

Prevention and Early Detection of ICU Delirium

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Abstract

Delirium in the intensive care unit is a frequent complication occurring in critical care patients. It is associated with increased mortality, prolonged length of stay, increased disability, and increased healthcare costs. The Confusion Assessment Method for the Intensive Care Unit (CAM-ICU) is a validated screening tool used to assess patients for the presence of delirium. The use of the CAM-ICU screening tool is currently included in the required daily assessment and documentation; however, there is inconsistency in the use of this screening tool. This identified phenomenon leads to under detection, under reporting, and delayed treatment for patients suffering from ICU delirium. The purpose of this quality improvement project was to increase the utilization of the CAM-ICU screening tool and increase the detection of ICU delirium. Adequate education for nursing staff and collaboration between nurses and advanced practice providers were utilized to optimize ICU delirium screening and documentation of interventions.

Keywords: delirium, critical care, CAM-ICU, ICU delirium

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Section I. Introduction

Background

Delirium is an acute, transient, and often reversible disturbance of mental status with incidence rates as high as 70-87% among critical care patients (Zhang et al., 2021). Delirium is characterized by fluctuating inattention and acute changes in perception and cognition that cannot be attributed to preexisting neurocognitive dysfunction, such as dementia (Koftis et al., 2018). Complications for patients experiencing delirium include prolonged hospital stays, cognitive disability, and long-term impairment of physical and mental health (Awan et al., 2021). Currently, the Confusion Assessment Method for the Intensive Care Unit (CAM-ICU) and the Intensive Care Delirium Screening Checklist (ICDSC) are the two validated scales recommended by the American College of Critical Care Medicine to screen for delirium (Awan et al., 2021). The CAM-ICU diagnostic tool screens for delirium by assessing four features: acute onset mental status change or fluctuating mental status, inattention, altered level of consciousness, and disorganized thinking. There are specific instructions, or questions to ask when performing the CAM-ICU assessment to assess the four features (Awan et al., 2021).

Organizational Needs Statement

The hospital for the project is a tertiary care referral center located in Greenville, North Carolina and its mission is to improve the health and well-being of eastern North Carolina. To better serve the patients at this hospital, this project seeks to explore the occurrence of delirium in the intensive care unit (ICU) and determine how this affects patient outcomes. The Cardiac Intensive Care Unit (CICU) leadership team identified the need to improve delirium detection and treatment to improve patient outcomes, decrease the length of hospital stay, and decrease healthcare costs. The leadership team believes that although a validated screening tool

is available to nursing staff, delirium is being under-detected and underreported, leading to delayed treatment. The nursing leadership and medical director of the CICU believe that delirium should be a quality metric because many cases are preventable, and there is inconsistency in utilizing preventative measures.

Patients suffering from delirium are more likely to experience hospital-acquired conditions and increased readmission rates, both of which The Centers for Medicare and Medicaid Services (CMS) measures to evaluate a hospital's relative performance. Due to the adverse outcomes mentioned above, it is estimated that delirium costs the United States healthcare system up to 150 billion dollars per year (Awan et al., 2021). The Institute for Healthcare Improvement Triple Aim goals seek to improve the United States (US) healthcare system by focusing on improving the experience of care, improving the health of populations, and reducing healthcare costs (Berwick et al., 2008). Elements of The Triple Aim and Healthy People 2030 address the project's need. Increasing early detection and intervention for ICU delirium aligns with The Triple Aim objectives of improving the experience of care and reducing costs. According to Marra et al., the number of days a patient experiences ICU delirium is associated with time to death within one-year post ICU admission, indicating that delirium is a significant risk factor for mortality (2017). This demonstrates the importance for delirium prevention, detection, and prompt treatment to be a quality metric to improve patient outcomes, improve quality of care, and decrease the cost of healthcare in the US. The organization also has determined the need to strive to meet the goals of Healthy People 2030. One of the overarching goals described by Healthy People 2030 is to "attain healthy, thriving lives and well-being free of preventable disease, disability, injury, and premature death" (2020). Delirium is often

preventable and can lead to disability and premature death, which is why the CICU seeks to explore this project need.

Problem Statement

Patients in the Intensive Care Unit (ICU) are particularly vulnerable to delirium due to mechanical ventilation, sedative use, sleep disturbances, and immobility. Delirium is often unrecognized and underreported by nursing staff, leading to delayed treatment and poor patient outcomes. The project site champion identified a need to address delirium in their patient population to meet the goals and objectives of Healthy People 2030 and The Triple Aim.

Purpose Statement

This project evaluated the utilization of the CAM-ICU tool, explored ways to increase the detection of delirium, and aimed to improve the process of provider notification and patient treatment when delirium is detected. The nursing staff received education on the CAM-ICU detection tool to increase appropriate assessment technique and documentation. In addition to this, the CICU critical care team added delirium to their daily checklist to address during interdisciplinary rounds.

Section II. Evidence

Literature Review

A literature review was performed to assess the current recommendations for screening, prevention, and treatment of ICU delirium. To conduct the search, several databases were utilized including Cumulative Index of Nursing and Allied Health (CINAHL), Medline, Ovid, PubMed, and ProQuest, with search terms such as “ICU delirium screening”, “prevention of ICU delirium”, “interdisciplinary rounds”, and “ICU delirium guidelines”. For each combination of search terms, the inclusion criteria consisted of a publish date within five years, a full-text version available online, English language, and peer-reviewed literature. The number of results varied depending on the search terms used, with the average search yielding approximately 200 or more results. After skimming through the initial results, the remaining articles were narrowed down after reading the abstract if they were directly related to the project topic. Initially, the search consisted of all levels of evidence as the foundation of knowledge on the project topic grew. There were many articles with redundant information that met the search criteria. Once this was evaluated, the search was narrowed down to articles with level IV evidence or higher using Melnyk’s and Fineout-Overholt’s Levels of Evidence (2015). This strategy reduced the search results down significantly yielding 62 articles that met criteria out of 12 different searches. Many of the articles were redundant and therefore were excluded. The articles that remained were read in their entirety to determine which articles provided the information needed to support this project. One article that was included did not meet the 2017–2022 time-frame due to its relevance to this project. Out of the 62 articles, 12 articles were retained and the majority consisted of evidence level IV or above.

Current State of Knowledge

In 2018, The Society of Critical Care Medicine released the updated Pain, Agitation/sedation, Delirium, Immobility, and Sleep disruption guidelines. One recommendation included in these guidelines is that all ICU patients should be routinely screened for delirium using one of the two validated screening tools (Wassenaar et al., 2019). The two validated screening tools for delirium are the Confusion Assessment Method for the Intensive Care Unit (CAM-ICU) and the Intensive Care Delirium Screening Checklist (ICDSC). Two systematic reviews of the CAM-ICU screening tool indicate pooled sensitivities of 76-80% and pooled specificity of 96%. Despite this, the performance of delirium screening is dependent upon the user having undergone training on the use of the screening tool. Inadequacies in proper training and implementation have resulted in the improper use of screening tools in clinical practice with nearly 75% of patients undergoing ICU admission without an assessment by a validated screening tool (Sutt et al., 2021). In addition to routine delirium screening, the guidelines recommend using a nonpharmacological, multi-component set of interventions to reduce the modifiable risk factors for delirium. Suggested interventions include but are not limited to improving cognition, optimizing sleep, initiating early mobility, and providing sensory aids for vision and hearing (Devlin et al., 2018). Currently, the Society of Critical Care Medicine congress does not recommend the routine use of any pharmacologic agents for the prevention or treatment of delirium (Devlin et al., 2018).

