February 15, 2022-May 15, 2022: nurses continued to assess CAM each shift. For patients with positive CAM, the delirium intervention was instituted. Data and the progress of the project was assessed weekly. It was noted early in the project that use of the non-pharmacologic delirium interventions was low. Consequently, additional project education and reminders were provided March 9- 10, 2022, March 21, 2022, and March 31, 2022. Post implementation data was collected from May 10- May 19, 2022. May 19- June 5, 2022: Data obtained from the project was statistically analyzed to evaluate effectiveness of the project. The project results were then disseminated. The full project timeline can be seen in Figure 2.

Figure 2

Project Timeline



Note. Addition to original timeline in red. Months are represented by their corresponding number.

Resource Requirements

The cost of the project was low, and no direct costs were identified. The main indirect costs were the cost of training RNs involved in the project. Training and education took place during staff meetings during the nurses' normal work shifts and lasted less than one hour. There were also indirect costs of the project team members who attended meetings, either during or outside of their regular workdays. The estimated indirect costs are around $1695 (Table 1). As mentioned previously, the charting process was streamlined using a smart phrase in the EHR. Documentation did not contribute significantly to additional time costs. The intervention itself involved normal nursing care, so it did not add additional time or cost requirements.

Table 1

Resource Requirements

Activity	Time	Cost
Training 33 Nurses	30 min	$495
Team Meetings	8 hours	$1200
Total		**$1695**

The average cost for implementation of a delirium protocol is $327 per patient (Inouye et al., 199). Implementation of a delirium protocol leads to an average cost savings of $1,600 to $10,000 per patient (Chen et al., 2017; Gode et al., 2021; Hshieh et al., 2018; Ogawa et al., 2019). Because of the low indirect costs of the project and potential for direct cost savings with implementation, this project should provide a positive return on investment.

Protection of Human Subjects

This project involved a low-risk intervention that was non-invasive and was based on established evidence-based practice recommendations. The project was designed for implementation at one site and the results are not generalizable. IRB approval was submitted,

and the project qualified for IRB exemption (Appendix B). No conflicts of interest were identified. General admission consent applied for all patients involved in the project (Appendix C).

Information needed for this project was contained within the EHR and no identifiable patient information was extracted from the record. Any data removed from the EHR for purposes of this project were password protected.

Results

The aim of this project was to determine if implementation of a non-pharmacologic delirium protocol decreased the incidence of delirium. Delirium was measured with CAM scale, where patients scored either "yes" or "no" for delirium. An example of the CAM scale used by RNs in the EHR can be seen in Table 2. A full description of CAM and how it is scored is available in Appendix D. The delirium intervention was used for a period of 12 weeks. Data was collected during this time, including CAM scale, interventions used, and patient demographics. Data was also collected pre and post intervention, including patient demographics and frequency of CAM scale.

Table 2

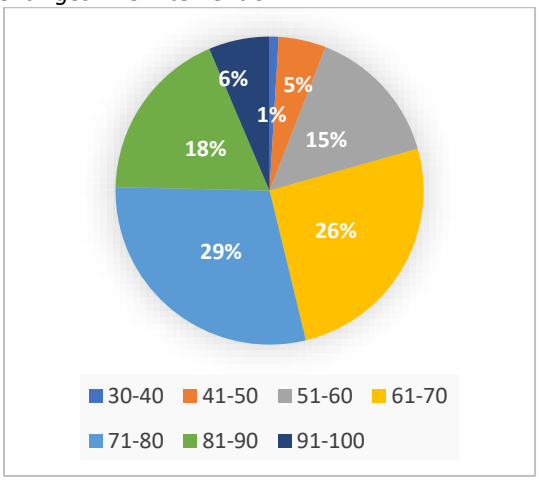
Confusion Assessment Method

1. Acute Onset/Fluctuating Course	Yes/No
2. Inattention	Yes/No
3. Disorganized Speech	Yes/No
4. Altered Level of Consciousness	Yes/No
Result	Delirium Present Yes/No

Prior to intervention implementation, baseline data was collected for two weeks. This included 439 patient encounters. During this two-week period, there were thirty-one patients who scored positive on CAM scale, indicating the presence of delirium. Prior to intervention implementation, seven percent of patients were positive for delirium, based on CAM. The frequency of delirium, based on positive CAM scale, was much lower than expected based on incidence reported in other studies, which was found to be up to one-third in patients over 70 (Marcantonio, 2017). The patient demographics prior to intervention implementation can be seen in Figures 3 and 4.

Figure 3

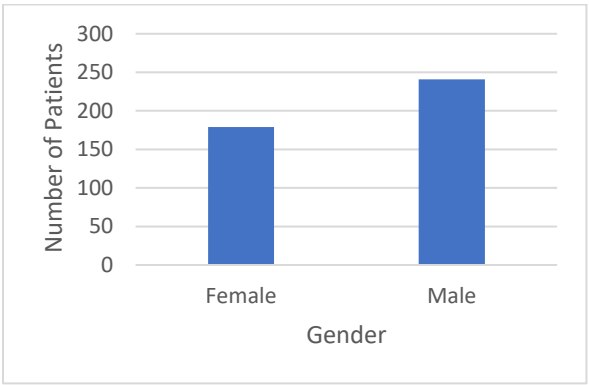
Patient Ages: Pre-Intervention



Note. Ages are noted in years

Figure 4

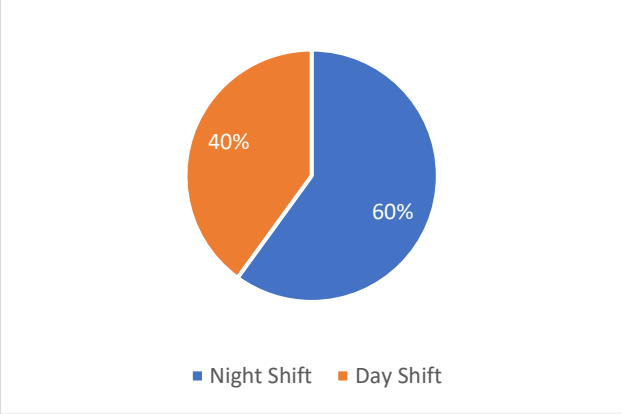
Patient Gender: Pre-Intervention



The intervention was employed for 12 weeks. During this time, 1004 patient encounters were documented. The average age of the patients was 63.71 years old. There were 460 males (46%) and 553 females (55%). Of these patients, there were 50 patients with documentation of delirium using CAM scale. There were 30 patients with documented delirium on night shift and twenty patients with delirium on day shift (Figure 5). The most frequent admitting diagnosis for patients that scored positive for delirium was transient ischemic attack (TIA) or stroke (36%, n=18), followed by acute cystitis (26%, n=13), and fracture (16%, n=8). Other diagnoses included spinal stenosis, respiratory failure, vision loss, aphasia, encephalopathy, diabetic hyperosmolar hyperglycemic syndrome, and no diagnosis. Diagnoses are demonstrated in Figure 6. The average age of patients with delirium was 63.36. See Figure 7 for a description of the ages of patients with delirium. Sixty-four percent of the patients with delirium were female.

Figure 5

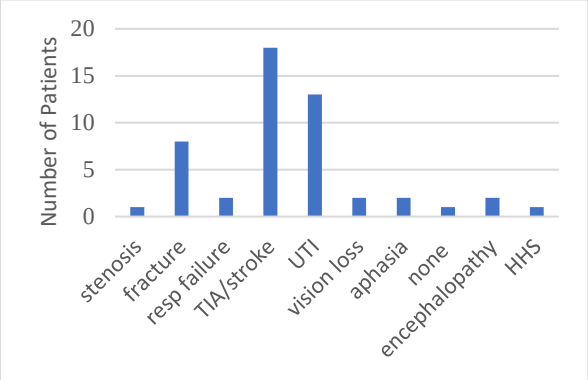
Positive CAM by Shift



Note. Recorded as number of patients.
Night Shift (n=20), Day Shift (n=30)

