Doctor of Nursing Practice Papers   School of Nursing

8-2022

Multicomponent approach to delirium prevention in the acute care setting: an evidence-based quality improvement project.

Kelley James
kelley.mccowan@louisville.edu

Kelley James
University of Louisville, kelley.mccowan@gmail.com

Multicomponent Approach to Delirium Prevention in the Acute Care Setting: An

Evidence-Based Quality Improvement Project

by

Kelley James

Paper submitted in partial fulfillment of the

requirements for the degree of

Doctor of Nursing Practice

School of Nursing, University of Louisville

July 11, 2022

_____   07/13/2022_____

Signature of DNP Project Chair   Date

_____   07/13/2022_____

Signature of DNP Project Committee Member   Date

_____   _____

Signature Program Assistant Dean   Date

_____   _____

Signature Associate Dean for Academic Affairs   Date

Dedication

I would like to dedicate this project to my husband, Robert, who has been a constant source of support, encouragement, and laughs during the challenges of graduate school and life. This work is also dedicated to my parents, Scott and Denise McCowan, who have always loved me unconditionally and who have taught me to work hard for the things I aspire to achieve.

Acknowledgements

Table of Contents

Abstract

Background: Acutely ill, hospitalized individuals are at an increased likelihood of developing delirium. Between 30-35% of those patients admitted to the hospital will develop delirium, and as a result, these individuals will face an increased risk of mortality, adverse medical events, restraint usage, and incur a more extended hospitalization. The literature supports early screening utilizing the Confusion Assessment Method (CAM) tool and nurse-driven, multicomponent interventions to aid in preventing its development.

Environment: This project was implemented in a long-term, acute care facility specializing in patients requiring long-term mechanical ventilation, advanced wound care, pulmonary and respiratory care, and the rehabilitation of individuals with traumatic brain injuries.

Purpose: The purpose of this quality improvement project was to improve patient outcomes (decrease fall rates, decrease restraint utilization, decrease length of stay) and increase nursing knowledge, implementation and documentation of the CAM tool.

Procedures: Six ten-minute educational sessions on delirium and the use of the CAM tool were provided to nursing staff at an inpatient, long-term acute care facility in a suburban town. Retrospective chart audits were performed and the data collected included daily CAM charting compliance, CAM documentation upon admission, restraint usage, length of stay and falls rates for eight weeks prior to intervention compared to eight weeks post-intervention.

Results: Thirty-four nurses participated in the delirium education intervention. There was a statistically significant improvement in daily CAM documentation ($p=<0.01$) and patient length of stay ($p=0.05$). Improvements (though not significantly significant) in restraint utilization and CAM admission documentation were found. Patient demographic data (age, sex, admission

diagnosis) from pre-intervention and post-intervention was collected to determine comparability between the samples, and the only statistically significant difference was in COVID admissions.

Keywords: Quality Improvement, QI, delirium, delirium management, delirium prevention protocol, delirium risk factors, Confusion Assessment Tool, CAM, long-term acute care, nursing education

Multicomponent Approach to Delirium Prevention in the Acute Care Setting: An

Evidence-Based Improvement Project

Delirium is an "acute, serious and often preventable medical condition characterized by confusion and a disturbed thought process" (American Nurses Association, 2016). It is a common complication among hospitalized patients, with an average of 25% of patients being diagnosed during their stay. Delirium is a significant concern because it places patients at an increased risk for falls, restraint usage, mortality, added medical cost, and several additional physical, mental, psychological, and financial burdens (Rogers, 2018).

There are three types of delirium to be aware of in practice: hyperactive delirium, hypoactive delirium, and mixed-type delirium. Hyperactive delirium is the most readily identified when attempting to diagnose delirium. It involves increased motor activity, restlessness, agitation, aggression, hypervigilance, and occasionally hallucinations or delusions (Department of Health, 2015). This type of delirium is commonly misdiagnosed as "ICU psychosis" or "sundowning". Hypoactive delirium is more challenging to identify with characteristics of decreased motor activity, lethargy, withdrawn affect, or drowsiness (Department of Health, 2015). The mixed type involves elements of both hyperactive and hypoactive delirium. The commonality between all kinds of delirium is the presence of acute onset confusion and inattention.

Multiple predisposing factors increase the likelihood of the development of delirium, and those with a history of dementia or cognitive impairment are at risk. Additionally, a history of delirium, elderly individuals, concurrent infection, prior institutionalization, and hearing/visual impairment are considered the nonmodifiable risk factors for the development of delirium (Cullen & Balas, 2017). Modifiable risk factors include immobility, polypharmacy, sleep deprivation, length of hospital stay, dehydration, hypoxia, and inadequately controlled pain

(Cullen & Balas, 2017). Knowing the risk factors for developing delirium is vital in preventing delirium in hospitalized patients.

Delirium is difficult to treat once it develops, and prevention has been shown as the most effective mechanism to decrease the incidence and prevalence of delirium in hospitalized patients. Prevention strategies include early screening, risk factor modification with nonpharmacological interventions, and vigilant, frequent assessment of patients for symptom development. Approximately 30-40% of cases of delirium can be prevented with proper, timely intervention (Siddiqi et al., 2006).

Over the last decade, studies have supported the use of multicomponent, nurse-driven interventions to prevent delirium in hospitalized patients, yet delirium remains one of the most common complications of hospitalizations, particularly for older adults. Studies support the use of screening tools to identify at-risk patients early in their hospitalization, frequent assessment using a standardized tool, such as the Confusion Assessment Method (CAM) to determine the presence of delirium, and prompt implementation of interventions to prevent or shorten delirium.

Environment

The site for this project will be referred to as Kentucky Metropolitan Hospital (KMH) to maintain anonymity for this scholarly project. KMH is an inpatient, long-term acute care hospital specializing in serving many patient populations, including patients requiring long-term mechanical ventilation, advanced wound care, pulmonary and respiratory care, and the rehabilitation of individuals with traumatic brain injuries. Patients are screened prior to admission to determine appropriateness as the facility's intention is for all patients to be able to functionally progress to discharge home or to outpatient rehabilitation within thirty days of admission. This goal is attained through extensive collaboration between nursing staff and

ancillary staff, including physical therapists, occupational therapists, speech therapists, social workers and dieticians.

The staff at KMH is comprised of multiple disciplines. As previously mentioned, there is an extensive team of therapists for each patient, as well as nurses (LPNs and RNs), physicians, and nursing assistants. Additionally, the nursing educator and Chief Operations Officer are huge assets to this team and occasionally demonstrate their support of staff by working as bedside nurses and nurse resources.

Culture

The culture in the unit at KMH provides a unique opportunity for this project. Recently at KMH, there have been multiple leadership changes, which promote an environment suitable for process improvements, such as this project.

Facilitators for Project Implementation

This project has support from stakeholders at KMH, including the Chief Operations Officer and nurse educator for the unit. These individuals are huge proponents of improving clinical practice and promoting patient outcomes. In addition, staff are encouraged to consistently work towards rehabilitation of their patients, and this attitude of constant improvement yields an environment that is supportive of seeking best practice.

Barriers to Project Implementation

The most significant potential barrier to this project is the current state of pandemic nursing occurring in the hospital. The priorities of management have been diverted off of quality improvement and toward daily management activities out of sheer necessity. The outbreak of COVID-19 has caused staffing crises and compassion fatigue yielding an environment that can be hostile to new projects.

Summary of Evidence

Multiple themes were identified in the literature regarding delirium education, assessing for delirium, prevention interventions, and outcomes of delirium management programs.

Education

A common theme found in the literature is the concept of education and its effect on delirium management. In nearly half of the articles reviewed, education was the primary step to beginning any intervention (Babine et al., 2018; Ogawa et al., 2019; Reppas-Rindlisbacher et al., 2021; Rohatgi et al., 2019; Choi et al., 2019; Thomas et al., 2014).

In many cases, staff education was considered the first step of the intervention protocols to generate "buy-in" and ensure all participants in the studies are acting in accordance with evidence-based practice and goals of the various studies. In general, education about delirium included etiology, risk factors, screening, and assessment tools. The time requirements of studies varied from a brief, ten-minute information session during change of shift huddle (Reppas-Rindlisbacher et al., 2019; Rohatgi et al., 2019) to more formal, lengthy sessions (Ogawa et al., 2019; Zaubler et al., 2013; Wand et al., 2013). Regardless of the time spent learning about delirium, education is a critical first step in implementing positive change with delirium prevention measures.

Assessment Tools

The primary commonality across all sixteen studies was the method in which delirium was assessed. All articles included the Confusion Assessment Tool (CAM) and its variations to evaluate and diagnose delirium. The CAM and its variation for intensive care, mechanically intubated patients (CAM-ICU) have demonstrated a sensitivity of 94-100%, specificity of 90-94%, and high interrater reliability (Oh et al., 2017).

Interventions

The "gold standard" of delirium prevention was established in the 1990s at Yale University through research performed by Inouye and colleagues. During this time, Inouye et al. (1999) identified six risk factors contributing to delirium. These factors are cognitive impairment, sleep deprivation, immobility, visual impairment, hearing impairment, and dehydration. These factors and their accompanying prevention strategy were named "Hospital Elder Life Program," now referred to as the "HELP program" (Inouye et al., 1999). The study by Inouye et al. supported multicomponent interventions targeting these factors to decrease the incidence of delirium and the number of days with delirium in the hospital.