Current Approaches to Solving Population Problem(s)

Delirium occurring in critical care patients occurs as a result of multiple factors. As a result, interventions aimed at preventing ICU delirium are multifactorial and vary from patient to patient. Current clinical practice guidelines recommend treatment strategies that include eliminating modifiable factors such as treatable diseases, uncontrolled pain, immobility, and

exposure to psychiatric medications (Barr & Pandharipande, 2013). According to Koftis et. al, the literature describe more than 25 factors that increase the risk of delirium significantly including advanced age, use of opioids, respiratory diseases, and metabolic acidosis. Additionally, the identified risk factors for ICU-delirium can be further divided into factors that predispose to delirium, and factors that accelerate delirium (2018). Due to the multifactorial nature of delirium management, many studies assess the utilization of bundle interventions. The Pain, Agitation, Delirium (PAD) bundle and the Assess, Prevent, and Manage Pain, **Both** Spontaneous Awakening Trials (SAT) and Spontaneous Breathing Trials (SBT), Choice of analgesia and sedation, **Delirium: Assess, Prevent, and Manage**, Early mobility and Exercise, and **Family engagement and empowerment (ABCDEF)** bundle have both been studied and have shown to be effective interventions (Negro et al., 2021).

Another intervention discussed in the literature for delirium prevention is early mobilization. Multiple studies have demonstrated that early mobilization programs are associated with a reduction in delirium prevalence and improved patient outcomes (Barr & Pandharipande, 2013). According to Mart et al., there is consistent evidence of improved patient outcomes when early-mobility is combined with light sedation and adequate pain control (2021). Furthermore, with the utilization of the ABCDEF bundle which includes early mobility, there is a decreased occurrence of delirium, mortality, and it is less likely patients will be discharged to a rehabilitation facility (Mart et al., 2021).

Evidence to Support the Intervention

After completing a comprehensive literature review and discussing goals with the project site champion, the decision was made to implement several interventions to address the project problem. As previously stated, the current practice guidelines support the use of delirium

screening with a validated tool on a regular basis. The project stakeholders have determined that despite current use of daily delirium screening with a validated tool, the target population continues to suffer from ICU delirium. According to a systematic review of implementation strategies for assessment, prevention, and detection of ICU delirium, programs with multi-component implementation strategies with a higher number of interventions have more potential to improve clinical outcomes (Trogrlić et al., 2015). This project utilized interventions that were multi-component and sought to address current gaps in practice. Awan et al. describe the most common reason patients are screened inappropriately, is the lack of understanding by the nursing staff which leads to missed screenings, or inappropriate responses (2021). Nurses on CICU were encouraged to voluntarily receive education on the steps of completing the CAM-ICU assessment, as well as the significance of managing this vulnerable patient population.

Not only does this project seek to educate the nursing staff on the CAM-ICU delirium screening tool, but it also seeks to change the communication between nursing staff and the providers regarding the results of the CAM-ICU assessment. Ideally, results of delirium assessments should be incorporated into interdisciplinary rounds and a discussion be held among healthcare team members. This discussion should include the screening results, current pain score, sedation scores, and identified risk factors. Then a customized treatment plan should be developed and documented in the patients plan of care (Barr & Pandharipande, 2013). According to Negro et al., one of the key components to the successful implementation of delirium care bundles is the use of interprofessional rounds that promote the coordination of care among team members (2021). Furthermore, the lack of consistent communication between team members and the lack of interdisciplinary rounds can negatively impact the implementation of delirium bundles (Negro et al., 2021). Based on these findings in the literature, the CICU incorporated the

ICU delirium into their daily rounding checklist with the goal of increasing awareness, detection, and management of delirium.

Evidence-Based Practice Framework

Plan-Do-Study-Act (PDSA) cycles were utilized to execute this project. The PDSA model was created by W. Edward Deming and was described in his work *Out of the Crisis* (1986). Edward Deming published the PDSA cycle after modifying earlier work completed by Andrew Shewhart in 1950 (Connelly, 2021). Originally, the PDSA model was used to educate about the scientific process in a simplified way and has since been adopted for use in healthcare as model for change (Connelly, 2021). The PDSA model of change is a cyclical process that is often utilized in healthcare for quality improvement. The first step of the PDSA cycle is the “planning” step where a goal or purpose will be identified and steps will be taken towards implementation. The next step is the “do” phase where implementation of the plan will occur. During the third step, outcomes are measured and evaluated to “study” the plan and identify areas of improvement. Lastly is the fourth step which is “act”. During the fourth step, the previous three steps will be combined and integrated to either change a process, adjust goals, or broaden the plan (The W. Edwards Deming Institute, 2022). According to Leis & Shojania, benefits of conducting PDSA cycles include an efficient use of data, the ability to recognize necessary changes needed, identifying beneficial interventions not yet utilized, and a reduction in resistance to change (2017). The PDSA process was utilized to guide implementation of this quality improvement.

The project plan was finalized with the project site partner and implementation began in August 2022 and concluded in December 2022. After one month of project implementation, the first PDSA cycle review was conducted and outcomes were evaluated for change. Based on these

findings, interventions were modified to achieve desired outcomes. Three PDSA cycles were completed during the implementation phase of the project.

Ethical Consideration & Protection of Human Subjects

The protection of human subjects must be a top priority when conducting a project involving individuals. This project consisted of nursing interventions, education, and a process change in how providers conduct daily rounds. All interventions included in this were equal to all of those in the target population. The project's target population included the staff nurses and providers caring for patients hospitalized in the CICU. They were not exposed to potential harm from this project. There is no evidence to suggest that anyone in the target population was taken advantage of during the implementation of this project.

To prepare for the formal approval process, the Collaborative Institutional Training Initiative (CITI) modules were completed, approval from the project site office of research and grants was granted, and the project plan was discussed with the project site champion. Additionally, the University Institutional Review Board/Quality Self Certification Review Process was completed. After careful evaluation by the organization and university review process, this project was deemed as quality improvement.

Section III. Project Design

Project Site and Population

This project took place in the CICU at a tertiary care center in eastern North Carolina. This unit is where the project leader is currently employed and serves as a facilitator for this project. The project leader has an established professional relationship with the CICU leadership team with mutually shared goals which serves as another facilitator for the project. The project leader has stakeholders support from the project champion and other members of the project team such as the CICU advanced practice providers.

Description of the Setting

The CICU is a 24-bed unit located in a 1,000+ bed tertiary referral center serving patients in 29 surrounding counties. The hospital provides care to patients that are covered by private insurance, Medicaid, Medicare, and the uninsured. The daily census for CICU often fluctuates and averages around 16-18 patients. The CICU accepts overflow patients from the Medical Intensive Care Unit, but primarily the population consists of patients with heart disease. The patient rooms are divided into “pods” that contain four patient rooms. There is a nurse’s station in each pod that is staffed by two nurses each shift and the nursing ratio is one nurse to two patients. Other team members working on CICU are nursing assistants, respiratory therapists, nurse practitioners, and physicians.