Figure 6

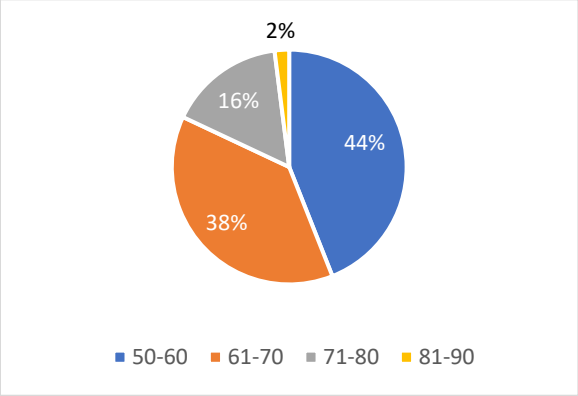
Diagnoses in Patients with Positive CAM



Note. Diagnoses represent the primary admitting diagnosis

Figure 7

Patient Ages with Positive CAM

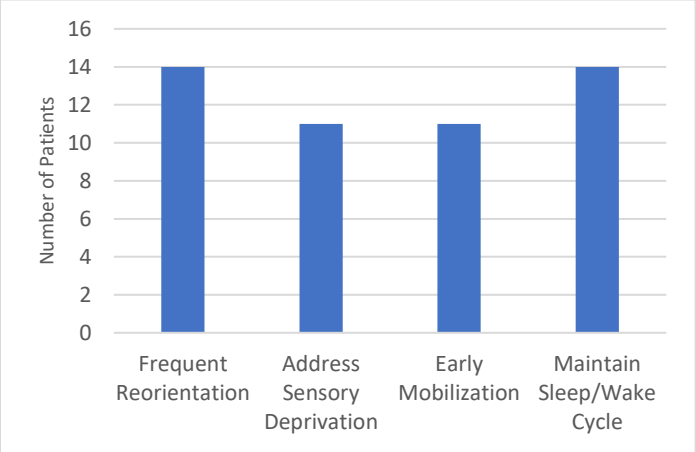


Note. Ages noted in years

Of the 50 patients that were positive for delirium, 15 received the non-pharmacologic interventions. Application of the interventions was low, with only 30 percent of patients who were positive for delirium having documented non-pharmacologic interventions. The most frequent interventions used were frequent reorientation and maintaining sleep/wake cycle. Eleven patients received all four interventions. All patients who had documented interventions received at least two of the four interventions. Seventy-three percent of the patients who received interventions were on day shift (n=11). The interventions used are demonstrated in Figure 8.

Figure 8

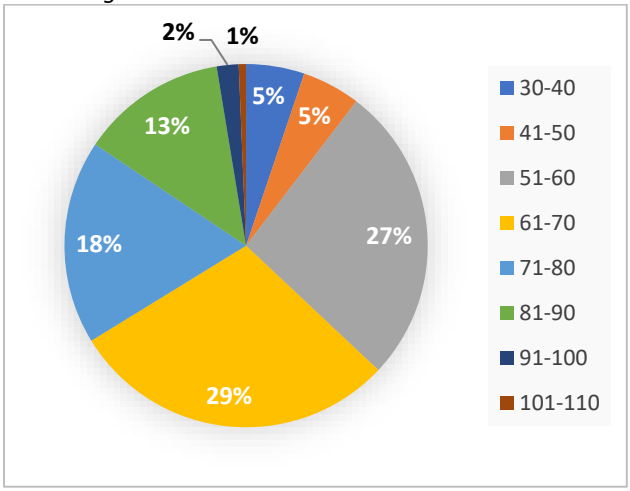
Delirium Interventions Used



Post project implementation data was collected for two weeks. Two-hundred six patient encounters were documented, with six patients scoring positive for delirium on CAM. This represents a three percent positive rate. During the post-project data collection, 84 patients were female and 122 were male. The average age was 66.39. See Figures 9 and 10 for post-intervention demographics.

Figure 9

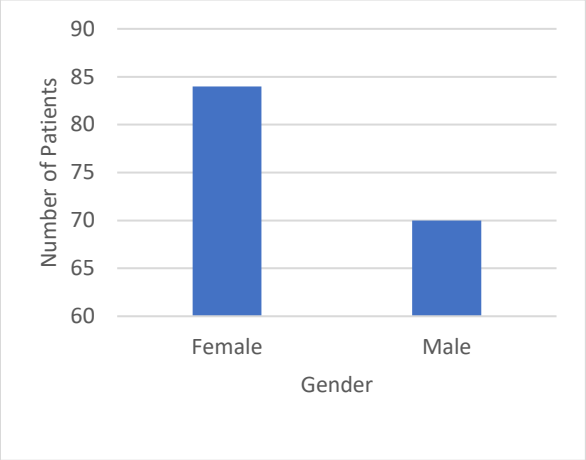
Patient Ages: Post- Intervention



Note. Ages noted in years

Figure 10

Patient Gender: Post- Intervention



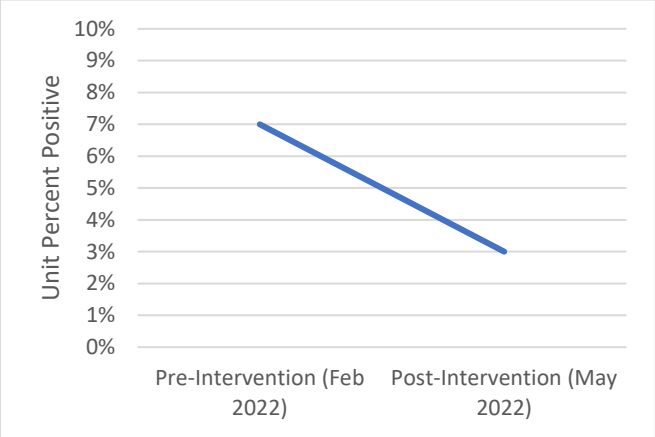
Statistical Analysis

To analyze the data, a two-tailed Wilcoxon signed rank test was conducted. This was done with Intellectus Statistics. The goal was to determine if there was a statistically significant difference between frequency of CAM scales before and after intervention implementation. The two-tailed Wilcoxon signed rank test is a non-parametric test that is an alternative to a t-test. This test was chosen because it does not meet the assumptions of a t-test (Intellectus Statistics, 2019).

The results of the two-tailed Wilcoxon signed rank test were significant, with an alpha value of .05, V= 54.00, z=2.11, and p=.035. This shows that the differences between the CAM scores before intervention implementation and CAM scores after intervention implementation are not due to random variation (Intellectus Statistics, 2019). The change in CAM Scale positivity rate can be seen in Figure 11. This represents a 59 percent decrease in delirium overall.

Figure 11

Change in CAM Positivity Rate



Contextual Elements

The incidence of delirium was much lower than expected compared to other studies. One factor that could have contributed to the lower-than-expected delirium rate was the average age of patients on the unit. During implementation, the average patient age was 63 years old. While delirium can occur at any age, it is seen more frequently in elderly patients (Marcantonio 2017). The introduction of a new scale could have also affected positivity rate. It may have taken the nurses time to become accustomed to using and charting the scale accurately.

The use of the non-pharmacologic delirium interventions was also lower than hoped for. Implementation of CAM scale was good, with 86 percent of patients on the unit having a documented CAM scale. Of patients positive for delirium, only 30 percent had documented non-pharmacologic interventions. During the first few weeks of project implantation, the low frequency of interventions was noted, so additional educational sessions were conducted with the nurses. A full project timeline, with changes, can be seen in Figure 2. There was an increase in use and documentation of interventions after the additional education

sessions. Use of interventions increased from 17 percent at the beginning of project implementation, to 37 percent after additional education sessions were conducted.

While there was an improvement in use of the non-pharmacologic interventions after re-education, their use remained low. There are several factors that could have affected use of delirium interventions. First, the frequency of patients with delirium, based on CAM scale, was much lower than expected, with .60 patients per day being positive. Because a positive patient occurred so infrequently, the nurses may have forgotten to use the interventions when a positive patient did rarely occur.

Secondly, there is a chance that the interventions were employed but not documented. The CAM scale was incorporated into the nurse flowsheet, where all other patient assessment data was documented. However, the use of non-pharmacologic interventions had to be documented in a free-text note. This may have led to inconsistency with documentation and provider bias because it required an extra step.

Strengths and Weakness

The project had multiple strengths. This included its low-cost and uncomplicated design. Use of CAM scale was adopted quickly, and documentation occurred consistently soon after project implementation. The project was not overly burdensome with time or charting requirements.

A number of weaknesses were identified. The use of the non-pharmacologic interventions was much lower than expected. Adding additional education did improve this, but overall use remained low. This project was conducted during a period of high nurse turnover and shortage, so the unit often had travel nurses or nurses from other units. These nurses were not familiar with the project, and this could have contributed to the low implementation rate. Use of the

interventions was especially low at night. This may have been due to decreased contact with RNs on this shift.

The project was conducted for 16 weeks (two weeks pre-intervention data collection, 12 weeks of using the intervention, and 2 weeks post-intervention data collection). This is a brief period to adopt a practice change and could be one explanation for the infrequent use of the delirium interventions. If the project was extended for a longer period, there may have been increased adoption over time.

The access to patient data was also a limiting factor. It was initially planned to also collect data about restraint and antipsychotic use as a secondary measure. Retrospective chart analysis was not available, which would have allowed for more comprehensive data collection.

The design of charting was not ideal. The CAM scale and interventions were documented in separate places and the interventions required a free-text note. Because there was an upcoming change to the EHR planned, the information technology (IT) department did not allow for changes to the nurse flowsheet. Incorporating the interventions into the flowsheet, at the same place as the CAM scale, may have led to higher documentation of interventions.