The study by Inouye et al. (1999) became the foundation for future delirium studies. Over the years, many studies have targeted the six factors outlined in the HELP program to determine the effect of risk modification on delirium and its outcomes (Hshish et al., 2015; Avendaño-Céspedes et al., 2019; Ogawa et al., 2019; Reppas-Rindlisbacher et al., 2021). Other studies have adapted and expanded the intervention targets. Avendaño-Céspedes et al. and Wand et al. included the six original components of the HELP Program and added oxygenation, elimination, pain, and delirogenic, or delirium-inducing, drug avoidance.

Two studies narrowed the focus of their interventions. Jeffs et al. (2013) targeted only two of the six components, focusing on early mobility and reorientation measures. Martinez et al. (2021) only included three of the six components, having family members work with patients to provide cognitive stimulation through frequent reorientation and eliminating hearing/visual impairments by providing patients with their glasses and hearing aids.

In general, studies focusing on multiple delirium prevention components were more successful in achieving outcomes than those with a narrower focus.

Outcomes

The incidence of delirium in the hospital affects patients in a multitude of ways. Individuals diagnosed with delirium have an increased risk of extended hospital stays, increased risks of falls or inadvertent equipment/tube removal, and increased requirement of institutionalization after hospitalization due to decreased functional status. Additionally, there is an increased financial burden on those with delirium. Each study observed different outcomes to determine how the multicomponent intervention would have an impact.

Delirium Incidence.

The most common outcome measured in these studies was the incidence of delirium in patients, defined as a patient having a positive CAM score at some point in their stay. Fourteen of the sixteen studies reviewed observed the impact their interventions had on the development/incidence of delirium. (Hshieh et al., 2015; Inouye et al., 1999; Ogawa et al., 2019; Reppas-Rindlisbacher et al., 2021; Rohatgi et al., 2019; Andro et al., 2011; Zaubler et al., 2013; Choi et al., 2019; Thomas et al., 2014; Jeffs et al., 2013; Brown et al., 2018; Martinez et al., 2021; Burton et al., 2021). Having incidence as an outcome measure is essential because other outcome measures (length of stay, cost, falls, etc.) are dependent on knowing if patients experiencing the various outcomes are delirious or not.

Length of stay.

Hospital length of stay was an expected outcome measured in seven of the sixteen studies. This measurement is crucial as the length of hospital stay is directly related to the total cost of hospitalization. This outcome directly benefits the healthcare system by decreasing the financial burden on hospitals, insurance, and patients and decreasing the physical, mental, and emotional toll on staff members. The majority of the studies supported using multicomponent interventions to reduce the length of stay (Babine et al., 2018; Hshieh et al., 2015; Avendaño-Céspedes et al., 2016; Rohatgi et al., 2019; Zaubler et al., 2013; Brown et al., 2018). The other

three studies did not find a statistically significant change in length of stay related to the interventions performed.

Purpose and Specific Aims

The purpose of this quality improvement project was to improve nursing knowledge of delirium, and to increase implementation and documentation of the Confusion Assessment Method tool. The specific aim was to increase CAM documentation to KMH's policy requirements, which requires documentation upon admission and daily throughout admission. Additionally, this study aimed to decrease restraint utilization, decrease length of stay, and decrease incidence of falls.

Theoretical Framework

Background of Conceptual Model

Quality improvement (QI) projects utilize theoretical frameworks and practice models to ground theory research. Rosswurm and Larrabee's model for change to evidence-based practice (1999) is used in this project. This practice model focuses on guiding institutions from a traditional, intuition-based approach to evidence-based, best practice. The model outlines six steps to taking the practitioner throughout the transition toward evidence-based practice, including maintaining the positive practice change. These steps and their relevance to this project are listed below (see Appendix B).

Step 1: Assess the Need for Change in Practice

The primary step in this practice model involves discovering the need for change. The first step includes conversations with project stakeholders regarding the lack of delirium prevention and management tools. An assessment was performed regarding the nurse's knowledge of risk factors for delirium, delirium prevention strategies, and how to utilize the CAM assessment tool accurately. The staff was honest regarding their uncertainty about

performing the CAM assessment and which nursing-led interventions to perform for prevention.

Finally, the decision was made to tackle delirium prevention at KMH.

Step 2: Link Problem with Interventions and Outcomes

This step involves linking the problem from step one to an intervenable nursing

classification. According to the American Psychiatric Association (2013), delirium has a DSM-5

classification (see Table 2), an International Statistical Classification of Diseases (ICD-10) of

J05, and CPT code for "acute delirium (also documented as an acute confusional state)" of 293.0.

The selection of interventions based on education and utilization of the CAM score for

documentation was based on the practitioner's project site preference and clinical judgment.

Step 3: Synthesize the Best Evidence

Literature was synthesized from multiple databases. Search keywords included

"inpatients or hospitalization or hospitalized patient", "quality improvement", and "delirium or

acute confusion". These keywords were deemed relevant to delirium evaluation, management,

and prevention.

Step 4: Design and change in practice

The synthesized evidence supported the most significant change in delirium prevention

through education on screening for risk factors, identifying and altering modifiable risk factors

through multicomponent interventions, and assessing delirium status regularly with a highly

validated and reliable tool. Additionally, some evidence exists that a bedside reference could

help trigger nurses to perform interventions. A pilot test of selected nurses and stakeholders will

overlook educational material and documentation changes to improve positive feedback.

Additionally, QI measures of the incidence of delirium, nursing confidence with screening and

assessing, and length of stay will continue to be evaluated.

Step 5: Implementing and Assessing Change in Practice

The educational sessions occurred in the first two weeks of the eight-week QI project, including six "morning huddle" sessions. During this educational roll-out, information was provided evaluating for risk factors, assessing for delirium using the CAM tool, and identifying possible appropriate interventions for bedside nursing staff. Before the education, nurses were surveyed on their perceived confidence regarding delirium management and the CAM assessment tool, and their reported utilization of interventions to prevent delirium. Data was collected throughout eight weeks, and practice change was monitored for needed adaptations for usefulness to practice.

Step 6: Integrate and maintain the practice change

The final stage of this practice change model involved maintaining the longevity of the evidence-based practice change. This practice change model provided education about delirium to all hospital staff, educational sessions, and collaborating with clinicians on delirium education and support. Quality improvement measures continued to be measured. Feedback on assessment tools, reference guides, and comfort with prevention protocols were continuously collected to continue promoting best evidence-based practice for patients.

Methods

This quality improvement project consisted of six ten-minute educational sessions for nursing staff. These educational sessions focused on the various types of delirium and associated symptoms, modifiable and nonmodifiable risk factors, how to assess for delirium using the CAM tool, and education on nursing-led, multicomponent interventions used to decrease incidence of delirium. Sessions were divided over one week and were led by the principal investigator and unit educator. These educational huddles were divided between dayshift and nightshift to allow equal opportunity for all staff to participate. The educational material was then distributed via email to all staff, ensuring all staff received the information even if they were unable to attend an

in-person session. The educational material used for the educational intervention can be found in Appendix E.

Additionally, two reference guides were created. The first reference guide was a badge-reel reference tool that was distributed to all staff. This badge tool is double-sided with one side demonstrating the appropriate method of performing the CAM tool and the other side displaying nursing-led, nonpharmacological interventions to prevent delirium. The second reference tool was created and exhibited in each patient room as a reminder of those delirium prevention interventions, visible to all staff, patients, and patient visitors.

Participants

The target population for this quality improvement project was the nursing staff on the long-term, acute care unit. To be included in the intervention, the nurses had to be a registered nurse, be employed by the facility and work on the unit. All full-time and part-time registered nurses were included, regardless of the shift worked. Additionally, contract or agency nurses employed on the unit were included. Licensed practical nurses were excluded from the quality improvement project, as they are unable to perform assessments or document the CAM in the electronic medical record.

Data Collection

Data for this quality improvement project was collected via retrospective chart audits. Baseline data was collected for eight consecutive weeks prior to the educational intervention and compared to eight weeks of data collected post-intervention. The data collected and recorded from the EMR included: patient demographic information (age, sex, admission diagnosis), CAM charting completion on admission, daily CAM charting, restraint use, length of stay, and incidence of falls.

For security purposes, access to the electronic health record was granted by the facility's Clinical Information Technology department. The principal investigator was given a unique username and password to access patient's charts. Collected data was incorporated into a codebook created on Microsoft Excel by the principal investigator. Patient security and anonymity was maintained throughout this process as each patient was assigned a randomized six-digit ID. This untraceable patient information was stored in an encrypted file on a password-protected device.

Project Budget

There were costs associated with this scholarly project as no healthcare improvement project is budget neutral. The costs with this project included the cost of time spent researching, creating educational materials, and educating current staff. As this principal investigator is providing this service as part of her graduate project, there was not be a cost to the project site for these services. Other specific costs include the cost associated with creating educational materials, badge reference tools (see Appendix F) and reference guides for the patients' rooms (Appendix G), including paper, ink, and toner. Additionally, this quality improvement project is built on staff being able to chart their patient's CAM scores. The Confusion Assessment Method delirium tool is already incorporated into the facility's EMR, and therefore did not require the addition of new software or expenses. Finally, the educational sessions were integrated with mandatory staff huddles and did not result in overtime for participants.