Description of the Population

The project population consists of the nurses and providers caring for patients admitted to CICU during the project time frame. There are currently 70 staff nurses employed on the CICU, nine who are currently on orientation as new hires. On each day, there are two attendings, three Advanced Practice Providers (APPs), and one critical care fellow. The APP group consists of six

Advanced Practice Registered Nurses (APRNs) and two Physicians Assistants. There are a total of eight intensivists that rotate weeks on the CICU, and seven critical care fellows that rotate through the unit as well.

Patients admitted to the CICU range from 18 to 90 plus years old (██████████, personal communication, August 2022). The most common diagnoses of this patient population are acute coronary syndrome, cardiac arrest, congestive heart failure exacerbation, and respiratory failure. The CICU accepts overflow patients from the Medical Intensive Care Unit with diagnoses of pulmonary embolism, gastrointestinal bleeding, pneumonia, and septic shock. Patients admitted to the CICU often require mechanical ventilation, vasopressor support, continuous renal replacement therapy (CRRT), and circulatory support such as intra-aortic balloon pumps and extracorporeal membrane oxygenation (ECMO).

Project Team

The project team consists of the project leader, the project site champion Nurse Manager of the CICU, the CICU medical director, CICU Acute Care Nurse Practitioner (ACNP), and university faculty member. The project lead and project site champion collaborated to determine the project's needs and possible strategies for implementation. The project leader used input from the project team and developed the project along with the support from the university faculty member. The university faculty member served as a guide to help direct the project leader during project development and continued to provide guidance during implementation. After gaining support from the project site champion, the project need was discussed with the project team to gain insight into the problem and to discuss feasibility of the proposed project plan. The CICU APRN recently graduated with a Master of Science in Nursing and completed a graduate

project on ICU-delirium. He served as the liaison for the CICU APRNs and communicated project strategies and observations during implementation.

Project Goals and Outcome Measures

The goals of this project was to increase the awareness of ICU-delirium on the CICU, increase the communication between nurses and the medical provider team, and to educate the nursing staff on the CAM-ICU delirium screening tool. The outcomes measures included documentation of the number of nurses who participate in education on ICU delirium and the CAM-ICU assessment tool. The utilization of the CAM-ICU assessment was tracked by reviewing the patient's chart to assess for completion, and documentation of positive screenings. The CICU daily rounding checklist utilization was tracked to assess the documentation of interventions provided for patients with a positive CAM-ICU screening. The last measurable outcome tracked was the number of patients who score positive for delirium using the CAM-ICU assessment tool.

Description of the Methods and Measurement

There were several tools utilized to quantify the project outcomes. An attendance record was maintained tracking each nurse that participated in the voluntary CAM-ICU assessment education (See Appendix A). Education included a review of the ICU delirium protocol to identify gaps in current practice with CICU nursing staff and providers (See Appendix B). Additionally, each week a review of the Electronic Health Record (EHR) was conducted and several data points were recorded for each patient which included documentation of the CAM-ICU assessment, positive and negative screening results, documentation of provider notification, and daily rounding progress note reviewed for the delirium care plan. A data collection flowsheet was created to track project outcomes (See Appendix C). In addition to the tools and educational

materials, this project utilized a PDSA cycle document to track the changes throughout implementation (See Appendix D).

Discussion of the Data Collection Process

Data collection occurred once weekly. This included a review of the electronic health record (EHR) by the project lead. Several data points were collected from the chart review of all patients admitted to the CICU including assessment of the CAM-ICU screening tool. If the screening result was positive, it was assessed if the nurse documented a note detailing which provider was notified of the positive screen result. After reviewing the CAM-ICU documentation, the patients CICU daily rounding note was reviewed for documentation of delirium screening and associated interventions. ICU delirium was added to the daily rounding checklist, and if a patient had a positive CAM-ICU score, providers were to document what interventions were being done in the note. Lastly, the patient's diagnosis list was reviewed to evaluate if an associated diagnosis was activated on the patient's problem list. No patient identifying information was included in the data collection process. Aside from the EHR review, there was an attendance form used to keep a record of all of the nurses who participated in the education on delirium and the CAM-ICU screening tool (See Appendix A).

Implementation Plan

The project implementation phase began the last week of August 2022. Education on ICU delirium and the CAM-ICU assessment was provided to staff nurses working on the unit during scheduled shifts, and during the huddle meetings which occur before each shift (See Appendix E and Appendix F). Education sessions were approximately five to ten minutes depending on the nurse's baseline knowledge and any questions asked. The education was offered throughout the duration of the project, or until all nurses on the unit had participated in the education on ICU

delirium and the CAM-ICU screening tool. All nurses, medical providers, and the CICU leadership team was notified of the project start time. Data collection started approximately one week after the education and occurred weekly for twelve weeks. Every four weeks a PDSA cycle review was conducted, and if needed, changes to the plan were made. Every two weeks the project lead provided updates to the project team regarding data collection and sought feedback and suggestions for the next PDSA cycle.

Timeline

The project began in August 2022 and concluded in December 2022. Data from the EHR were collected each week and reviewed for trends. A PDSA cycle occurred every four weeks. Project evaluation occurred between December 2022 and March 2023. Project findings will be disseminated on April 11, 2023. Please refer to Appendix G for further details regarding the project timeline.

Section IV. Results and Findings

Results

Data collection occurred over eleven weeks from September to December 2022. Data were collected by conducting a review of the electronic health record. A total of 232 charts were audited during the data collection process. Education on ICU delirium and the CAM-ICU screening tool was provided to 62 out of 70 (88.5%) of the staff nurses employed on CICU.

Voluntary educational sessions were provided to staff nurses individually, and in groups of two during normally scheduled shifts on the unit. The nursing staff was highly encouraged to participate, but it was not mandatory. The majority of education was provided during the first four weeks of project implementation, while a few sessions were offered during the second month of implementation in an attempt to offer sessions to all nurses. At the time of project implementation, there were 70 staff nurses employed on the unit, and 62 (88.5%) of them participated in the education provided by the project lead. The advanced practice providers participated in one group education session during their monthly council meeting. Five providers attended the session face-to-face, two providers attended via telephone speaker, and one provider was unable to attend and was sent implementation documents via email.

Compliance of the CAM-ICU screening tool was 93.9%, with 218 CAM-ICU assessments completed and documented out of the 232 charts reviewed. Of the 218 completed CAM-ICU screening assessments, 25 (11.5%) yielded a positive screening result, and the remaining 192 (88.1%) yielded a negative screening result. Nurses were asked to notify the patient's provider of positive screening results during the education sessions. Of the 25 positive results detected, 24 (92%) had documentation of which provider was informed (See Appendix H). Compliance rates were tracked on a weekly basis to assess for trends in the data. Most weeks

the compliance rate was similar, however, week seven the compliance was lower than average at 83.3%. Week eight data collection was already occurring when the project lead noticed the decrease in compliance. Week eight compliance increased to 92.3%, and there were no identifiable causes for the decrease in compliance of week seven. No interventions were done between the two weeks of implementation and data collection (See Appendix I).