Due to the design of the project, it is also possible that the delirium interventions were implemented outside of the confines of the project. Educational sessions were held prior to project implementation about delirium and the use and benefit of interventions. It is possible that nurses implemented these interventions for some or all their patients after the educational session and this was not fully captured in the data.

Discussion

The prevalence of delirium decreased from seven percent to three percent. Although the frequency of delirium was low, as was documentation of the non-pharmacologic interventions,

this decrease was statistically significant (p=.035). Because of this, use of CAM scale and non-pharmacologic interventions should be implemented into permanent practice. The cost and time requirements to do this are low and there is the potential to improve patient care. As mentioned previously, delirium is associated with longer length of stay and worse outcomes, so continued use of these interventions has the potential to improve patient outcomes. It can also improve nursing care and satisfaction. Nurses often report difficulty managing symptoms of delirium. Decreasing delirium on the unit has the potential to improve both patient and nursing experience.

Other studies found a reduction in delirium by 30 to 56 percent with the use of multi-component non-pharmacologic interventions (Chen et al., 2017; Gode et al., 2021; Hshieh et al., 2018; Siddiqi et al., 2016). This project had comparable results, with a decrease in delirium of 59 percent. Two studies also experienced a low prevalence of delirium prior to intervention implementation (Friedman et al., 202; Ogawa et al., 2019). Both studies found a similar prevalence of delirium as this project, which was seven percent prior to implementation and three percent after implementation (Friedman et al., 202; Ogawa et al., 2019).

Future directions for this project could include extending the data collection period, as it is expected the use of the interventions would increase over time and would provide more comprehensive data. Nurse leaders could measure if the use of the delirium intervention had impact on length of stay, patient outcomes, and total cost. Other hospital units that experience a high frequency of delirium could implement the non-pharmacologic delirium interventions and obtain objective data looking for improvements in their delirium rates.

As mentioned previously, due to the limited access to patient data, the planned secondary measures of restraint and antipsychotic use could not be obtained. Future projects could measure

any change in antipsychotic and restraint use after implementation of the non-pharmacologic delirium interventions. This data could objectively capture improvements in patient outcomes.

The use of the non-pharmacological delirium interventions was low, especially at night. Future projects could focus specifically on night shift, to increase trainings and future participation. This could also identify any barriers specific to night shift.

Addressing delirium has effects at the system and population level. Use of non-pharmacologic delirium interventions has been shown to decrease delirium by up to 30 percent (Chen et al., 2017; Hshieh et al., 2018; Gode et al., 2021; Siddiqi et al., 2016). Length of stay is also decreased by an average of two days (Brown et al., 2018; Friedman et al., 2021; Gode et al., 2021; Ogawa et al., 2019). Delirium prevention can lead to a cost savings of $1,600 to $10,000 per patient (Chen et al., 2017; Gode et al., 2021; Hshieh et al., 2018; Ogawa et al., 2019). It can also lead to decreased use of sedating medications, reduction in falls, and increased independence (Friedman et al., 2021; Hshieh et al., 2018; Ogawa et al., 2019; Inouye et al., 1999).

Conclusion

Delirium is a common but often unrecognized disorder that is frequently preventable. It can have significant impact on patient quality of life. Through an evidenced-based project, a non-pharmacologic delirium protocol was developed and implemented. The goal of the project was to determine if the implementation of a delirium protocol would decrease the incidence of delirium.

After project implementation, the number of patients with delirium, based on CAM, improved significantly from seven percent to three percent of unit population. The project was low-cost and easy to implement. The use of CAM scale and non-pharmacologic interventions can decrease the occurrence of delirium and should be implemented into standard practice.

References

Aldecoa, C., Bettelli, G., Bilotta, F., Sanders, R. D., Audisio, R., Borozdina, A., Cherubini, A., Jones, C., Kehlet, H., MacLullich, A., Radtke, F., Riese, F., Slooter, A. J. C., Veyckemans, F., Kramer, S., Neuner, B., Weiss, B., & Spies, C. D. (2017). European society of anaesthesiology evidence-based and consensus-based guideline on postoperative delirium. *European Journal of Anaesthesiology*, *34*(4), 192-214. https://doi.org/10.1097/eja.0000000000000594

American Nurses Association (2016, October 27). *Delirium Prevention strategies*. https://www.nursingworld.org/~4afecf/globalassets/practiceandpolicy/innovation--evidence/prevention-best-practices-wg10272016.pdf

Brown, C. G. (2014). The Iowa model of evidence-based practice to promote quality care: an illustrated example in oncology nursing. *Clinical Journal of Oncology Nursing*, *18*(2), 157–159. https://doi.org/10.1188/14.CJON.157-159

Brown, E. G., Josephson, S. A., Anderson, N., Reid, M., Lee, M., & Douglas, V. C. (2018). Evaluation of a multicomponent pathway to address inpatient delirium on a neurosciences ward. *BMC Health Services Research*, *18*(1), 106–113. https://doi.org/10.1186/s12913-018-2906-3

Buckwalter, Cullen, L., Hanrahan, K., Kleiber, C., McCarthy, A. M., Rakel, B., Steelman, V., Tripp-Reimer, T., & Tucker, S. (2017). Iowa Model of Evidence-Based Practice: Revisions and Validation. Worldviews on Evidence-Based Nursing, 14(3), 175–182. https://doi.org/10.1111/wvn.12223

Chen, C. C., Li, H. C., Liang, J. T., Lai, I. R., Purnomo, J. D. T., Yang, Y. T., Lin, B. R., Huang, J., Yang, C. Y., Tien, Y. W., Chen, C. N., Lin, M. T., Huang, G. H., & Inouye, S. K. (2017). Effect of a modified hospital elder life program on delirium and length of hospital stay in patients undergoing abdominal surgery: a cluster randomized clinical trial. *JAMA Surgery*, *152*(9), 827-834. https://doi.org/10.1001/jamasurg.2017.1083

Cyrus, T., Wenthold, R., Hall, B., Tu, L., Hedquist, K., Omodt, J., Kozub, E., & Guthrie, P. F. (2021). Effectiveness of a delirium prevention initiative on an inpatient neuroscience unit. *Journal of Neuroscience Nursing*, *53*(2), 75-80. https://doi.org/10.1097/JNN.0000000000000580

Ebersbach, G., Ip, C. W., Klebe, S., Koschel, J., Lorenzl, S., Schrader, C., Winkler, C., & Franke, C. (2019). Management of delirium in Parkinson's disease. *Journal of Neural Transmission*, *126*(7), 905-912. https://doi.org/10.1007/s00702-019-01980-7

FitzGerald, J., Yan, M., Bandecar, A., Ratnasabapathy, V., Rubinsztein, J., Hatfield, C., & Ruhi, S. (2020). Management of delirium superimposed on dementia in a dementia service. *Progress in Neurology & Psychiatry*, *24*(4), 22-24. https://doi.org/10.1002/pnp.683

Friedman, J. I., Li, L., Kirpalani, S., Zhong, X., Freeman, R., Cheng, Y. T., Alfonso, F. L., McAlpine, G., Vakil, A., Macon, B., Francaviglia, P., Cassara, M., LoPachin, V., Reina, K., Davis, K., Reich, D., Craven, C. K., Mazumdar, M., & Siu, A. L. (2021). A multi-phase quality improvement initiative for the treatment of active delirium in older persons. *Journal of the American Geriatrics Society*, *69*(1), 216-224. https://doi.org/10.1111/jgs.16897

Gode, A., Kozub, E., Joerger, K., Lynch, C., Roche, M., & Kirven, J. (2021). Reducing delirium in hospitalized adults through a structured sleep promotion program. *Journal of Nursing Care Quality*, *36*(2), 149–154. https://doi-org.pallas2.tcl.sc.edu/10.1097/NCQ.000000000000049

Gou, R., Hshieh, T., Marcantonio, E., Cooper, Z., Jones, R., Travison, T., Fong, T., Abdeen, A., Lange, J., Earp, B., Schmitt, E., Leslie, D., & Inouye, S. (2021). One-year medicare costs associated with delirium in older patients undergoing major elective surgery. *JAMA Surgery*, *156*(5), 430–442. https://doi.org/10.1001/jamasurg.2020.7260

Hshieh, T. T., Yang, T., Gartaganis, S. L., Yue, J., & Inouye, S. K. (2018). Hospital elder life program: Systematic review and meta-analysis of effectiveness. *American Journal of Geriatric Psychiatry*, *26*(10), 1015-1033. https://doi.org/10.1016/j.jagp.2018.06.007

Inouye, S. K., van Dyck, C. H., Alessi, C. A., Balkin, S., 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. https://doi-org.pallas2.tcl.sc.edu/10.7326/0003-4819-113-12-941

Inouye, S. K., Bogardus, S. T., Charpentier, P. A., Leo-Summers, L., Acampora, D., Holford, T. R., & Cooney, L. M. (1999). A multicomponent intervention to prevent delirium in hospitalized older patients. *The New England Journal of Medicine*, *340*(9), 669–676. https://doi.org/10.1056/NEJM199903043400901