Measures

This project's goal was to evaluate if education on delirium has an effect on policy adherence with CAM documentation (on admission and once daily), restraint usage, length of stay, and falls. The CAM documentation was collected directly from the electronic medical record and restraint utilization and falls data was provided by the facility's Quality Coordinator.

The EMR is considered an accurate measurement tool, however human error in charting and discrepancies must be considered.

The main tool utilized in this study is the Confusion Assessment Method. This tool's usefulness has been validated in several studies and was found to have a sensitivity of 94-100%, specificity of 90-95%, and high inter-rater reliability (Oh et al., 2017). Permissions for use of this tool was granted by the Hospital Elder Life Program (Appendix A).

Data Analysis

Demographic data of the project participants was collected and analyzed using descriptive statistics. Outcomes data including CAM documentation, restraint usage, length of stay, and falls incidence was collected for eight weeks prior to intervention, and eight weeks after intervention. An independent t-test was performed to determine if there was a significant difference between all outcome variables in the two outcome data sets. Data analysis was completed using the Statistical Package for the Social Sciences (SPSS), version 28.0.

Ethics

This quality improvement project was submitted to the Institutional Review Board at the University of Louisville and approved for non-human subject research. The project site does not have an independent review board for quality improvement projects. Permission for this project was approved by the Chief Operations Officer and unit educator.

Results

Nurse Demographics

The educational intervention was provided via in-person session and over email to all registered nurses working at the project site. All thirty-two registered nurses were included in either an in-person educational session plus informational email (56.3%, n=18) or received the educational information email (43.8%, n=14). Demographic information was collected including

nurses' age, sex, and years of nursing experience. Seventy eight percent of the registered nurses

on the unit are females (n=25), 67% are between 22-30 years old (n=21), and approximately 63%

have less than five years of nursing experience. Additionally, staff was identified as either

project site staff (56.3%, n=18) or contracted agency employees (43.8%, n=14). Finally, the

groups were divided by the intervention received with 56.3% of participants attending the in-

person session and receiving the educational information via email (n=18) and 43.8% receiving

only the educational email (n=14). Demographic data is further outlined in Table 3.

Patient Demographic

A total of 118 patient charts were reviewed during the course of this project. Patient

demographic information was collected pre- and post-intervention to determine if the two

populations were comparable. Independent t-test were utilized to determine comparability

between the two populations. The populations were found to be not significantly different in

regard to age, sex, and multiple of the admission diagnoses (respiratory failure, sepsis, wounds,

and "other" including GI complications, kidney injury and heart failure). The only statistically

significant difference between the pre-intervention (M=0.2745, SD=0.45071) and post-

intervention groups (M=0.0597, SD=0.23872) was the admission diagnosis of COVID; t(116)=

3.337, p=0.001). Complete demographic data for patient population is located in Table 4.

Outcome Variables

See Table 5 for complete outcomes data.

CAM Admission Documentation

Per policy, nursing staff is required to assess patient for delirium using the CAM

assessment tool upon admission to the facility. In the eight weeks preceding the intervention,

CAM documentation compliance was 60.8%, with 31 documented upon admission out of the 51

charts reviewed. In the eight weeks following the intervention, CAM admission documentation compliance was at 70.1%, with 47 documented out of the 67 charts reviewed. An independent t-test was conducted to compare pre-intervention and post-intervention CAM documentation on admission. There was not a significant difference in the CAM admission charting for pre-intervention (M=0.61, SD=0.493) and post-intervention (M= 0.70, SD= 0.461) conditions; t(116)= -1.061, p=0.291.

Daily CAM Documentation

Similar to the CAM documentation requirement upon admission, staff is expected to chart a CAM score at least once daily. An independent t-test was conducted to compare pre-intervention daily CAM assessments and post-intervention daily CAM assessments. There was a significant difference in the CAM daily charting for pre-intervention (M= 0.2490, SD=0.1795) and post-intervention (M=0.4559, SD= 0.2071), t(116)= -1.061, p= <0.001). Cohen's d was calculated to determine effect size of this statistically significant difference and demonstrated a large effect (d= -0.834 95% CI -1.212 to -0.452).

Length of Stay

An independent t-test was conducted to compare differences in patient length of stay prior to the intervention and post-intervention. This independent t-test demonstrated a significant difference in the pre-intervention length of stay (M=28.14, SD= 16.53) and the post-intervention length of stay (M=20.07, SD=13.81), and a moderate to large effect was found (d= 0.536 95% CI 0.164- 0.905).

Restraint Utilization

According to an independent t-test, there is not a significant difference between pre-intervention restraint utilization (M=0.0382, SD= 0.01298) and post-intervention restraint utilization (M=0.0317, SD= 0.1143).

Incidence of Falls

An independent t-test was performed to compare average number of falls per occupied bed days. This independent t-test did not demonstrate a significant difference in pre-intervention fall incidence (M=0.0055, SD=0.0154) and post-intervention fall incidence (M=0.0093, SD= 0.0299).

Missing Data

Two aspects of data were not able to be reported. First, patient comorbidity data was not included as it was not consistently charted in the electronic medical record. Additionally, information about reason for restraint utilization was not included, as this data is completed on paper charting and not available for review by this principal investigator.

Discussion

Interpretation

The purpose of this quality improvement project was to increase nursing knowledge, implementation, and documentation of the CAM tool. Patient data during the eight weeks prior to educational intervention was collected and compared to patient data in the eight weeks following intervention. According to facility policy, CAM is required to be documented upon admission and daily. The data collected demonstrated an improvement in both measures. Compliance with admission CAM documentation improved from 61% to 70%, and while this is not a statistically significant improvement, it is an improvement in compliance, nonetheless. Daily CAM documentation showed a statistically significant increase from 25% to 46% with

large effect. These improvements show understanding and retention of information shared during

the educational intervention.

Another goal of this quality improvement project was to improve patient outcomes by

decreasing length of stay, decreasing restraint utilization, and decreasing incidence of falls. The

only statistically significant improvement was in length of stay. There was also a decrease in

restraint utilization from 38% to 31%. Incidence of falls remained steady with seven total falls

during the pre-intervention period and seven during the post-intervention period. It is crucial to

note that correlation does not indicate causality with these results. Differences in population

acuity can affect these factors. To compensate for this potential factor, the demographic data

from the pre-intervention patient sample was compared to the post-intervention patient sample.

While the ages, sex, and distribution of many admission diagnoses stayed consistent, there was a

statistically significant decrease in COVID admissions in the post-intervention data.

Limitations

There were a few limitations in this quality improvement project. The project site was

isolated to one long-term, acute care unit at a suburban hospital. The sample size is limited by

the size of the facility, with a limited sample size (N=118). The intervention was provided in two

formats. For those who were able, an in-person education was provided. An email was then sent

to all staff, including those who attended the session, to ensure maximum saturation for staff. In-

person session attendance was tracked, however there was not a means to ensure the emails sent

to those who did not attend were reviewed.

Future Implications

Delirium development is not isolated to long-term, acute care facilities. Future projects

could evaluate the effects of the intervention on different populations, including home health

patients, nursing home residents, or patients admitted to the intensive care unit. Increasing

sample size and project duration could further validate data. Additionally, the education could be

expanded to all those who impact patient stay, including physical therapists, occupational

therapists, nursing assistants, and physicians. It would be interesting to evaluate if the nurses

who attended the in-person session (with the email reminder) were more likely to be compliant

with documentation requirements compared to nurses who only received the email

communication. Lastly, the utilization of the interventions to prevent delirium (hydrate,

mobilize, provide hearing/visual assistance, promote sleep hygiene, and prevent cognitive

impairment) was only assumed to have taken place, as there was not an area to document within

the existing electronic medical record. Adding this documentation of interventions into the

medical record would stand as a reminder to be vigilant about delirium prevention.

Conclusion

Hospitalized individuals are at an increased risk of developing delirium, especially those

with prolonged length of hospitalization, multiple comorbidities, or a history of cognitive

impairment. The consequences of developing delirium are an increased risk of mortality, adverse

medical events, restraint usage, and further increased length of stay. The literature supports early

identification of delirium through screening with the Confusion Assessment Method tool and the

use of multifactorial preventative strategies. Education for staff was provided on types of

delirium, risk factors for its development (modifiable and non-modifiable), assessment for

delirium, and tactics for prevention.

The quality improvement project implemented an evidence-based educational

intervention for nurses in a long-term, acute care facility. Patient outcomes were evaluated to

determine change between the two months prior to intervention and two months post-

intervention. Outcomes assessed were CAM documentation on admission, daily CAM

documentation, length of stay, restraint utilization, and incidence of falls. There was a

statistically significant improvement in daily CAM documentation (p= <0.01) and length of stay

(p=0.05). There was an improvement, though not statistically significant, in CAM documentation

on admission (p=0.291) and restraint utilization (p=0.774). Future projects could include

additional hospital units, increasing sample size, and increase study duration. Additionally,

education could be expanded to all members of patient's hospitalization including patients'

families, physical therapists, occupational therapists, nursing assistants, and physicians.

References

American Nurses Association. (2016). Delirium: Prevent, identify, treat. Retrieved March 30,

    2020, from https://www.nursingworld.org/practice-policy/work-environment/health-

    safety/delirium.