To assess the documentation of delirium in the daily rounding note, the same 232 charts were reviewed. Out of the 232 charts reviewed, ICU delirium was addressed during daily rounds in all 232 charts with 100% compliance (See Appendix H). For the 25 positive screenings, the interventions implemented were documented for all 25 patients (100%).

Discussion of Major Findings

The main two goals of this project were to increase the detection of ICU delirium by utilizing the CAM-ICU screening tool and to encourage an interdisciplinary approach to addressing ICU delirium. Most nurses on the unit (88.5%) received the education provided on delirium and the CAM-ICU screening tool. This education included the correct use of the screening tool and the importance of accurately screening all eligible patients. Some barriers that prevented all of the nurses from receiving the education included scheduling conflicts, nurses being out of work on leave, and education was only provided by one individual, the project leader.

The goal of encouraging an interdisciplinary approach to addressing ICU delirium was met with 100% compliance with the intervention. The ICU daily rounding note was reviewed on all 232 charts audited, and each note included ICU delirium and the patient's most recent CAM-ICU score. Furthermore, if patients had a positive screening result, interventions were documented in the plan of care to address the presence of ICU delirium. Nurses, advanced

practice providers, physicians, pharmacists, and respiratory therapists all participated in daily rounds.

The overall CAM-ICU screening tool utilization compliance was 93.9%. The literature supports the use of a validated screening tool such as the CAM-ICU to assess for the presence of ICU delirium. The literature also supports proper training and education for those administering the screening tool to ensure appropriate utilization (Awan et. al, 2021). The literature also recommends that an interdisciplinary approach be taken in managing ICU delirium, and the key findings from this project align with those recommendations (Zhang, 2018).

Section V. Interpretation and Implications

Costs and Resource Management

The benefit of implementing this project outweighs the minimal associated costs. This project was implemented by the project lead, who spent time planning, implementing, and evaluating project outcomes. Approximately 180 hours were spent on nursing education, data collection, and stakeholder collaboration during the implementation phase of this project. If a registered nurse at this institution were to devote their time and be compensated with their hourly wage of \$30 an hour, it would cost approximately 5,500 dollars. However, this project could be led by somebody in nursing leadership or the quality improvement team, which would not cost the institution any extra. Additionally, recruiting unit “champions” to implement the project can significantly reduce the costs. Champions are staff members who volunteer their time and expertise to be leaders and stakeholders, who may participate in quality improvement project for professional development. There were no costs associated with the educational materials because they were shared digitally. However, paper and ink costs would need to be considered if paper copies were distributed. The interventions utilized came at no additional cost or time constraint to the staff members who participated in this project. Educational sessions were conducted during normal working hours, and the CAM-ICU assessment takes about two minutes to perform and should be considered as part of the expected daily workflow. However, if educational sessions were to be conducted outside of normal business hours, it would take about one hour to educate and train each nurse. With the average registered nurse salary of \$30/hr it would cost approximately 1,860 dollars to provide training for the 62 nurses that participated (See Appendix J). The CAM-ICU assessment and ICU daily rounding checklist were already part of the established workflow of the staff and did not distract from expected roles and responsibilities.

The costs associated with project implementation are nominal when considering the additional costs associated with ICU delirium (See Appendix J). The BRAIN-ICU study demonstrated that the patient-level 30-day cumulative costs that were attributable to higher resource utilization associated with ICU delirium was estimated at \$17,838. When broken down by each day, patients with ICU delirium could cost the healthcare system approximately \$600 daily. The study also suggested that the costs would have likely been higher if it wasn't for the high mortality rate associated with ICU delirium (Stollings et al., 2020).

Implications of the Findings

This project has multifaceted implications for patients, nursing practice, and the healthcare system.

Implications for Patients

This project impacts patients in many ways, including improving their experience as a consumer of healthcare, improving their health and well-being, and decreasing the financial burden of hospitalization. Routine screening for ICU delirium with a validated screening tool increases the detection of delirium, facilitating opportunities for interventions and treatment. Using the CAM-ICU screening tool also aligns with current best practices according to the literature (Wassenaar et al., 2019). Using best practice guidelines can encourage patients and their families by knowing that they are receiving care with their best interest at the forefront, as well as increase patient satisfaction. When ICU delirium is detected, family members are able to play a pivotal role by becoming involved in the care plan and helping with interventions to combat delirium. Early detection of delirium can also decrease the length of stay and prevent nosocomial infections and other adverse events.

Implications for Nursing Practice

This project highlighted the need for nursing engagement and buy-in for successful implementation. Nursing practice will be aligned with current best practice recommendations, emphasizing interdisciplinary collaboration and communication. This project highlighted the partnership between the nursing staff and the advanced practice providers. By involving the advanced practice providers, the issue of addressing ICU delirium was no longer solely the responsibility of the nursing staff. The nurses should recognize the importance of ICU delirium screening and early intervention. By including ICU delirium in the daily rounding checklist, it will now be an expectation to discuss the screening tool results with the advanced practice providers, physicians, pharmacists, and other team members. By involving all members of the care team, multifactorial solutions can be offered. Once utilization of the validated screening tool is optimized, there are further implications for nursing practice such as implementing a best practice bundle to prevent ICU delirium.

Impact for Healthcare System(s)

This project can help healthcare systems improve by decreasing healthcare costs and improving patient outcomes. By improving patient outcomes and reducing healthcare costs, this project helps meet the objectives of The Triple Aim and Healthy People 2030. The healthcare system has an obligation to control costs and improve patient outcomes by reducing length of stay, preventing nosocomial infections, and by improving the experience of patients and families. Due to the adverse outcomes associated with ICU delirium, it is estimated that delirium costs the United States healthcare system up to 150 billion dollars per year (Awan et al., 2021). Additionally, prevention and early detection of ICU delirium significantly reduces morbidity and mortality which further demonstrates the significance of utilizing a validated screening tool (Marra et al., 2017).

Sustainability

The project site plans to continue the project, requiring CAM-ICU assessment each shift. The topic of ICU delirium will remain on the daily ICU rounding checklist to be completed during interdisciplinary rounds to initiate conversation among the team members on presence of ICU delirium for their patients. At completion of the project, the nursing staff verbalized that the new process in assessing ICU delirium had been integrated into their daily workflow. There is currently no financial cost to continue the project at the site.

Dissemination Plan

This project was disseminated via an in-person presentation at East Carolina University on April 11, 2023. The presentation included an approximately 10-minute oral presentation of the project with an associated poster, followed by a question-and-answer session. The project paper was uploaded into the university's online repository on April 24, 2023, and is available for public access. After the formal presentation and upload of the paper to the university's online repository, the project will be presented at the project site for project stakeholders and nursing leadership which is scheduled to occur at the end of April, 2023. Additionally, the project lead plans to submit the abstract to the Journal of Critical Care Medicine and to the American Association of Critical Care Nurses in hopes to share this work.