Intellectus Statistics. (2019). Intellectus Statistics [Online computer software]. Retrieved from http://analyze.intellectusstatistics.com/

Marcantonio, E. (2017). Delirium in hospitalized older adults. *The New England Journal of Medicine*, *377*(15), 1456–1466. https://doi.org/10.1056/NEJMcp1605501

Ogawa, A., Okumura, Y., Fujisawa, D., Takei, H., Sasaki, C., Hirai, K., Kanno, Y., Higa, K., Ichida, Y., Sekimoto, A., & Asanuma, C. (2019). Quality of care in hospitalized cancer patients before and after implementation of a systematic prevention program for delirium: The DELTA exploratory trial. *Supportive Care in Cancer*, *27*(2), 557-565. https://doi.org/10.1007/s00520-018-4341-8

Oh, E., Fong, T., Hshieh, T., & Inouye, S. (2017). Delirium in older persons: advances in diagnosis and treatment. *JAMA: The Journal of the American Medical Association*, *318*(12), 1161–1174. https://doi.org/10.1001/jama.2017.12067

Siddiqi, N., Harrison, J. K., Clegg, A., Teale, E. A., Young, J., Taylor, J., & Simpkins, S. A. (2016). Interventions for preventing delirium in hospitalised non-ICU patients. *Cochrane Database of Systematic Reviews*, *2016*(3), 1-125. https://doi.org/10.1002/14651858.CD005563.pub3

Traynor, V., Britten, N., & Burns, P. (2016). Developing the delirium care pathways. *Journal of Research in Nursing*, *21*(8), 582–596. https://doi-org.pallas2.tcl.sc.edu/10.1177/1744987116661377

Wei, L. A., Fearing, M. A., Sternberg, E. J., & Inouye, S. K. (2008). The confusion assessment method: A Systematic Review of Current Usage. *Journal of the American Geriatrics Society*, 56(5), 823–830. https://doi.org/10.1111/j.1532-5415.2008.01674.x

Young, J., Murthy, L., Westby, M., Akunne, A., & O'Mahony, R. (2010). Guidelines: diagnosis, prevention, and management of delirium: Summary of NICE guidance. *British Medical Journal*, *341*(7766), 247-249. https://doi.org/10.1136/bmj.c3704

Appendix A

Non-Pharmacologic Delirium Interventions

Frequent Orientation	• Introduce self and role • Use patient's name • Reorient frequently with date and location • Address time of day and weather/season • Encourage pictures and familiar objects in room • Encourage family visits/calls
Address Sensory Deprivation	• Update white boards with date • Ensure room clock is working • Provide adequate lighting during the day • Use glasses and hearing aids if applicable; have family bring in if not available • Keep window blinds open during the day • Turn on television • Engage in meaningful conversation
Early Mobilization	• Avoid restraints. Prioritize sitter or family in room if possible • Encourage daily mobilization such as sitting on side of bed or in chair, standing, transferring, walking with assistance • Encourage family to walk with patient if appropriate • Consider physical therapy consult if unsafe to mobilize • Encourage use of assistive devices if applicable • Encourage self-care independence • Provide adequate footwear
Maintain Sleep/Wake Cycle	• Enforce designated sleep period • Turn/dim room lights at night • Close blights at night • Reduce noise at night • Turn off TV/other electronics one hour prior to sleep time • Consider decreasing vital sign checks at night if appropriate • Delay morning blood work/ testing if appropriate • Limit caffeine • Toilet before bedtime • Cluster activities as much as possible

(American Nurses Association, 2016; Siddiqi et al., 2016; Young et al., 2010)

Appendix B

IRB Exemption Letter

[redacted]

Date: November 16, 2021

To: Alexandria Bridges, APRN, FNP-C
[redacted]

From: [redacted]
RP³ Administrator
Research Participant Protection Program (RP³)
[redacted]

Re: A Nursing-Driven Delirium Protocol

Thank you for providing the documents and background regarding your project: "A Nursing-Driven Delirium Protocol."

Based on your project's details and overall objectives, the Office of Research has determined that it does not meet the criteria for human subjects research as currently defined by federal regulations. Therefore, it does not fall within the purview of [redacted] IRB review, approval, and oversight responsibilities. As no identifiable [redacted] patient data is being utilized or transmitted outside [redacted] the project does not require review by the [redacted] Regulatory & Compliance Committee.

Since this project is not human subjects research, you do not need [redacted] IRB approval, but will need to obtain approval from your department's leadership, administration, or residency adviser. Please verify if any further departmental approvals are required. Our office just makes the determination of human subjects research vs. not human subjects research (NHSR) and facilitates IRB review for the former.

Congratulations on your project and best wishes for its successful implementation!

Thank you,

[redacted]
RP³ Administrator
Research Participant Protection Program (RP³) | [redacted]
[redacted]
[redacted]

Appendix C

Hospital General Admission Consent

[redacted]

GENERAL ADMISSIONS CONSENT FORM FOR BON SECOURS SAINT FRANCIS HEALTH SYSTEM

1. CONSENT TO MEDICAL AND/OR SURGICAL TREATMENT AND DIAGNOSTIC PROCEDURES: I, the undersigned patient, present myself for admission to [redacted] Health System. I have engaged the doctor whose name is imprinted above to administer to me certain medical treatment. I consent to and authorize the administration of such treatment to me at [redacted] Health System and any preliminary, further, or additional diagnostic procedures and medical or surgical treatment that may be, in the judgment of my doctor named above or whomever he may designate as his consult or assistant, necessary or advisable at the time the treatment is performed.

I acknowledge that the practice of medicine and surgery is not an exact science and that no guarantee or assurance has been made to me by my doctor or by any agent or employee of the health system regarding the results, outcome or effect of any treatment or procedure which may be given or performed. Any tissues, parts or fluids surgically or otherwise removed from me may be disposed of by the health system in accordance with its customary practices and any applicable laws and regulations.

2. HEALTH SYSTEM STAFF: I understand that many of the doctors on the staff of this health system, possibly including my attending doctor, are not employees or agents of [redacted] Health System but, rather, are independent contractors who have been granted the privilege of using its facilities for the care and treatment of patients. Further, I realize that among those who attend patients at the [redacted] Health System are medical, nursing, and other health care personnel in training who, unless requested otherwise, may be present during patient care as a part of their education.

3. AUTHORIZATION TO RELEASE MEDICAL RECORD INFORMATION: I authorize [redacted] Health System to disclose all or any part of my medical record to any insurance company or other entity that may be concerned with the payment of the cost of my hospitalization or any medical treatment or procedure administered to me. I give this authority with full knowledge that such disclosure may contain information which may result in a denial of insurance benefits to me or which may be otherwise unfavorable to me. I authorize the release of this information to any agency which may be concerned with providing post-hospital care to me and to all health system personnel who might use this information for hospital or medical research, provided the release of information does not violate my rights to patient confidentiality.

In addition, I agree to hold and save [redacted] Health System, its officers, its employees, and any doctors who may have examined me harmless for any cost, loss or demand, or any liability resulting from such disclosure. I also agree if all or any part of any insurance benefits are denied me, I will be liable for all hospitalization charges.

4. ASSIGNMENT OF HOSPITAL INSURANCE BENEFITS: I assign to [redacted] Health System and authorize payment directly to the health system of any hospitalization insurance benefits and major medical benefits, including, but not limited to, benefits for hospital-based doctors, due me but cumulatively not exceeding the health system's regular charges for hospitalization, medical treatment and medical procedure charges not paid by insurance. I appoint [redacted] Health System as my attorney-in-fact in my behalf to collect the above- mentioned benefits and to give full and final receipts for me for all amounts collected and to endorse for me any checks payable to me for benefits collected under this paragraph.

5. ASSIGNMENT OF DOCTOR INSURANCE BENEFITS: I assign to all doctors performing services to me or for me and authorize payment to all such persons directly any and all benefits, not exceeding the regular charges of such doctors, which may be due and payable under any insurance coverage that I may have. I understand that I am liable and responsible for any charges due any doctors performing services for me which are not covered by insurance.

6. MEDICARE AUTHORIZATION: I certify that the information given me in applying for payment under Title XVIII of the Social Security Act is correct. I authorize any holder of any medical or other information about me to release to the Social Security Administration or its intermediaries or carriers any information needed for a Medicare Claim related to me. I request that payment of authorized benefits be made on my behalf. I assign the benefits payable for hospital or doctor's services to the health system or doctors providing such services. I understand that I am liable for any health insurance deductibles and co-insurance. I agree that a photo static copy of this authorization shall be considered as effective and valid as the original.

7. CHAMPUS AUTHORIZATION: I request payment of authorized benefits to me or on my behalf for any services furnished me by [redacted] Health System, including doctor services. I authorize any holder of medical or other information about me to release all information needed to determine these benefits or benefits for related services.