American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental*

    disorders (5th ed.). https://doi.org/10.1176/appi.books.9780890425596

Andro, M., Comps, E., Estivin, S., & Gentric, A. (2011). Prevention of delirium in demented

    hospitalized patients. *European Journal of Internal Medicine, 23*(2), 124-125.

    http://doi.org/10.1016/j.ejim.2011.05.011

Avendaño-Céspedes, A., García-Cantos, N., del Mar González-Teruel, M., Martínez-García, M,

    Villarreal-Bocanegra, E., Oliver-Carbonell, J. L., & Abizanda, P. (2016). Pilot study of

    preventative multicomponent nurse intervention to reduce the incidence and severity of

    delirium in hospitalized older adults: MID-Nurse-P. *Maturitas, 86*, 86-94.

    http://doi.org/10.1016/j.maturitas.2016.02.002

Babine, R., Hyrkäs, K. E., Hallen, S., Wieman, H. R., Bachand, D. A., Chapman, J. L., Fuller, V.

    J. (2018). Falls and delirium in an acute care setting: A retrospective chart review before

    and after an organization-wide interprofessional education. *Journal of Clinical Nursing,*

    27(7-8), e1429-e1441. http://doi.org/10.1111/jocn.14259

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*(106), 1-8.

    http://doi.org/10.1186/s12913-01802906-3

Burton, J. K., Craig, L. E., Yong, S, Q, Siddiqi, N, Teale, E. A., Woodhouse, R., Baraugh, A. J.,

    Shepherd, A. M., Brunton, A., Freeman, S., C., Sutton, A. J., & Quinn, T. J. (2021).

Nonpharmacological interventions for preventing delirium in hospitalised non-ICU

patients. Cochrane Database Systematic Reviews, 7(7), 1-189.

http://doi.org/10.1002/14651858.CD013307.pub2

Choi, J., Kim, K., Kang, M., Lee, Y., Koo, K., Oh, J., Park, Y., Suh, J., Kim, N., Yoo, H., Koo,

J., Moon, H., Kim, E., Park, K., & Kim, C. (2019). Impact of a delirium prevention

project among older patients who underwent orthopedic surgery: a retrospective cohort

study. BMC Geriatrics, 19(289), 1-9. http://doi.org/10.1186/s12877-019-1303-z

Cullen, E. & Balas, M. (2017). Delirium: monitoring and management in the acute care setting.

The Nurse Practitioner, 42(12), 37-42.

http://doi.org/10.1097/01.NPR.0000526764.53348.dl

Department of Health. (2015, October 5). *Delirium is a serious condition.* Department of Health.

https://www.health.vic.gov.au/patient-care/delirium-is-a-serious-condition

Fong, T. G., Tulebaev, S. R., Inouye, S. K. (2009). Delirium in elderly patients: diagnosis,

prevention, and management. *Nature Reviews Neurology, 5*(4), 210-220.

http://doi.org/10.1038/nrneurol.2009.24

Hshieh, T. T., Yue, J., Oh, E., Puelle, M., Dowal, S., Travison, T., & Inouye, S. K. (2015).

Effectiveness of multicomponent nonpharmacological delirium interventions: A meta-

analysis. JAMA Internal Medicine, 175(4), 512-520.

http://doi.org/10.1001/jamainternmed.2014.7779

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.

http://doi.org/10.1056/NEJM199903043400901

Inouye, S., van Dyck, C., Alessi, C., Balkin, S., Siegal, A. & Horwitz, R. (1990). Clarifying

confusion: The confusion assessment method. *Annals of Internal Medicine, 113*(12), 941-

948. http://doi.org/10.7326/0003-4819-113-12-941

Jeffs, K. J., Berlowitz, D. J., Grant, S., Lawlor, V., Graco, M., de Morton, N. A., Savige, J. A., &

Lim W. K. (2013) An enhanced exercise and cognitive programme does not appear to

reduce incident delirium in hospitalized patients: A randomized control trial. *BMJ Open,*

3(6). http://doi.org/10.1136/bmjopen-2013-002569

Martinez, F. T., Tobar, C., Beddings, C. I., Vallejo, G, & Fuentes, P. (2012). Preventing delirium

in an acute hospital using nonpharmacological intervention. *Age and Ageing, 41*, 629-

634. http://doi.org/10.1093/ageing/afs060

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 systemic prevention program for delirium:

the DELTA exploratory trial. *Supportive Care in Cancer 27*, 557-565.

http://doi.org/10.1007/s00520-018-4341-8

Oh, E. S., Fong, T. G., Hsheish, T. T. & Inouye, S. K. (2017). Delirium in older persons:

Advances in diagnosis and treatment. *JAMA, 318*(12), 1161-1174.

http://doi.org/10.1001/jama.2017.12067

Reppas-Rindlisbacher, C., Siddhpuria, S., Wong, E. K., Lee J. Y., Gabor, C., Curkovic, A.,

Khalili, Y., Mavrak, C., De Freitas, S., Eshak, K., Patterson, C. (2021). Implementation

of a multicomponent intervention sign to reduce delirium in orthopaedic inpatients

(MIND-ORIENT): a quality improvement project. BMJ Open Quality, 10(1)

http://doi.org/10.1136/bmjoq-2020-001186

Rogers, S. (2018, March 8). *Falls: The under-recognized risk of delirium* [Powerpoint

Slides]. Lake Superior Quality Innovation Network. https://www.lsqin.org/wp-

content/uploads/2018/02/Falls-and-Delirium-SRogers-03082018.pdf.

Rohatgi, N., Weng, Y., Bentley, J., Lansberg, M. G., Shepard, J., Mazur, D., Ahuja, N., &

Hopkins, J. (2019). Initiative for prevention and early identification of delirium in

medical-surgical units: Lessons learned in the past five years. *The American Journal of

Medicine, 132*, 1421-1430. http://doi.org/10.1016.j.amjmed.2019.05.035

Rosswurm, M. & Larrabee, J. H. (1999). A model for change to evidence-based practice. *Journal

of Nursing Scholarship, 31*(4), 317-322.

Siddiqui, N., House, A. O., & Holmes. J. D. Occurrence and outcome of delirium in medical

inpatients: a systemic literature review. *Age Ageing, 35*. 350-364.

http://doi.org/10.1093/ageing/afl005

Thomas, E., Smith, J. E., Forrester, D. A., Heider, G., Jadotte, Y. T., & Holly, C. (2014). The

effectiveness of nonpharmacological multicomponent interventions for the prevention of

delirium in non-intensive care unit older adult hospitalized patients: a systematic review.

JBI Database of Systematic Reviews and Implementation Reports, 12(4), 180-232.

http://doi.org/10.11124/jbisrir-2014-1446

Wand, A. P. F., Thoo, W., Sciuriaga, H., Ting, V., Baker, J., Hunt, G. E. (2014). A multifaceted

educational intervention to prevent delirium in older inpatients: A before and after study.

International Journal of Nursing Studies, 51, 974-982.

http://doi.org/10.1016/j.ijnurstu.2013.11.005

Zaubler, T. S., Murphy, K., Rizzuto, L., Santos, R., Skotzko, C., Giordano, J., Bustami, R.,

Inouye, S. K. (2013). Quality improvement and cost savings with multicomponent

delirium interventions: Replication of the hospital elder life program in a community

hospital. *The Academy of Psychosomatic Medicine, 54*, 219-226.

https://doi.org/10.1016/j.psym.2013.01.010

Table 1

Confusion Assessment Method (CAM) Algorithm

1. **Acute Onset**
Is there evidence of acute change in mental status from baseline?
2. **Inattention**
Did the patient have difficulty focusing attention (like being easily distractible or having difficulty keeping track of what was being said)?
3. **Disorganized thinking**
Was the patient's thinking disorganized or incoherent, such as a rambling or irrelevant conversation, unclear or illogical flow of ideas, or unpredictable switching from subject to subject?
4. **Altered level of consciousness**
What is the patient's level of consciousness (alert, hyperalert, stupor, coma)?
SCORING: A diagnosis of delirium by CAM requires the presence of features 1 and 2 and either 3 or 4.

Confusion Assessment Method Algorithm and Scoring Guide (s)

Table 2

DSM-5 Diagnostic Criteria for Delirium

A. A disturbance in attention and awareness
B. The disturbance develops over a short time, represents a change from baseline attention and awareness, and tends to fluctuate in severity during the day.
C. An additional disturbance in cognition (e.g., memory deficit, disorientation, language visuospatial ability, or perception)

D. The disturbances in Criteria A and C are not explained by another preexisting, established, or evolving neurocognitive disorder and do not occur in the contest of a severely reduced level of arousal.	
E. There is evidence from the history, physical examination, or laboratory findings that the disturbance is a direct physiological consequence of another medical condition, or exposure to a toxin, or is due to multiple etiologies.	