Section VI. Conclusion

Limitations and Facilitators

The most significant limitation recognized during the implementation of this project was time restraints. It was challenging to find the opportunity to educate the staff nurses during their shifts. On more than one occasion, nurses were occupied with patient care while educational sessions were occurring, which prevented them from attending. If time allowed, the project lead would revisit that nurse later. However, the project leader had to move on to other project activities, such as data collection and stakeholder meetings. Another identified barrier during implementation was limited buy-in from the staff. Initially, the staff was reluctant to discuss an additional documentation requirement; however, with education and continued support from nursing leadership, buy-in improved. Another limitation was a limited target population. This project was implemented in a 24-bed intensive care unit. Study replication in a larger setting would be beneficial. Additionally, no data was tracked or collected prior to implementation, which could have been helpful in evaluating the overall impact. This project had many identifiable facilitators, with the primary facilitator being an established working relationship among the project lead, the project site champion, and the project stakeholders. The interdisciplinary rounds on the unit were well established with team collaboration, which allowed for the effective adoption of the new item on the ICU rounding checklist. The final identifiable facilitator was the close collaboration between the project lead and the DNP project faculty, who provided feedback, and guidance throughout project planning, implementation, and evaluation.

Recommendations for Others

Anyone attempting to replicate this project should gain the perspective and insight of the staff who will be involved. Staff engagement was one of the most significant barriers that ultimately became a facilitator for this project. To further strengthen this process, it would be beneficial to consider financial and other incentives for staff members to further increase their engagement in the process. Additionally, further education could be provided on the financial implications and long-term morbidity associated with ICU delirium to help the nursing staff understand the importance and significance of screening for delirium. Incentivizing the nursing staff would have likely further increased the staff's interest and buy-in. Furthermore, long-term tracking of patient outcomes would be beneficial to determine the long-term effectiveness of the intervention. Measurements such as length of hospital stay and readmission rates would add significance and guide future studies.

Recommendations Further Study

This project should only be implemented in an intensive care unit because the CAM-ICU is a specific screening tool for ICU patients. However, the concept of this project could be adapted and used with a different screening tool in a different care setting, such as the Colombia Suicide Severity Rating Scale in the emergency department. This project could be easily replicated in another intensive care unit in the same organization or another organization. In addition to replicating this project in another unit, the current project site could expand on this project by implementing a best practice bundle to prevent ICU delirium, using the items from this project as components of the bundle.

The literature has demonstrated that the ABCDEF bundle is an effective intervention in preventing and treating ICU delirium (Negro et al., 2021). The ABCDEF bundle incorporates pain control, spontaneous awakening trials, choice of analgesia and sedation, delirium

management, early mobility and exercise, and family engagement and empowerment.

Considering that the project site does not currently utilize a best practice bundle, this could be a valuable future project.

Final Thoughts

Delirium continues to be a significant problem for patients hospitalized in the intensive care unit. Prevention and early detection of ICU delirium are critical in decreasing healthcare costs and improving patient outcomes. This project addressed how nurses screen for delirium and how these findings are communicated to collaborating advanced practice providers and physicians. By adding ICU delirium to the ICU daily rounding checklist, delirium is discussed daily among the interdisciplinary care team in evaluating the patient plan of care. The implementation of this project was a success, and more importantly, the organization was challenged to look at how they are currently managing ICU delirium and how to improve patient outcomes.

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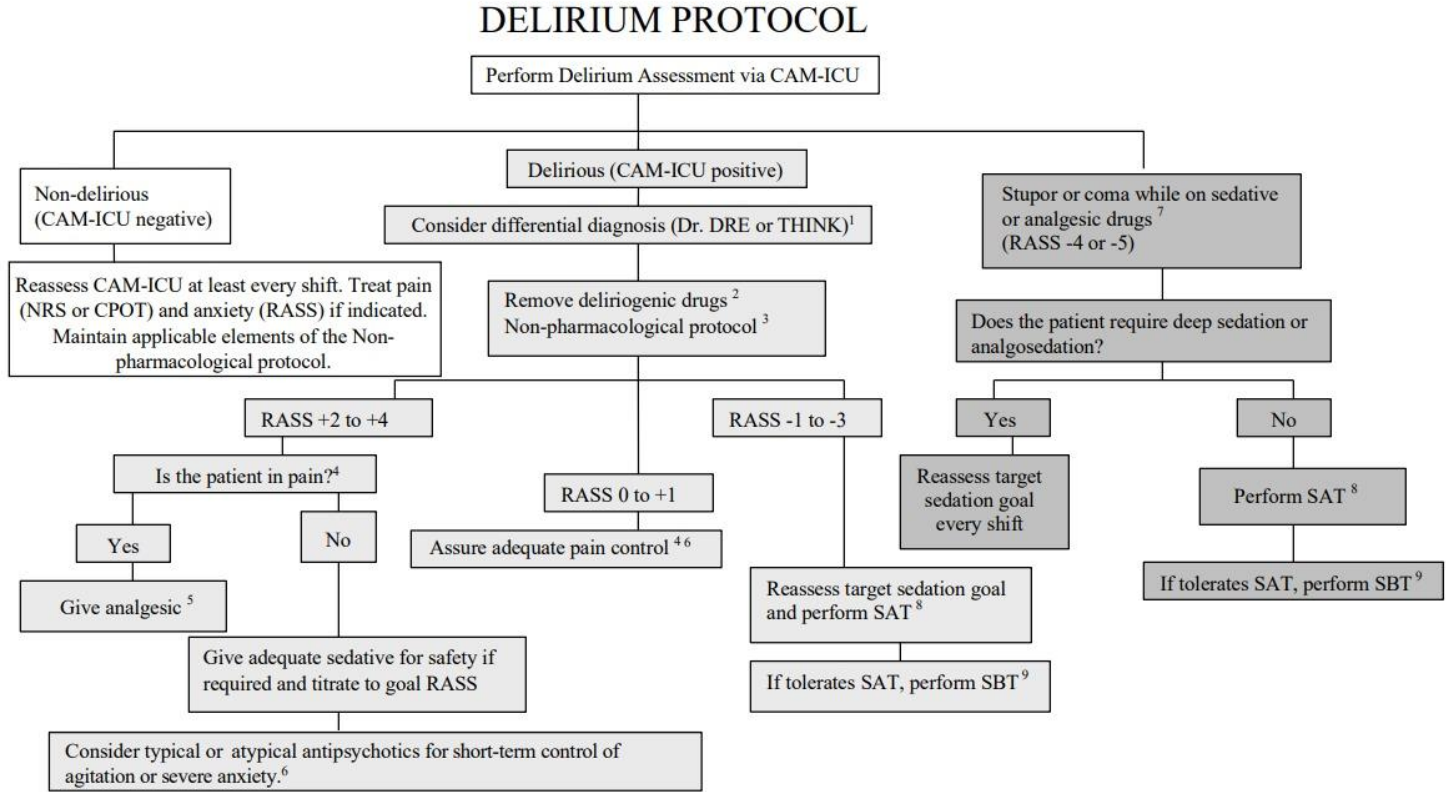
Appendix A
Education Attendance Record

ICU-Delirium Education Record

	Name	Date	Signature	Role
1				
2				
3				
4				
5				
6				
7				
8				
9				
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26				