8. DISCHARGE AGAINST MEDICAL ADVICE: I agree that if I leave the hospital before my doctor has discharged me, I will assume the full responsibility for this action and hold the [redacted] Health System, its officers, employees, agents and my doctor(s) separately and individually harmless from any liability in connection with my leaving the hospital and waive all rights or causes of action that I may now have or later acquire as a result of such discharge.

9. RELEASE AND RESPONSIBILITY FOR PERSONAL PROPERTY: I release [redacted] Health System and any of its hospitals, other facilities, officers, management, agents, representatives and employees and their successors and assigns from any and all claims, demands, damages and liability arising from the loss of or damage to any money or personal property that I take to my room and waive all rights, claims or causes of action that I or my representatives may now have or later acquire as a result of any such loss or damage. I understand that the health system cannot protect personal possessions, which are not delivered to the health system and placed in the hospital's or facility's vault. I waive any cause of action that I now have or may have in the future against [redacted] Health System, its officers, agents or employees arising from the loss or damage to any personal property that I fail to place in the hospital's or facility's vault. Such items may include but are not limited to jewelry, hearing aids, glasses, dentures and other dental work.

10. PATIENT INFORMATION: I have received a copy of [redacted] Health System's Patient Information packet which summarizes those health system policies that apply to me. I agree to comply with the policies and procedures set forth in this packet. I understand that this packet includes information on the [redacted] Health System's charity care program for which I may be eligible and that the packet enumerates the patient's rights which have been established in accord with [redacted] Health System's code of objectives, policies and its moral and religious beliefs.

11. FINANCIAL AGREEMENT: I agree to pay the [redacted] Health System for the services rendered to me or the patient. I understand and agree that the payment for these services, to the extent it is not paid by the insurance company or any organization or agency acceptable to the health system, is due and payable in full upon notification of balance due. Any information provided by the patient or responsible party specifically cell phone numbers, may be used by [redacted] Hospital Inc., as well, as their agents and representatives in their attempts to collect any amount due as a result of services rendered to the patient . If this account is referred to any attorney for collection, I agree to pay court costs and reasonable attorney's fees.

If I am a friend, neighbor or relative of the patient who has not been appointed to assume the patient's powers of attorney or otherwise been charged with legal responsibility for the patient's debts, bills or other financial obligations, I am therefore exempted from personal responsibility for the health system and other medical bills of this patient; but I will assist the health system in making decisions concerning the medical treatment and care of the patient.

12. CONSENT TO AIDS & HEPATITIS TEST: I hereby give my permission to any health care professional designated by [redacted] Health System or my doctor to take a sample of my blood and test it for Hepatitis and the presence of antibodies indicating exposure to the AIDS virus. I understand that this procedure may be performed in accordance with South Carolina law in the event [redacted] Health System or my doctor has reason to believe that any person has been exposed to any of my blood products or bodily fluids.

13. Financial Agreements / Assignment of Benefits / Authorized Representative / Agent

1. I assign [redacted] Health System, Inc., all rights to benefits, insurance payments, insurance reimbursements or other payments or judgements to which I may be entitled for services provided to me at [redacted] facilities. I authorize [redacted] to bill my insurance and assign the payment of these benefits directly to [redacted] Health System, Inc.
2. I assign all rights to benefits, insurance payments, insurance reimbursements or other payments or judgments to which I may be entitled for hospital-based physician services (pathology, radiology, cardiology, etc.) and/or emergency department services to the physician or organization providing the professional service. I also authorize submission of a bill for professional services to my insurance for payment.
3. I authorize and designate [redacted] Health System, Inc., as my authorized agent and representative with the power to act on my behalf with respect to all matters related to all of my rights, benefits, privileges, protections, claims, causes of action, interests or recovery arising out of any coverage source, including but not limited to the ability to request reconsideration and/or appeal payment decisions made by any group health plan, employee benefits plan, health insurance plan , any other insurance plan or utilization review entity for coverage or grievance review (the "plan"). This includes, without limitation, the authority and right to: file medical claims with the plan; file appeals and grievances with the plan; request verification of coverage or pre-certification or authorization; file pre-service and post-service claims; request any and all information and documents under which the plan is established or operated; request any and all policies, procedures and guidelines and protocols considered by the plan in connection with the benefit claim determination; and to institute any litigation and/or complaints against the plan naming me as the plaintiff in such litigation if necessary.
4. I designate, authorize and convey to [redacted] Health System, Inc., to the fullest extent permissible under law under any applicable plan the right and ability to act as my Authorized Representative with respect to benefit plan governed by the provisions of ERISA as provided in 29 C.F.R. §2560.503-1(b)(4) with respect to any healthcare expense incurred as a result of the services I received from [redacted]. This includes, without limitation, the right and ability to act on my behalf in connection with any claim, appeal right, cause of action, including without limitation, any claim that may be brought pursuant to ERISA, that I may have under the plan; and the right and ability to act on my behalf in connection with any claim, right, or cause of action including litigation against the plan (even to name me as a plaintiff in such action) that I may have under such plan, I understand I can revoke this authorization in writing at any time.

Appendix D

Confusion Assessment Method

1a. **Acute Onset**: Is there an acute change in mental status from the patient's baseline?

1b. **Fluctuating Course**: Did the behavior fluctuate during the day?

AND

2. I**nattentio**n: Did the patient have difficulty focusing attention?

AND

3. **Disorganized Thinking**: Was the patient's thinking disorganized or incoherent?

OR

4. **Altered Level of Consciousness**: Rate level of consciousness- alert, vigilant, lethargic, stuporous, comatose*

For positive CAM: Answer "Yes" to both questions 1 AND 2, plus 3 OR 4

*For question 4, all answers other than "alert" are scored as "Yes"

(Wei et al., 2008)

Appendix E

Evidence Table

Brief Reference, Type of study, Quality rating	Methods	Threats to Validity/ Reliability	Study Findings	Conclusions
Article 1: Chen, C. C., Li, H. C., Liang, J. T., Lai, I. R., Purnomo, J. D. T., Yang, Y. T., Lin, B. R., Huang, J., Yang, C. Y., Tien, Y. W., Chen, C. N., Lin, M. T., Huang, G. H., & Inouye, S. K. (2017). Effect of a modified hospital elder life program on delirium and length of hospital stay in patients undergoing abdominal surgery: A cluster randomized clinical trial. JAMA Surgery, 152(9), 827-834. https://doi.org/10.1001/jamasurg.2017.1083 **Evidence level:** I- RCT **Quality:** A high- large sample size, powered at 80% for delirium and 80% for LOS, definitive conclusions.	**Design:** cluster randomized RCT **Sample:** 377 patients ≥65 years of age, undergoing gastrectomy, pancreaticoduodenectomy, and colectomy **Setting:** 2000-bed urban medical center in Taipei, Taiwan, from August 1, 2009, through October 31, 2012 **Framework:** not discussed **Measures:** 1. Presence of delirium, 2. length of stay **Analysis Plan:** Intention to treat approach **Procedure:** The intervention (implemented by an mHELP nurse) consisted of 3 protocols administered daily: orienting communication, oral and nutritional assistance, and early mobilization. Intervention group participants received all 3 mHELP protocols postoperatively, plus usual care, upon arrival to the inpatient ward and until hospital discharge. Control received usual care.	**Conclusion Validity**: good, discussed limitation with cluster RCT, results cannot be generalized to other types of surgery. **Internal Validity**: Low level of attrition. Intervention and control had same caregivers, so this could bias results. **External Validity**: Generalizable to other institutions. Did not use ERAS, so may not be generalizable to institutions using this. **Construct validity**: Intervention adherence was ensured, and adherence was good **Reliability**: CAM scale used for evaluation, which is well validated **Precision:** Bonferroni-corrected $P = .01$	POD occurred in 6.6% of mHELP participants and 15.1% of control group Intervention group participants received the mHELP for a median of 7 days and had a shorter median LOS (12.0 days) than control participants (14.0 days)	Postoperative delirium occurred in fewer patients in the intervention group than in the control group. Hospital length of stay was also significantly shorter in the intervention group The modified Hospital Elder Life Program strongly may benefit older patients undergoing abdominal surgery, with significant reduction of delirium incidence and hospital length of stay.