DSM-5 Criteria for delirium (American Psychiatric Association, 2013)

Table 3

Nurse Demographic Data

Demographic Variable	N (%)
Sex	
Female	25 (78.1%)
Male	8 (21.9%)
Age (years)	
20-25	9 (28.1%)
26-30	13 (40.6%)
31-35	6 (18.8%)
36+	4 (12.5%)
Nursing experience (years)	
0-5	21 (65.6%)
6-10	8 (25%)
10-15	2 (6.3%)
16+	1 (3.1%)
Level of employment	
Staff member	18 (56.3%)
Contract/agency employee	14 (43.8%)
Intervention	
In-person + educational email	18 (56.3%)
Educational email	14 (43.8%)

Note: Total sample size= 32

Table 4

Patient Demographic Data

Demographic Variable	Pre-Intervention N (%)	Post-Intervention (mean)	Significance Two-sided p value
Age (years)	58.84	57	0.537
Sex			
Male	31 (61%)	38 (57%)	0.660
Female	20 (39%)	29 (43%)	0.660
Admission Diagnosis			
Respiratory Failure	23 (45%)	35 (52%)	0.446
COVID	14 (27%)	4 (6%)	0.001
Wound	3 (6%)	5 (7%)	0.738
Endocarditis	3 (6%)	5 (7%)	0.738
Sepsis	7 (14%)	11 (16%)	0.690
Other	1 (2%)	7 (10%)	0.700

Note: Total charts reviewed = 118

Table 5

Outcomes Data

Outcomes Data	Pre-intervention		Post-intervention		t(116)	p	Cohen's d
	M	SD	M	SD			
CAM Admission	0.61	0.493	0.70	0.461	-1.061	0.291	0.197
Daily CAM	0.2940	0.1759	0.4559	0.2071	-4.486	<0.01	0.843
Length of Stay	28.14	16.532	20.07	13.813	2.884	0.05	0.536
Restraints	0.0382	0.1299	0.0317	0.1143	0.228	0.774	0.054
Falls	0.0055	0.0154	0.0093	0.0299	0.060	0.409	-0.154

CAM Documentation Compliance, Daily and on Admission
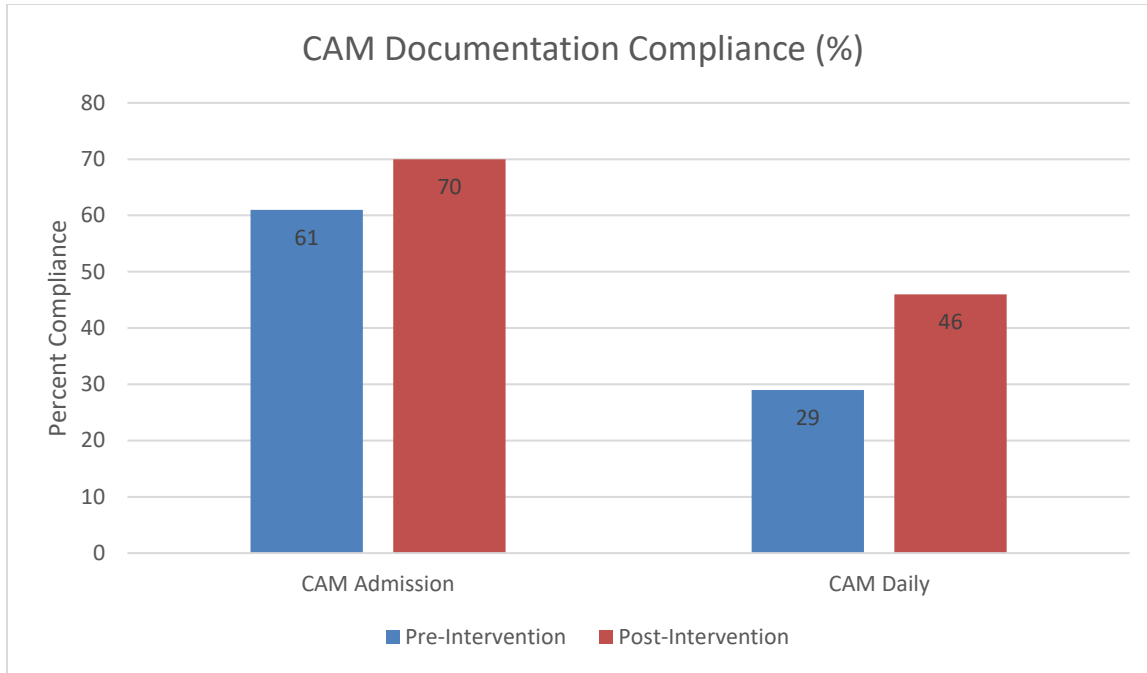
Average Length of Stay: Pre-Intervention and Post-Intervention Compared to Goal Length of Stay
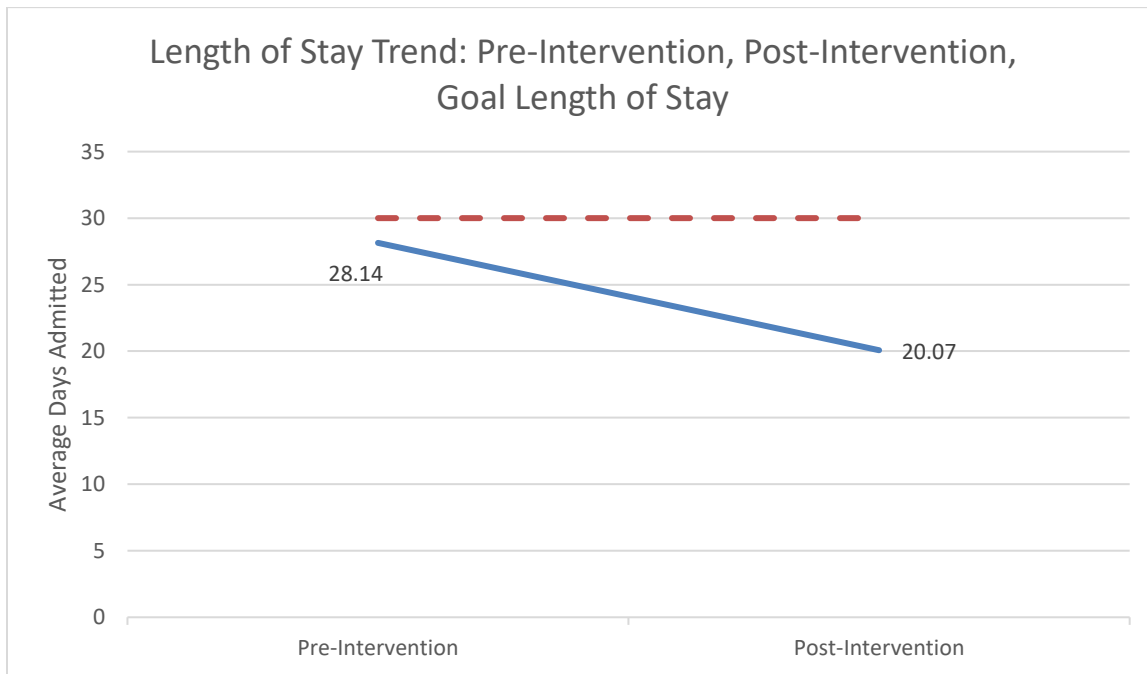
Note: The goal length of stay for all patient's admitted to KMH is 30 days.

Appendix A

CAM Permissions for Use

November 23, 2021

Dear Kelley James,

Thank you for requesting permission to utilize the Confusion Assessment Method (CAM) The Hospital Elder Life Program, LLC. Your request is to utilize the CAM for a "Multicomponent Approach to Delirium Prevention in the Acute Care Setting" project as part of your DNP program at Kindred Hospital at Jewish Hospital in Louisville, Kentucky. The purpose of this scholarly project is to institute a screening protocol for all patients for risk factors of delirium, increase compliance in assessing patients for delirium through education on the CAM assessment tool, and promote timely, nurse-driven, multicomponent interventions to prevent delirium in an acute care setting. The project will take place at Kindred Hospital At Jewish Hospital in Louisville, Kentucky. It is a long-term, acute care facility specializing in the rehabilitation of individuals suffering from traumatic brain injuries, respiratory diseases, post-trauma care, and recovery, and many more ailments. The address for the project site is Kindred Hospital Louisville at Jewish Hospital, 200 Abraham Flexner Way, Louisville Kentucky 40202.

Permission is granted for the above provided that:

1. Permission to use: CAM is limited to this quality improvement project. Rights do not apply to revised editions and is limited to this individual project for data collection purposes only during the time period of January 2022- May 2023. The CAM can be printed for purposes of this project only and cannot be altered or revised. Materials cannot be distributed for any other use.

2. Proper citation must be given to the Hospital Elder Life Program, LLC, including full acknowledgment of the source:
   Acknowledgement: "Confusion Assessment Method. Copyright 2003, Hospital Elder Life Program, LLC. Not to be reproduced without permission."
   Disclaimer: "No responsibility is assumed by the Hospital Elder Life Program, LLC for any injury and/or damage to persons or property arising out of the application of any of the content at help.agscocare.org."
   "Permission granted by Hospital Elder Life Program, LLC, 2021."

3. Upon completion, study results to be shared with the Hospital Elder Life Program, LLC via email to agingbraincenter@hsl.harvard.edu.

There is **no fee** for this request. If you have any questions please feel free to contact me at agingbraincenter@hsl.harvard.edu.