Appendix B

ICU-Delirium Protocol via CAM-ICU



1. **Dr. DRE:**
 Diseases: Sepsis, CHF, COPD
 Drug Removal: SATs and stopping benzodiazepines/narcotics
 Environment: Immobilization, sleep and day/night orientation, hearing aids, eye glasses, noise
THINK:
 Toxic Situations - CHF, shock, dehydration - Deliriogenic meds (tight titration) - New organ failure (liver, kidney, etc)
 Hyponatremia:
 Infection/sepsis (nosocomial), Immobilization
 Nonpharmacological interventions³
 K⁺ or Electrolyte problems
2. Consider stopping or substituting deliriogenic medications such as benzodiazepines, anticholinergic medications (metoclopramide, H2 blockers, promethazine, diphenhydramine), steroids, etc.
3. See non pharmacological protocol - see below
4. If patient is non-verbal assess via CPOT or if patient is verbal assess via visual analog scale
5. Analgesia - Adequate pain control may decrease delirium. Consider opiates, non-steroidals, acetaminophen or gabapentin (neuropathic pain)
6. Typical or atypical antipsychotics. Short-term control of agitation (alcohol or drug withdrawal) or severe anxiety to avoid respiratory depression (CHF, COPD, asthma). Discontinue if high fever, QTc prolongation, or drug-induced rigidity.
7. Consider non-benzodiazepine sedation strategies (propofol or dexmedetomidine)
8. Spontaneous Awakening Trial (SAT) - If meets safety criteria (No active seizures, no alcohol withdrawal, no agitation, no paralytics, no myocardial ischemia, normal intracranial pressure, Fio2 ≥ 70%)
9. Spontaneous Breathing Trial (SBT) - If meets safety criteria (No agitation, No myocardial ischemia, FIO2 ≤ 50%, adequate inspiratory efforts, O2 saturation ≥ 88%, no vasopressor use, PEEP ≤ 7.5 cm)

Non-pharmacological protocol³

Orientation
 Provide visual and hearing aids
 Encourage communication and reorient patient repetitively. Have familiar objects from patient's home in the room
 Attempt consistency in nursing staff
 Family engagement and empowerment

Environment
 Sleep hygiene: Lights off at night, on during day.
 Control excess noise (staff, equipment), earplugs
 Early Mobilization/Rehabilitation and exercise
 Music
 Maintain O2 saturations >90%

Treat underlying metabolic derangements and infections
 ABCDEF Bundle

<http://www.icudelirium.org/medicalprofessionals.html>

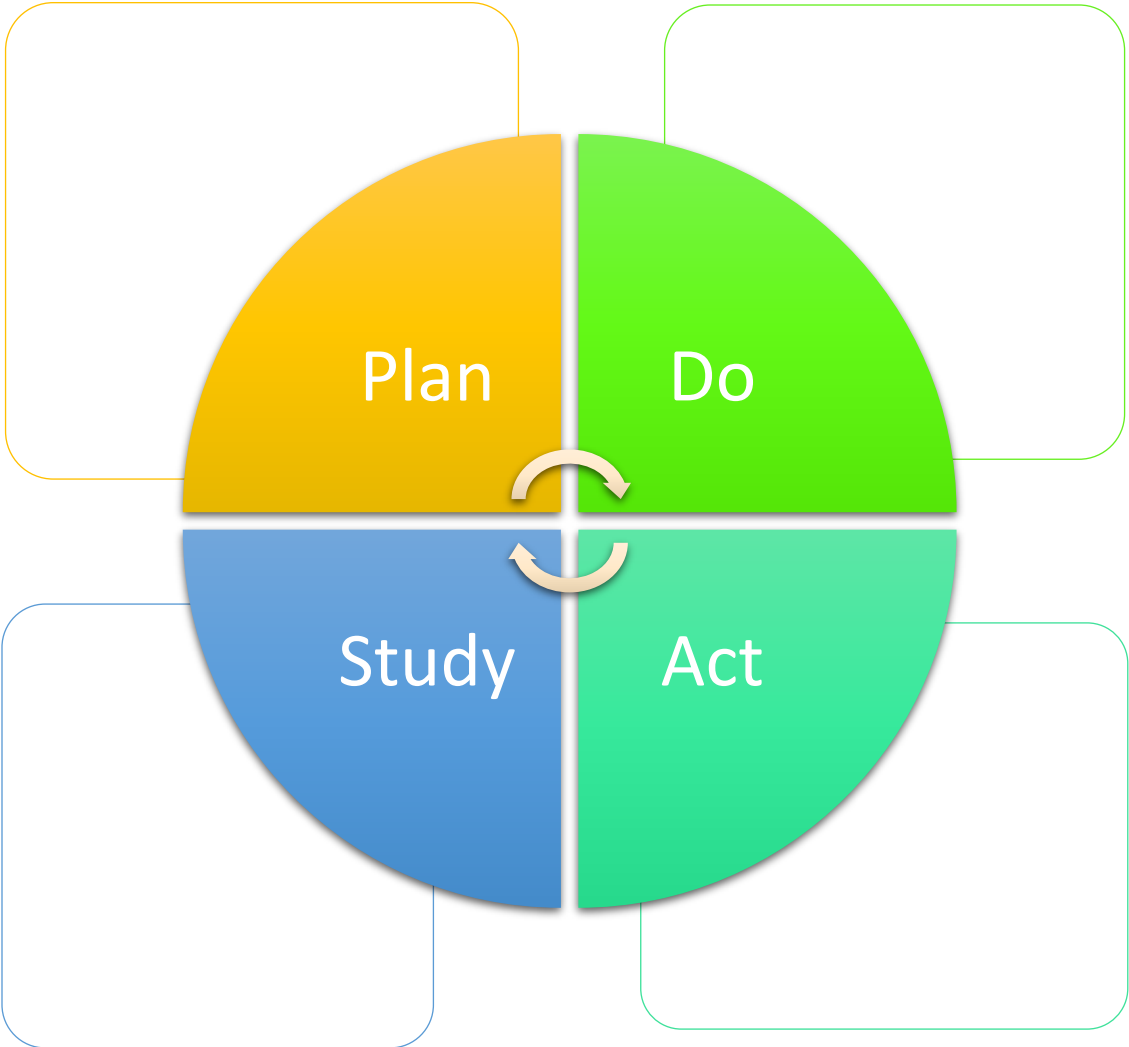
Appendix C Data Collection Flowsheet

The image shows a Microsoft Excel spreadsheet titled "Data Collection Flowsheet" in Appendix C. The spreadsheet is set up with the following columns:

- Column A:** Patient
- Column B:** CAM-ICU Assessment if no, why?
- Column C:** Provider Notified?
- Column D:** Delirium addressed in daily rounding note?
- Column E:** Interventions Documented?
- Column F:** Associated diagnosis in EHR
- Column G:** Data Collection Date