Article 2: Siddiqi, N., Harrison, J. K., Clegg, A., Teale, E. A., Young, J., Taylor, J., & Simpkins, S. A. (2016). Interventions for preventing delirium in hospitalised non-ICU patients. *Cochrane Database of Systematic Reviews* (3), Article Cd005563. https://doi.org/10.1002/14651858.CD005563.pub3 **Evidence level:** I- systematic review of RCTs **Quality:** A- High. Consistent generalizable results. Sufficient sample size. Consistent recommendations.	**Design:** Systematic review **Sample:** 39 RCTs which recruited 16, 802 participants **Setting:** Orthopedic practice was most common setting. Others included cardiac, cancer, colorectal or general surgery, or other elective procedures **Framework:** Cochrane review procedures **Measures:** incidence of delirium. Secondary outcomes were duration and severity of delirium, institutionalization at discharge, QOL, health care costs. **Analysis Plan:** Two review authored examined RCTs found by database search for inclusion. Disagreement decided by consensus. RR, between group mean differences and standard deviations used to measure treatment effect. **Procedure:** Search of multiple databases. Review of RCTs of single and multi- component non-pharmacological and pharmacological interventions for preventing delirium in hospitalized non-ICU patients	**Conclusion Validity**: Good. Addressed potential sources of bias. **Internal Validity**: Good. Only controlled studies were included. **External Validity**: A heterogenous sample was included for good generalizability. **Construct validity**: failure to exclude prevalent delirium at enrollment was a common limitation. **Reliability**: good. Included studies were likely underpowered to detect mortality and institutionalism. **Precision:** Primary outcome was statistically significant at RR 0.98, 95% CI	Multi-component interventions reduced the incidence of delirium (RR 0.69, 95% CI 0.59 to 0.81) No evidence cholinesterase inhibitors prevent delirium (RR 0.68, 95% CI) No clear evidence of effect of antipsychotics on delirium (RR 0.73, 95% CI, 0.33 to 1.59) No clear evidence that melatonin reduces delirium incidence (RR 0.41, 95% CI 0.09 to 1.89) Moderate evidence that BIS guided anesthesia reduces delirium (RR 0.71, 95% CI 0.60 to 0.85)	There is strong evidence supporting multi-component interventions to prevent delirium in hospitalized patients.

Brief Reference, Type of study, Quality rating	Methods	Threats to Validity/ Reliability	Study Findings	Conclusions
Article 3: Inouye, S. K., Bogardus, S. T., Charpentier, P. A., Leo-Summers, L., Acampora, D., Holford, T. R., & Cooney, L. M. (1999). A multicomponent intervention to prevent delirium in hospitalized older patients. *The New England Journal of Medicine*, *340*(9), 669–676. https://doi.org/10.1056/NEJM199903043400903 **Evidence level:** II- quasi-experimental **Quality: A** High- consistent, generalizable results, sufficient sample size and control, consistent recommendations	**Design:** controlled trial with prospective patient matching **Sample:** 852 patients 70 years of age or older who had been admitted to the general-medicine service at a teaching hospital between March 1995-March 1998 **Setting:** Yale-New Haven Hospital **Framework:** not discussed **Measures:** Incidence of delirium, severity of delirium **Analysis Plan:** CAM used to evaluate delirium. Scores evaluated using intention-to-treat approach **Procedure:** Patients enrolled to receive a multicomponent delirium protocol (HELP) or usual care.	**Conclusion Validity**: good. Randomized intervention, but no control. Patient matching to increase generalizability **Internal Validity**: individuals were not randomized, but there was a control arm. **External Validity**: prospective patient matching increases the generalizability to other settings. **Construct validity**: controlled trial with a standardized, validated instrument. **Reliability**: Good. A previously validated measurement tool was used. **Precision:** P= 0.02	The rate of incidence of delirium was significantly lower in the intervention group than in the usual- care group (9.9 percent vs. 15.0 percent, P=0.02). The total number of days of delirium was significantly lower in the intervention group.	The HELP intervention is effective at reducing delirium in hospitalized adult patients. The intervention decreased the incidence of delirium and reduced the total number of days of delirium.

Article 4: Brown, E. G., Josephson, S. A., Anderson, N., Reid, M., Lee, M., & Douglas, V. C. (2018). Evaluation of a multicomponent pathway to address inpatient delirium on a neurosciences ward. *BMC Health Services Research*, *18*(1), 106–106. https://doi.org/10.1186/s12913-018-2906-3 **Evidence level:** II- retrospective cohort study **Quality**: B Good- purpose and measures clearly stated. Describes specific techniques used.	**Design:** Retrospective cohort study **Sample:** 800 admissions chosen, any patient >50 admitted to neurosciences ward was eligible **Setting:** neuroscience floor, UCSD Medical Center **Framework:** not discussed **Measures:** incidence of delirium. Secondary: LOS, use of restraints, use of sitter, readmissions, disposition to SNF **Analysis Plan:** chi square test or Wilcoxon's rank test. **Procedure:** implemented a multicomponent delirium care pathway	**Conclusion Validity**: Fair. Discussed limitations. Identified several confounding variables. Intervention has not been validated in specific patient population. **Internal Validity**: symptoms of delirium can be caused by other neurologic conditions, which were not accounted for. Incidence of delirium may have been affected by increased provider recognition. **External Validity**: conclusion could apply to the same patient population in a similar setting. **Construct validity**: multi-component interventions has not been studied as much in neuroscience patients, may decrease validity **Reliability**: **Precision:** did not obtain statistical significance p=.24 and .54 for primary outcome	Prevalence or incidence of delirium incidence did not change before or after care implementation pathway (prevalence: 25% before and 21% after, p = 0.24; incidence: 7.7% before and 8.9% after, p = 0.54). LOS decreased by 2 days (p= 0.008) Restraint and sitter use had non-significant declines (p=0.18)	There was no change incidence of delirium, but LOS did decrease significantly. Neuroscience patients may have more concurrent illnesses that affect assessment of delirium and interventions

Article 5: Ogawa, A., Okumura, Y., Fujisawa, D., Takei, H., Sasaki, C., Hirai, K., Kanno, Y., Higa, K., Ichida, Y., Sekimoto, A., & Asanuma, C. (2019). Quality of care in hospitalized cancer patients before and after implementation of a systematic prevention program for delirium: the DELTA exploratory trial. *Supportive Care in Cancer*, *27*(2), 557-565. https://doi.org/10.1007/s00520-018-4341-8 **Evidence level:** II- retrospective cohort study **Quality:** B good- adequate sample size, limitations discussed. Definitive conclusions may not be generalizable.	**Design:** retrospective before-after study **Sample:** 4180 adult patients with cancer **Setting:** National Cancer Center Hospital East **Framework:** not discussed **Measures:** 1. Incidence of delirium, 2. Delirium free days, 3. Incidence of adverse events, 4. Use of benzodiazepines, 5. Benzodiazepine-free days., 6 use of antipsychotics, 7. Antipsychotic-free days, 8. Use of opioids, 9. Opioid-free days, 10. Use of psychiatry consults, 11. ADLS, 12. Discharge status, 13. LOS, 14. Cost, **Analysis Plan:** logistic regression for binomial outcomes. Estimated relative effect measures with RR and OR with 95% confidence intervals, significance 0.05 **Procedure:** Implement a 6-component delirium treatment program (DELTA) (1) education, (2) screening, (3) planning, (4) prevention, (5) scheduled assessment, and (6) management and treatment.	**Conclusion Validity**: Fair. Discussed limitations, design did not create reproducible results **Internal Validity**: fair. Used an observational design rather than RCT, unrecognized cofounders may exist. **External Validity**: single-center study limits generalizability **Construct validity**: identification of delirium was based on chart review, which may lead to bias. Hypoactive delirium may be underestimated. **Reliability**: **i**ncidence of delirium was lower than previous studies, which may be related to chart review design **Precision:** (OR), 0.52; 95% CI, 0.42–0.64 for outcome 1. RR, 1.02; 95% CI, 1.01–1.03for outcome 2.	Implementation of the DELTA trial was associated with a 48% reduction in delirium incidence (odds ratio (OR), 0.52; 95% CI, 0.42–0.64) . There was a significant decrease in benzodiazepine prescription, but a significant increase in antipsychotic prescription (OR, 0.79; 95% CI, 0.71–0.87) It was associated with an increase in level of independence at discharge 93.0 vs. 95.9%; OR, 1.94; 95% CI, 1.11–3.38.	A systematic intervention for delirium decreased the incidence of delirium and improved associated clinical outcomes. The data suggests that this cost-effective program is feasible and implantable.