Thank you,
Nadya Shlykova

Nadezhda Shlykova, MPH
Study Coordinator II, Aging Brain Center
Hinda and Arthur Marcus Institute for Aging Research
Hebrew SeniorLife
1200 Centre Street
Boston, MA 02131

Appendix B

Rosswurm and Larrabee's Model for Change to Evidence-Based Practice

Assess the need for practice change

Link problem, interventions, and outcomes

Synthesize best evidence

Design practice change

Implement & Evaluate change in practice

Integrate & Maintain change in practice
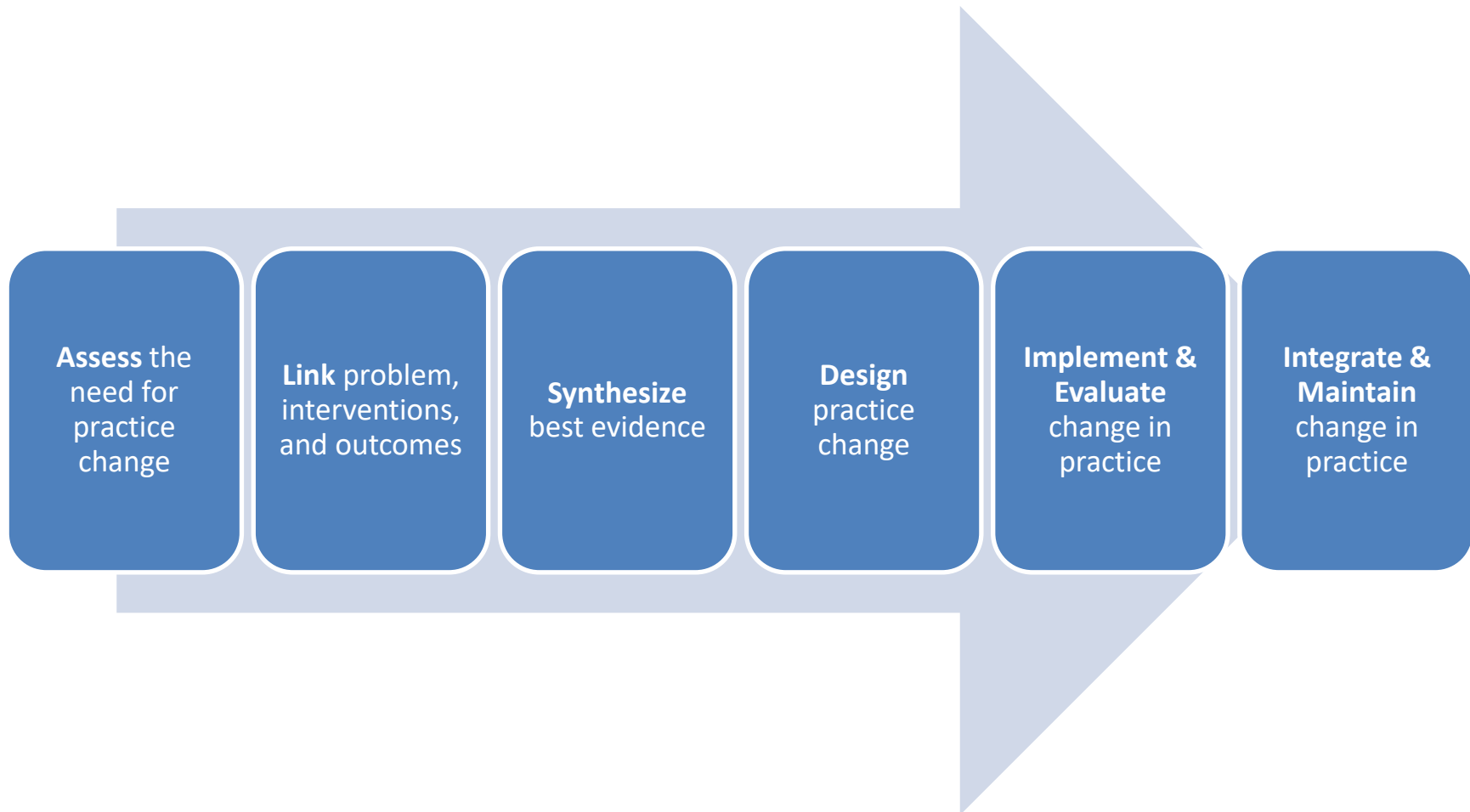
Appendix C

Logic Model

Program: Kindred at Jewish: at the end of the six-week quality improvement project, the incidence of delirium as measured by the Confusion Assessment Method will decrease by 10% after the implementation of a nurse-driven, multicomponent delirium prevention bundle.

Situation: Individuals admitted to Kindred frequently have already experienced long hospital stays prior to admission placing them at an increased risk of developing delirium. Delirium development increases likelihood of falls, self-extubation, and increased morbidity and mortality. Prevention is key, as there is no gold standard for treatment once delirium develops.

Inputs	Outputs		Outcomes- Impact		
	Activities	*Participation*	*Short*	*Medium*	*Long*
• Key personnel (educators/quality coordinator, DNP project committee, Dr. Beverly Williams-Coleman-committee chair, "nurse champions" myself) • Literature review (assessing various multicomponent intervention protocols and effects on delirium development) • Staff time • Assessment tools • Population of interest: nursing staff, Kindred patients and family caregivers, physicians	• Educational programs for bedside nurses and "nurse champions" • Quality improvement activities based on the PSDA cycle • EHR documentation • Laminated bedside resources • Brochure for family education	• University of Louisville DNP project committee • Partner organization: Kindred Hospital at Jewish • Computer Information Technology nurse specialist (EHR) • Kindred's Quality Coordinator	• Education modules delirium: definitions, types, modifiable and nonmodifiable risk factors, and potential interventions to prevent • Brochure for patient and family education on goals of interventions • Bedside reference • Needs assessment completed	• Lunch N' Learn session • Perceived competency/ confidence in delirium prevention and interventions improves • Facility embeds delirium prevention protocol into hospital admission • CAM scores assessed and documented in the EHR	• Policy change accepted by stakeholders • Impact: change in 30, 60, 90-day readmission rates • Decrease in hospital length of stay • Decrease in incidence of falls/self-extubations/restraint usage • Decrease in incidence of delirium

Assumptions: training and education in delirium prevention measures will increase compliance in prevention activities; patients and families will be actively involved in preventative care after education

External factors: staff retention rates; time constraints surrounding completion of multicomponent interventions; patients with alterations in mental status unable to participate in activities; family involvement (or lack thereof)

Appendix D

Matrix Legend

Identification

CINAHL
n= 52

PubMed
n= 53

Medline via
Ovid
N=7

Google Scholar
N=47

Inclusion criteria:
- English language
- Published within ten years
- Human subjects
- Adults

Screening

Records after duplicates removed
(n = 135)

Records screened
(n = 135)

Records excluded
(n =49)

Eligibility

Full-text articles assessed
for eligibility
(n = 86)

Full-text articles excluded, with
reasons
(n=74)
- Pharmacological interventions
- Feasibility
- Outpatient/home health
- Treatment, not prevention
- Emergency room
- Pediatrics

Included

Studies included in
quantitative synthesis
(meta-analysis)
(n =16)

Additional records identified
through other sources
(n = 4)

Appendix E

Education

DELIRIUM AND THE CONFUSION ASSESSMENT METHOD

Guide to identifying delirium in the acute care population &
steps to prevent delirium

OBJECTIVES

1. Define delirium and types of delirium: hypoactive, hyperactive, and mixed type delirium.

2. Describe symptoms observed with each type of delirium.

3. Identify the various modifiable and nonmodifiable risk factors leading to diagnosis of delirium.

4. Understand the components of the Confusion Assessment Method and its use for diagnosing delirium.

5. Recognize nursing-led, multicomponent interventions to decrease incidence delirium.

Can be misdiagnosed as:

"ICU psychosis"

"Sundowning"

"Dementia"

Involves:

Acute onset confusion/ altered mental status

Inattention

Trouble focusing

Disorientation

Distractibility

(Department of Health, 2015)

DELIRIUM

DSM-5 Diagnostic Criteria for delirium
• Disturbance of attention or awareness
• Disturbance occurs over a short period of time • Change from baseline attention/awareness • Fluctuates throughout day
• Additional disturbance in cognition, such as memory deficit, disorientation or perception changes
• Changes cannot be explained by another preexisting, established or evolving neurocognitive disorder & does not occur in the context of a severely reduced level of arousal (i.e., a comatose patient)
• There is physical evidence from history, physical exam, or lab findings that this disturbance is a consequence of another medical condition, or exposure to toxin, or is due to multiple etiologies

(American Psychiatric Association, 2013)

DELIRIUM VS DEMENTIA

Characteristics	Delirium	Dementia
Onset	Acute, sudden onset	Gradual
Duration	Temporary, reversible	Lasting, irreversible
Characteristics	Inability to focus on task	Difficulty with memory
Fluctuation	Significantly and frequently throughout the day	Memory and thinking skills remain consistent

*Patients with dementia are at an increased likelihood of developing delirium.

(Mayo Clinic, n.d.)

WHO IS AT RISK?

An average of 25% of all hospitalized patients will develop delirium.