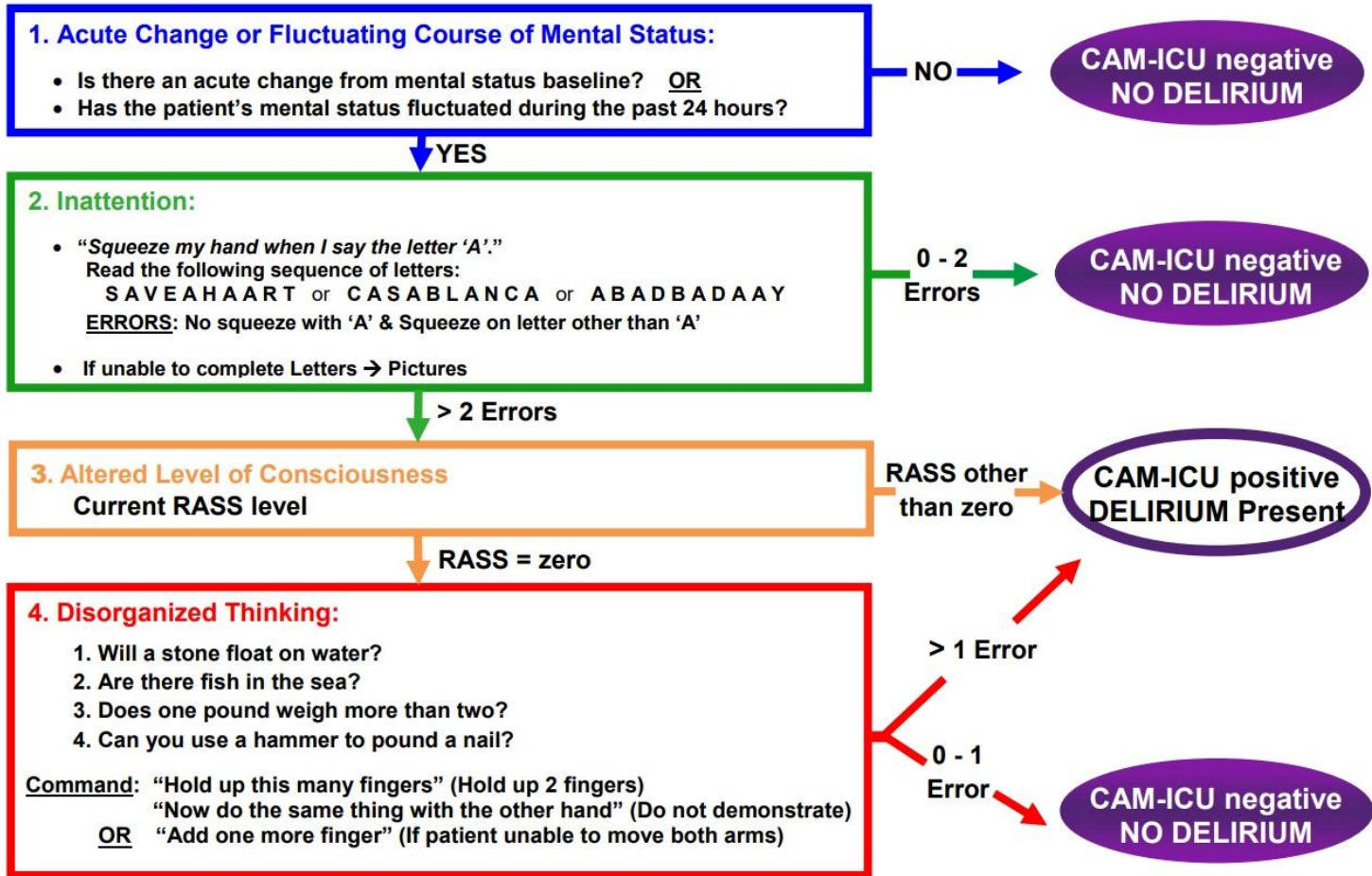
The spreadsheet is currently empty, with a green border around cell C5. The Excel ribbon is visible at the top, showing the Home tab with options for Clipboard, Font, Alignment, Number, Styles, Cells, Editing, and Analysis. The status bar at the bottom indicates "Ready" and "Accessibility: Good to go".

Appendix D
PDSA Cycle Worksheet



Appendix E
CAM-ICU Flowsheet

Confusion Assessment Method for the ICU (CAM-ICU) Flowsheet



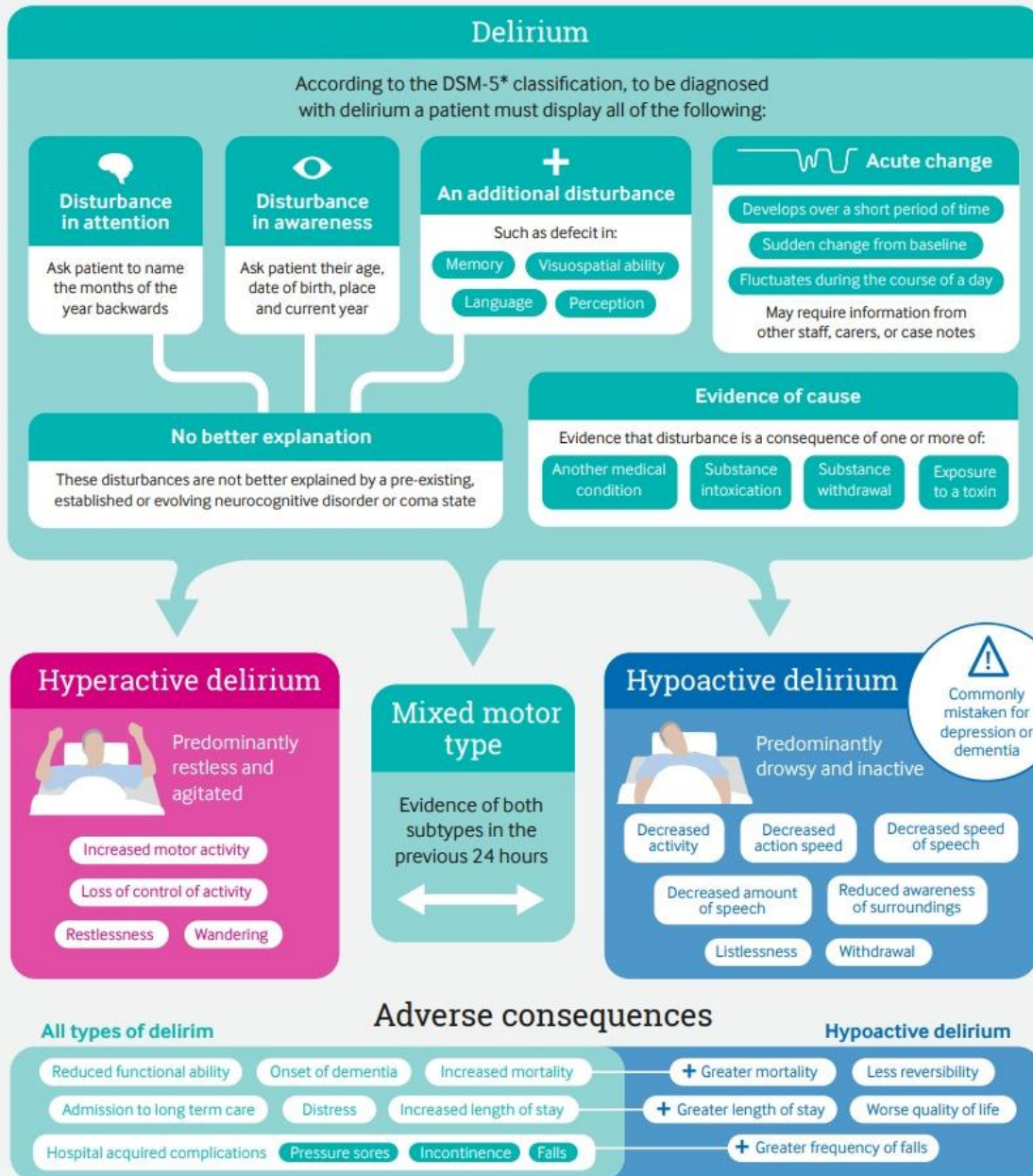
Appendix F

Delirium Education Visual

Visual summary

Quietly delirious

Hypoactive delirium can be more difficult to recognise than hyperactive delirium, and is associated with worse outcomes. This infographic summarises the main differences between the two forms of delirium.