Brief Reference, Type of study, Quality rating	Methods	Threats to Validity/ Reliability	Study Findings	Conclusions
Article 6: Aldecoa, C., Bettelli, G., Bilotta, F., Sanders, R. D., Audisio, R., Borozdina, A., Cherubini, A., Jones, C., Kehlet, H., MacLullich, A., Radtke, F., Riese, F., Slooter, A. J. C., Veyckemans, F., Kramer, S., Neuner, B., Weiss, B., & Spies, C. D. (2017). European society of anaesthesiology evidence-based and consensus-based guideline on postoperative delirium. *European Journal of Anaesthesiology*, *34*(4), 192-214. https://doi.org/10.1097/eja.0000000000000594 **Evidence level:** IV- Practice guideline **Quality:** A High Guideline is professionally sponsored, documented literature search strategy, evidence and recommendations are graded	**Design:** Evidenced-based and consensus-based guideline **Sample:** n/a non-research study **Setting:** n/a non-research study **Framework:** Appraisal of Guidelines for Research and Evaluation (AGREE II **Measures:** Grade of recommendation was obtained based on level of evidence and consensus expert majority **Analysis Plan:** Critical Appraisal Worksheets from the Centre for Evidence-Based Medicine of the University of Oxford. Draft guideline was peer reviewed by ESA's Scientific Committee subcommittees, then made available for critical appraisal by ESA members. **Procedure:** Multiple databases searched for relevant articles	**Conclusion Validity**: not discussed **Internal Validity**: not discussed **External Validity**: not discussed **Construct validity**: not discussed **Reliability**: not discussed **Precision:** not discussed	Recommend: Implementing fast track surgery Avoid pre-med with benzodiazepines Monitor depth of anesthesia Adequate pain treatment Prompt diagnosis and treatment of POD Low-dose Haldol or atypical antipsychotics for treatment	POD is a frequent complication and requires preventive measures as well as immediate and adequate treatment. systematic interventions aimed to reduce its incidence and duration are rarely implemented Despite the huge costs of POD and its preventability, it receives little attention in terms of resource allocation from hospital administrators and healthcare institutional governance representatives.

Brief Reference, Type of study, Quality rating	Methods	Threats to Validity/ Reliability	Study Findings	Conclusions
Article 7: Hshieh, T. T., Yang, T., Gartaganis, S. L., Yue, J., & Inouye, S. K. (2018). Hospital elder life program: systematic review and meta-analysis of effectiveness. *American Journal of Geriatric Psychiatry, 26*(10), 1015-1033. https://doi.org/10.1016/j.jagp.2018.06.007 **Evidence level:** IV systematic review of RCTs and quasi-experimental **Quality:** A high- supported by government agency. Documentation of systematic literature search. Consistent results with well-defined studies.	**Design:** Systematic review with meta-analysis **Sample:** n/a **Setting:** n/a **Framework:** not discussed **Measures:** 14 studies examined for effectiveness, 30 for cost savings, adherence, role of volunteers, successes and barriers, and sustainability **Analysis Plan:** results pooled for meta-analysis. **Procedure:** Ovid MEDLINE, Embase, the Cochrane Central Register of Controlled Trials, and the Cochrane Database of Systematic Reviews 1999-2017.	**Conclusion Validity**: good. Included large number of RCTs with meta-analysis of results **Internal Validity**: good. Included high number of RCTs **External Validity**: good. Meta-analysis of results/recommendations of RCTs and quasi-experimental studies **Construct validity**: meta-analyses of effectiveness of HELP. **Reliability**: n/a **Precision:** meta-analysis results at 95% confidence interval	Odds of delirium is 53% lower with implementation of HELP Incidence of falls was 43% lower Length of stay was lower, but not statistically significant. Odds of being institutionalized was the same. Meta-analysis indicated $18 billion could be saved per year and $7 billion per year in Medicare dollars or $12,000 per case.	HELP provides cost savings. HELP improves health care quality, enhances patient satisfaction, and decreases cost (triple aims) HELP has been demonstrated to be sustainable, adaptable, and flexible.

Brief Reference, Type of study, Quality rating	Methods	Threats to Validity/ Reliability	Study Findings	Conclusions
Article 8: Young, J., Murthy, L., Westby, M., Akunne, A., & O'Mahony, R. (2010). Guidelines: diagnosis, prevention, and management of delirium: summary of NICE guidance. *British Medical Journal*, *341*(7766), 247-249. https://doi.org/10.1136/bmj.c3704 **Evidence level:** IV- Practice guideline **Quality:** A high- Based on systematic review. Sponsored by government agency	**Design:** Evidenced-based and consensus-based guideline **Sample:** n/a non-research study **Setting:** n/a non-research study **Framework:** not discussed **Measures:** Recommendations were obtained based on expert review of literature and consensus **Analysis Plan:** Developed in accordance with NICE guideline development methods. **Procedure:** Systematic search and appraisal of literature	**Conclusion Validity**: not discussed **Internal Validity**: not discussed **External Validity**: not discussed **Construct validity**: not discussed **Reliability**: not discussed **Precision:** not discussed	Recommend assessing patients admitted to the hospital for risk of delirium. Recommends a multi-disciplinary team. Recommends a multi-component delirium intervention tailored to each patient.	Delirium is a complex syndrome that is common but can often be prevented. Clinical factors identified as contributing to delirium should be addressed with a multi-component delirium intervention.

Brief Reference, Type of study, Quality rating	Methods	Threats to Validity/ Reliability	Study Findings	Conclusions
Article 9: Ebersbach, G., Ip, C. W., Klebe, S., Koschel, J., Lorenzl, S., Schrader, C., Winkler, C., & Franke, C. (2019). Management of delirium in Parkinson's disease. *Journal of Neural Transmission (Vienna)*, *126*(7), 905-912. https://doi.org/10.1007/s00702-019-01980-7 **Evidence level:** Level V- literature review **Quality:** A High- current literature analyzed, gaps in literature and future recommendations were recommended, provides scientific rationale	**Design:** literature review **Sample:** n/a **Setting:** n/a **Framework:** not discussed **Measures:** n/a **Analysis Plan:** not discussed **Procedure:** review of current literature on delirium in Parkinson's disease	**Conclusion Validity**: good. Summarizes current literature into recommendations **Internal Validity**: n/a **External Validity**: conclusions can be applied to **Construct validity**: **Reliability**: n/a **Precision:** n/a	Non-pharmacologic interventions for prevention and management of delirium in PD: -Identify predisposing conditions -Detection and treatment of medical precipitators -Familiar person contact Adapted communication - Maintain hydration and nutrition -Avoid sensory deprivation -Correct and maintain sleep-wake cycle -Soothing and calming measures -Exclude other causes -Provide safe mobility with minimum restraints	Delirium is common in PD and can be prevented with non-pharmacologic measures. When delirium occurs, focus should be on patient safety. There are few studies addressing delirium in PD. More efforts to identify possible strategies for prevention and management

Article 10: Cyrus, T., Wenthold, R., Hall, B., Tu, L., Hedquist, K., Omodt, J., Kozub, E., & Guthrie, P. F. (2021). Effectiveness of a delirium prevention initiative on an inpatient neuroscience unit. Journal of Neuroscience Nursing, 53(2), 75-80. https://doi.org/10.1097/JNN.0000000000000580 **Evidence level:** V- QI project **Quality:** B Good. Methods clearly described and measures identified. Did not discuss statistical evaluation of results or cost benefit analysis.	**Design:** Pretest-posttest **Sample:** 304 patients pre- and 332 patients post intervention **Setting:** 46 bed neuroscience unit in a 631-bed hospital quaternary hospital in upper Midwest **Framework:** not discussed **Measures:** increase in nursing knowledge and confidence. Number of interventions implemented by volunteers. Decrease in incidence of delirium **Analysis Plan:** initial objective evaluated using descriptive statistics and Wilcoxon signed rank test. Descriptive statistics used for 2nd objective. 3rd objective used descriptive statistics and *t* test or Mann-Whitney *U* test **Procedure:** 18 1 hr delirium education sessions for nurses, MIND project created a volunteer program. 1-1 two-hour educations sessions for volunteers, who then visited patients and implemented nonpharmacologic delirium interventions. Nurses completed survey	**Conclusion Validity**: Fair. Discusses potential biases. Used a validated survey. Did not discuss generalizability or reliability, or precision. **Internal Validity**: Subjects were colleagues with researchers, which could cause bias. **External Validity**: Not discussed. Results would not be generalizable **Construct validity**: good. A validated survey was used **Reliability**: not specifically discussed. Consistency of applying interventions was an issue and a longer time was needed to evaluate effects **Precision:** not discussed	RN confidence increased from 77% to 100% Delirium rates were slightly lower than control in August 2019 (6.72 to 6.69). Rates increased in September (7.38) and similar as pre-group mean (12.18). MIND volunteers were successful in implementing non-pharmacological interventions for patients. Following project conclusion, delirium rates remained below the lower control from November 2019-November 2020, with exception of April 2020	Preventing delirium in the neuroscience population is challenging due to confounding symptoms, including cognitive and expressive deficits Recommendations from project include providing staff with ongoing delirium education and training volunteer to assist in implementing non-pharmacologic interventions. Future studies with longer measurement periods and consistent volunteer visits will determine the true effect of these interventions on delirium rates.