In elderly patients, this likelihood increases to 56%.   Fong et al., 2009
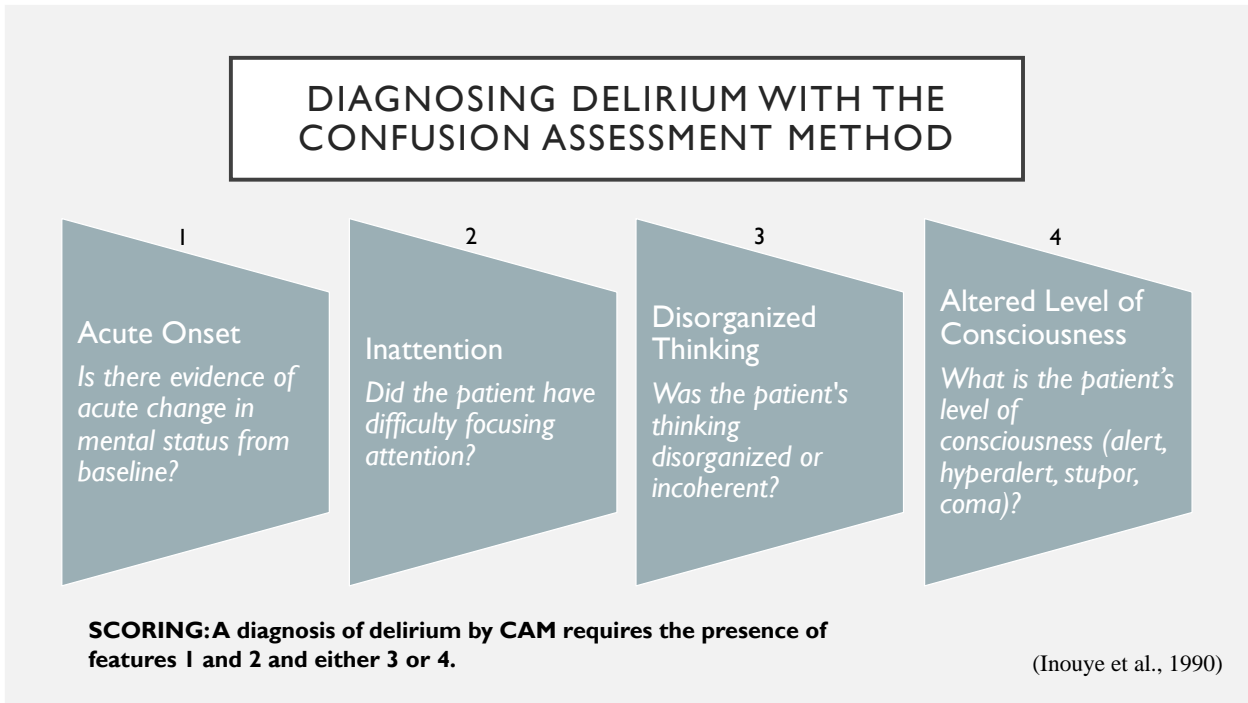
Nonmodifiable risk factors:
- History of delirium or dementia
- Elderly individuals
- Concurrent infections
- Prior institutionalization
- Hearing/vision impairment

Modifiable risk factors:
- Immobility
- Polypharmacy
- Sleep deprivation
- Length of stay
- Dehydration
- Hypoxia
- Inadequate pain control

(Cullen & Balas, 2017)

DIAGNOSING DELIRIUM WITH THE CONFUSION ASSESSMENT METHOD

1

Acute Onset

Is there evidence of acute change in mental status from baseline?

2

Inattention

Did the patient have difficulty focusing attention?

3

Disorganized Thinking

Was the patient's thinking disorganized or incoherent?

4

Altered Level of Consciousness

What is the patient's level of consciousness (alert, hyperalert, stupor, coma)?

SCORING: A diagnosis of delirium by CAM requires the presence of features 1 and 2 and either 3 or 4.

(Inouye et al., 1990)

PREVENTION IS KEY

Once a patient is diagnosed with delirium, there is not a "gold standard" of treatment; therefore, prevention is key.
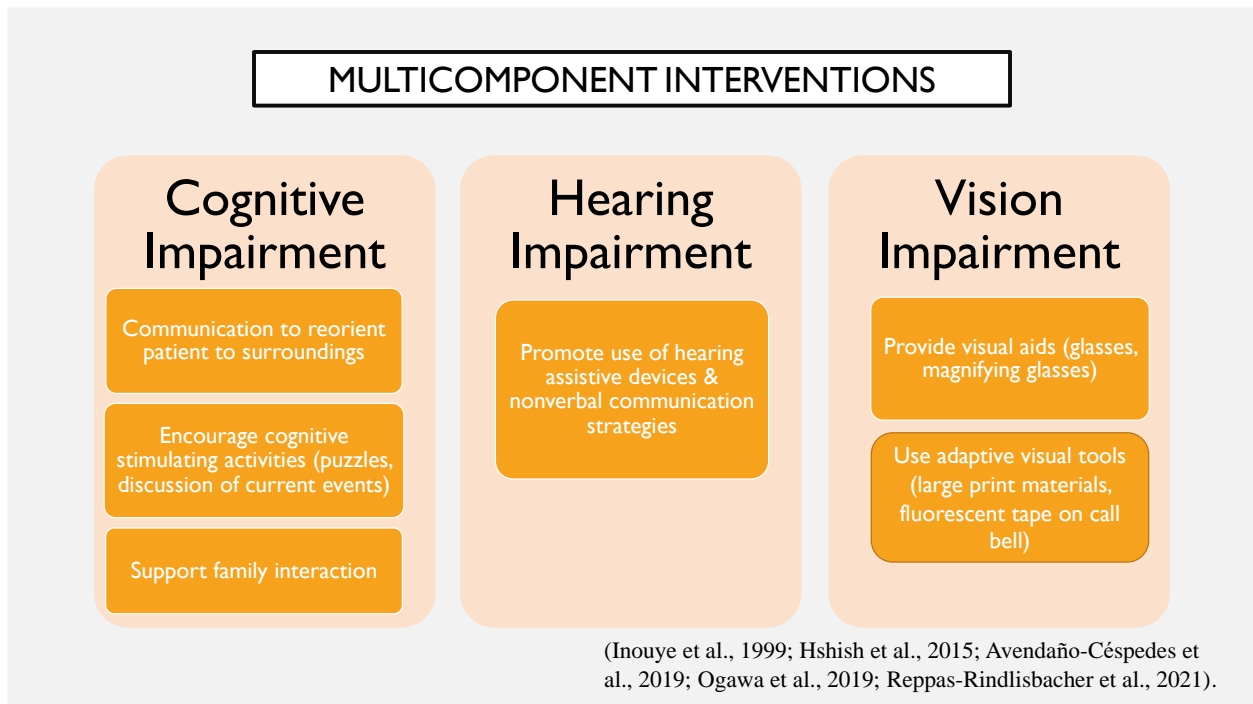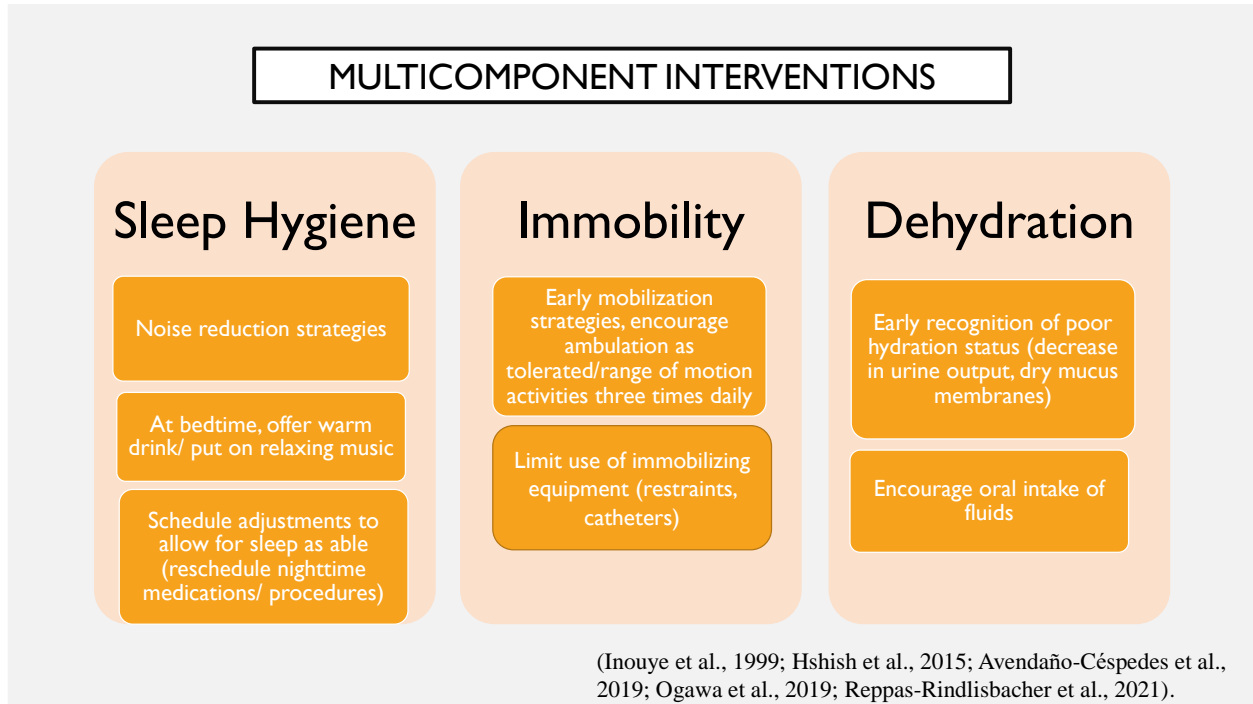
HOW?

Identify modifiable risk factors for delirium and eliminate/ amend as much as possible.

Six areas of improvement have been identified in research.

1. Sleep hygiene
2. Vision impairment
3. Hearing impairment
4. Immobility
5. Dehydration
6. Cognitive impairment

(Inouye et al., 1990)

MULTICOMPONENT INTERVENTIONS

Sleep Hygiene

- Noise reduction strategies
- At bedtime, offer warm drink/ put on relaxing music
- Schedule adjustments to allow for sleep as able (reschedule nighttime medications/ procedures)

Immobility

- Early mobilization strategies, encourage ambulation as tolerated/range of motion activities three times daily
- Limit use of immobilizing equipment (restraints, catheters)

Dehydration

- Early recognition of poor hydration status (decrease in urine output, dry mucus membranes)
- Encourage oral intake of fluids

(Inouye et al., 1999; Hshish et al., 2015; Avendaño-Céspedes et al., 2019; Ogawa et al., 2019; Reppas-Rindlisbacher et al., 2021).

MULTICOMPONENT INTERVENTIONS

Cognitive Impairment

- Communication to reorient patient to surroundings
- Encourage cognitive stimulating activities (puzzles, discussion of current events)
- Support family interaction

Hearing Impairment

- Promote use of hearing assistive devices & nonverbal communication strategies

Vision Impairment

- Provide visual aids (glasses, magnifying glasses)
- Use adaptive visual tools (large print materials, fluorescent tape on call bell)

(Inouye et al., 1999; Hshish et al., 2015; Avendaño-Céspedes et al., 2019; Ogawa et al., 2019; Reppas-Rindlisbacher et al., 2021).

MOVING FORWARD

✓ Assess for delirium every shift and with changes in mental status with the CAM assessment tool

✓ Begin intentional use of the strategies to prevent delirium incidence

✓ Provide education to family members and caregivers on how they can help prevent delirium for their loved ones

REFERENCES

American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). https://doi.org/10.1176/appi.books.9780890425596

Avendaño-Céspedes, A., García-Cantos, N., del Mar González-Teruel, M., Martínez-García, M, Villarreal-Bocanegra, E., Oliver-Carbonell, J. L., & Abizanda, P. (2016). Pilot study of preventative multicomponent nurse intervention to reduce the incidence and severity of delirium in hospitalized older adults: MID-Nurse-P. *Maturitas, 86*, 86-94. http://doi.org/10.1016/j.maturitas.2016.02.002

Cullen, E. & Balas, M. (2017). Delirium: monitoring and management in the acute care setting. *The Nurse Practitioner, 42*(12), 37-42. http://doi.org/10.1097/01.NPR.0000526764.53348.dl

Department of Health. (2015, October 5). *Delirium is a serious condition.* Department of Health. https://www.health.vic.gov.au/patient-care/delirium-is-a-serious-condition

Fong, T. G., Tulebaev, S. R., Inouye, S. K. (2009). Delirium in elderly patients: diagnosis, prevention, and management. *Nature Reviews Neurology, 5*(4), 210-220. http://doi.org/10.1038/nrneurol.2009.24

Hshieh, T. T., Yue, J., Oh, E., Puelle, M., Dowal, S., Travison, T., & Inouye, S. K. (2015). Effectiveness of multicomponent nonpharmacological delirium interventions: A meta-analysis. JAMA Internal Medicine, 175(4), 512-520. http://doi.org/10.1001/jamainternmed.2014.7779

REFERENCES

Inouye, S., van Dyck, C., Alessi, C., Balkin, S., Siegal, A. & Horwitz, R. (1990). Clarifying confusion: The confusion assessment method. *Annals of Internal Medicine, 113*(12), 941-948. http://doi.org/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. http://doi.org/10.1056/NEJM199903043400901
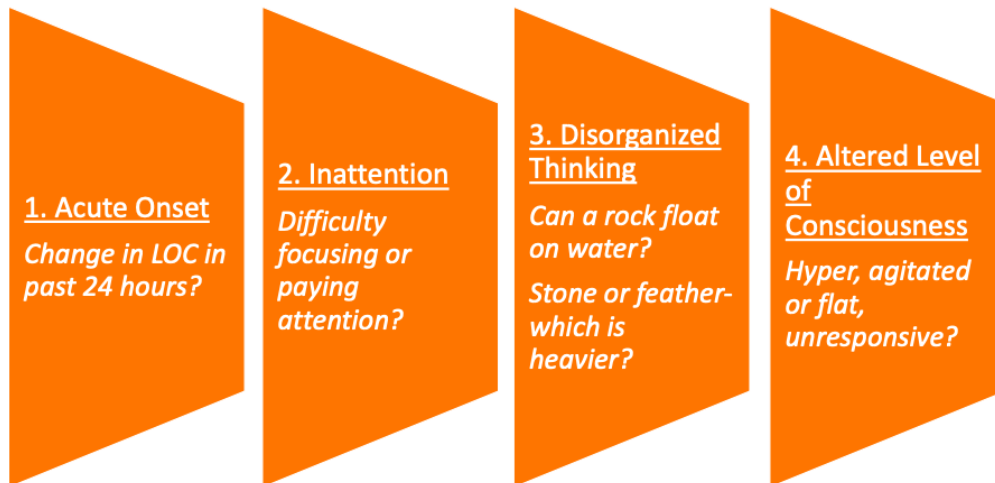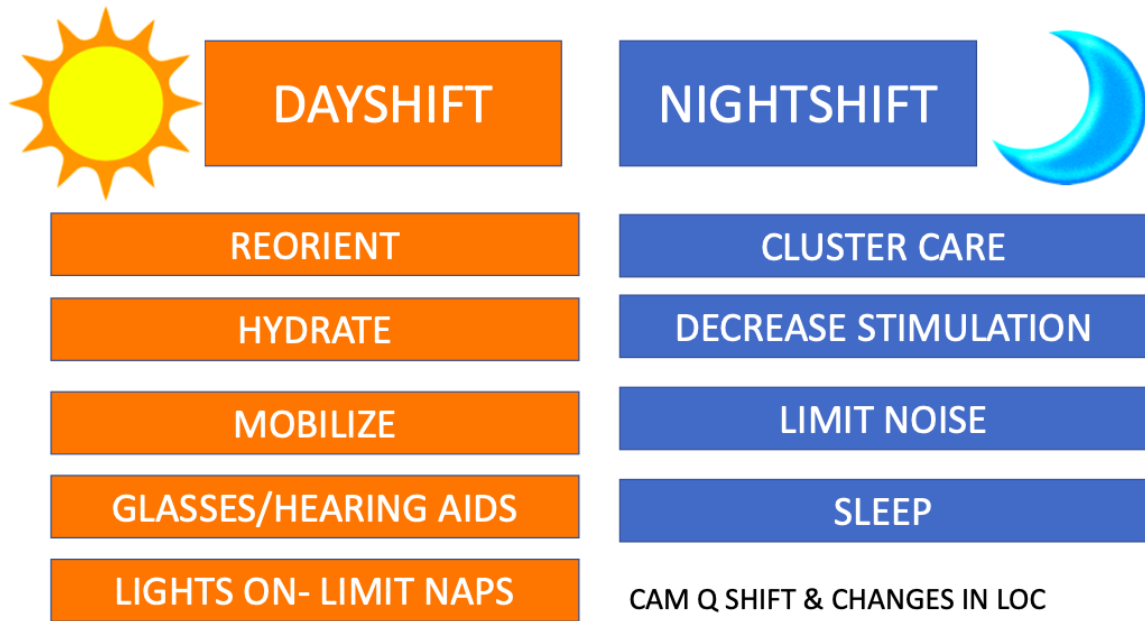
Mayo Clinic. (n.d.). *Delirium*. https://www.mayoclinic.org/diseases-conditions/delirium/symptoms-causes/syc-20371386

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 systemic prevention program for delirium: the DELTA exploratory trial. *Supportive Care in Cancer 27*, 557-565. http://doi.org/10.1007/s00520-018-4341-8

Reppas-Rindlisbacher, C., Siddhpuria, S., Wong, E. K., Lee J. Y., Gabor, C., Curkovic, A., Khalili, Y., Mavrak, C., De Freitas, S., Eshak, K., Patterson, C. (2021). Implementation of a multicomponent intervention sign to reduce delirium in orthopaedic inpatients (MIND-ORIENT): a quality improvement project. BMJ Open Quality, 10(1) http://doi.org/10.1136/bmjoq-2020-001186

Appendix F

Badge Reference Tool

DAYSHIFT

REORIENT

HYDRATE

MOBILIZE

GLASSES/HEARING AIDS

LIGHTS ON- LIMIT NAPS

NIGHTSHIFT

CLUSTER CARE

DECREASE STIMULATION

LIMIT NOISE

SLEEP

CAM Q SHIFT & CHANGES IN LOC

1. Acute Onset

Change in LOC in past 24 hours?

2. Inattention

Difficulty focusing or paying attention?

3. Disorganized Thinking

Can a rock float on water?

Stone or feather- which is heavier?

4. Altered Level of Consciousness

Hyper, agitated or flat, unresponsive?

SCORING: A diagnosis of delirium by CAM requires the presence of features 1 and 2 and either 3 or 4.

Appendix G

Delirium Reference Tool