Brief Reference, Type of study, Quality rating	Methods	Threats to Validity/ Reliability	Study Findings	Conclusions
Article 11: FitzGerald, J., Yan, M., Bandecar, A., Ratnasabapathy, V., Rubinsztein, J., Hatfield, C., & Ruhi, S. (2020). Management of delirium superimposed on dementia in a dementia service. *Progress in Neurology & Psychiatry*, *24*(4), 22-24. https://doi.org/10.1002/pnp.683 **Evidence level:** V- program evaluation **Quality:** B good- expertise appears credible, but does not provide clear conclusions	**Design:** Clinical audit **Sample: all** patients >65 discharged from a specialist dementia unit or dementia intensive support team, 24 pts initial audit, 75 pts subsequent audit **Setting:** specialist dementia unit for elderly, Cambridge, May-November 2018. Wider audit Jan-June 2019 including dementia intensive support team **Framework:** not discussed **Measures:** 1. Compliance with clinical standards (NICE guideline) 2. Occurrence of delirium 3. Use of antipsychotic medication **Analysis Plan:** Audit tool designed based of off NICE guidelines **Procedure:** Audit tool was used to evaluate dementia discharge cases	**Conclusion Validity**: poor. Does not discuss limitations. There was a small sample size. No statistical analysis of results **Internal Validity**: Not a controlled study. Risk for investigator bias **External Validity**: Results cannot be generalized to other settings or other patient populations **Construct validity**: researchers created an audit tool that was presented for review to NHS foundation for review but was not validated prior to implementation. **Reliability**: Questions 3 and 4 on audit were low performing. Sample size was expanding to address this **Precision:** not discussed	Half of patients admitted had antipsychotic prescribed for symptoms of dementia. Standard of care for delirium superimposed on dementia was high and in keeping with NICE guidelines	Recommendations: -improve documentation of diagnosis -more in-depth evaluation of clinical understanding of DSD is needed Future audits may consider exploring trends in antipsychotic use in DSD

Brief Reference, Type of study, Quality rating	Methods	Threats to Validity/ Reliability	Study Findings	Conclusions
Article 12: Friedman, J. I., Li, L., Kirpalani, S., Zhong, X., Freeman, R., Cheng, Y. T., Alfonso, F. L., McAlpine, G., Vakil, A., Macon, B., Francaviglia, P., Cassara, M., LoPachin, V., Reina, K., Davis, K., Reich, D., Craven, C. K., Mazumdar, M., & Siu, A. L. (2021). A multi-phase quality improvement initiative for the treatment of active delirium in older persons. *Journal of the American Geriatrics Society*, *69*(1), 216-224. https://doi.org/10.1111/jgs.16897 **Evidence level:** V- QI project **Quality:** B Good. Clear aims and objectives, consistent recommendations with reference to scientific evidence	**Design:** Pretest-posttest **Sample:** 9214 consecutively admitted older pts to non-intensive care units over a 5.5-year period **Setting:** Mt Sinai Hospital, a tertiary-care teaching facility **Framework:** **Measures:** LOS, benzodiazepine, opiate, and antipsychotic use. **Analysis Plan:** ANOVA for continuous variables for means and Kruskal-Wallis test for medians. For categorical variables, a chi-squared test was used **Procedure:** Pts were diagnosed with active delirium using CAM. Non-pharmacologic interventions were implemented to address visual impairment, hearing impairment, reconciliation of meds, immobility, sleep deprivation, dehydration, cognitive impairment, nutrition, delirium team consult, delirium volunteer team visit.	**Conclusion Validity**: **Internal Validity**: Study was controlled, but not blinded. **External Validity**: The results cannot be generalized to other populations, but intervention can be easily reproduced. **Construct validity**: Assessment procedures limited the researchers from measuring delirium incidence, severity, and duration **Reliability**: A single CAM score was obtained, which weakens assumptions. Incidence of delirium may be underestimated. **Precision:** 95% confidence interval	There was a significant drop in LOS by 1.98 days (95% confidence interval). Decrease in average morphine dose equivalents from 38 mg to .21 mg per patient hospital day, diazepam dose equivalents from .22 mg to .15 mg per patient hospital day, and quetiapine administered from .17 mg to .14 mg per patient hospital day for delirious patients on the program pilot units	There is a suggested association between the delirium treatment program and positive changes in clinical practice, as evidenced by decrease in LOS and medication use. Intervention presented can serve as a useful and more cost-effective option for delirium management. Elements of the active delirium treatment program may provide direction to other developers. A more rigorous study is needed.

Brief Reference, Type of study, Quality rating	Methods	Threats to Validity/ Reliability	Study Findings	Conclusions
Article 13: Gode, A., Kozub, E., Joerger, K., Lynch, C., Roche, M., & Kirven, J. (2021). Reducing delirium in hospitalized adults through a structured sleep promotion program. *Journal of Nursing Care Quality*, *36*(2), 149–154. https://doi-org.pallas2.tcl.sc.edu/10.1097/NCQ.000000000000049 **Evidence level:** V- EBP project **Quality:** B good. Clearly describes current literature and implementation process. Assesses potentials for bias and confounding variables	**Design:** EBP project **Sample:** patients on two med/surg units **Setting:** metropolitan quaternary medical center in the upper Midwest region in the United States **Framework:** Iowa EBP model **Measures:** rate of positive delirium, cost savings **Analysis Plan:** interrupted time series with Newey-West estimation **Procedure:** Sleep promotion program to reduce delirium: guidelines for patient selection, sleep menu, patient education, staff and provider education, environmental assessment, electronic order, staff responsibilities, hospital-wide communication	**Conclusion Validity**: Good. Discusses limitations. Small sample size **Internal Validity**: EBP framework lacks rigor of a formal research study. Did not adjust for other variables that impact delirium. Statistical analysis used mitigated some confounding variables **External Validity**: results could apply to a similar patient population, but not generalizable to other patient groups or institutions **Construct validity**: potential for cross-over effect since frontline staff was used. **Reliability**: There was some difficulty in identifying when patients were ready for intervention implementation. **Precision:** P= .0005	Positive delirium screening decreased from 26.3 to 17.9% (P< .00001) on medical oncology unit and from 14.8 to 7.8% on surgical spine unit. Average cost avoidance was $160,505 and $241, 802 for two units	Implementation of a sleep promotion protocol was associated with a reduction in delirium and increased patient satisfaction. Interdisciplinary cooperation is key to successful development of a protocol.

Brief Reference, Type of study, Quality rating	Methods	Threats to Validity/ Reliability	Study Findings	Conclusions
Article 14: Traynor, V., Britten, N., & Burns, P. (2016). Developing the delirium care pathways. *Journal of Research in Nursing*, *21*(8), 582–596. https://doi-org.pallas2.tcl.sc.edu/10.1177/1744987116661377 **Evidence level:** V- Consensus statement **Quality:** A good. Commissioned by governmental agency. Definitive conclusions with consistent recommendations. Did not use formal program evaluation methods.	**Design:** Consensus statement **Sample:** population of NSW in 410 hospitals and 890 nursing homes. **Setting;** Across New South Wales **Framework:** not discussed **Measures:** n/a **Analysis Plan:** n/a **Procedure:** Focus groups and 1-1 interviews with practitioners to develop pathway, which was then piloted across 19 clinical settings	**Conclusion Validity:** team used a rigorous approach to develop and screen care pathway recommendations. Results were based on expert opinion consensus, no experimental design or statistical analysis. **Internal Validity**: n/a **External Validity**: Sample included entire province with large size, so may be generalizable to similar patient populations. **Construct validity**: n/a **Reliability**: n/a **Precision:** not discussed	For patients identified at risk or with delirium, a care plan was implemented: Identify and treat causes, manage symptoms, assess medications, provide support, prevent complications, monitor for resolution, manage risk factors, provide patient education	The project developed a care pathway that allowed providers to prevent, recognize, and treat delirium The methodology ensured the tool reflected the needs of the practitioner and care setting. The publication of the delirium care pathway led to initiation of other projects to target delirium at state and national levels.

Brief Reference, Type of study, Quality rating	Methods	Threats to Validity/ Reliability	Study Findings	Conclusions
American Nurses Association (2016, October 27). Delirium Prevention strategies. https://www.nursingworld.org/~4afecf/globalassets/practiceandpolicy/innovation--evidence/prevention-best-practices-wg10272016.pdf **Evidence level:** V- Consensus statement **Quality:** A fair. Definitive conclusions/recommendations. No discussion of process for appraising evidence	**Design:** Consensus statement **Sample:** n/a **Setting;** n/a **Framework:** not discussed **Measures:** n/a **Analysis Plan:** n/a **Procedure:** Expert consensus statement of the American Nurses Association and the American Delirium Association	**Conclusion Validity:** Results were based on expert opinion consensus, no experimental design or statistical analysis. Process for appraising evidence was not discussed **Internal Validity**: n/a **External Validity**: Literature reviewed included systematic reviews **Construct validity**: n/a **Reliability**: n/a **Precision:** not discussed	Recommend a multi-component delirium intervention: Evaluate risk factors, use a validated tool to assess delirium, treat diagnostic findings, prevent nosocomial infection, appropriate medication management, maintain cognition, adequate pain control, early mobility, adequate oxygenation, adequate nutrition, sleep promotion, ongoing staff education, large scale implementation	RNs need to drive delirium prevention. The best prevention consists of high-level nursing care.