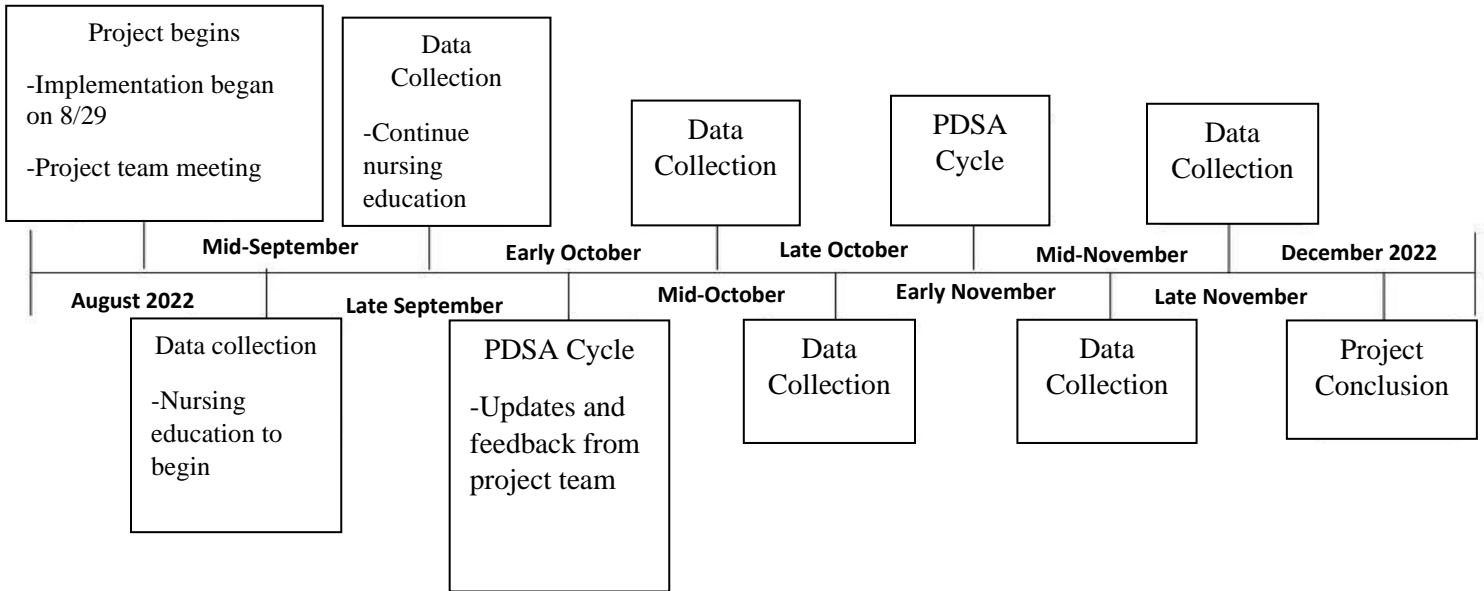
* DSM-5 = Diagnostic and Statistical Manual of Mental Disorders (fifth edition)

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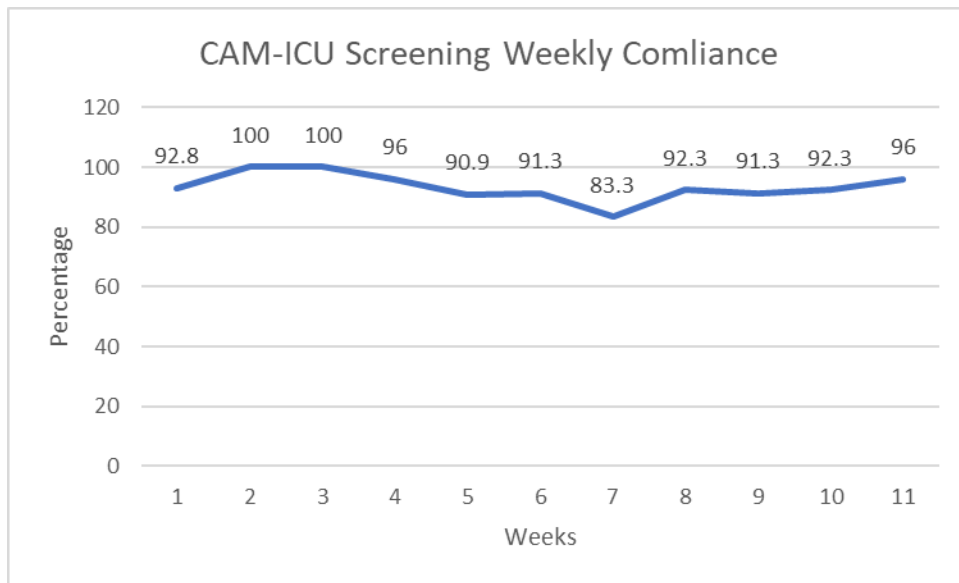
Appendix G
Project Timeline



Appendix H
Data Display Table

Week	Charts Audited	Screenings Completed	Percentage
1	14	13	92.8
2	24	24	100
3	23	23	100
4	25	24	96
5	11	10	90.9
6	23	21	91.3
7	12	10	83.3
8	26	24	92.3
9	23	21	91.3
10	26	24	92.3
11	25	24	96

Appendix I
CAM-ICU Weekly Compliance



Appendix J**Itemized Project Budget**

Item	Cost
Nurse Champion	30\$/hr x 180 hours = \$5500.00
Digital educational material	\$0.00
Printed educational material	\$0.50
Volunteers	\$0.00

Appendix K

Doctor of Nursing Practice Essentials

	Description	Demonstration of Knowledge
Essential I <i>Scientific Underpinning for Practice</i>	<p>Competency – Analyzes and uses information to develop practice</p> <p>Competency -Integrates knowledge from humanities and science into context of nursing</p> <p>Competency -Translates research to improve practice</p> <p>Competency -Integrates research, theory, and practice to develop new approaches toward improved practice and outcomes</p>	<ul style="list-style-type: none"> • Read course materials • Performed literature review • Analyzed research • Completed the Institute for Healthcare Improvement modules
Essential II <i>Organizational & Systems Leadership for Quality Improvement & Systems Thinking</i>	<p>Competency –Develops and evaluates practice based on science and integrates policy and humanities</p> <p>Competency –Assumes and ensures accountability for quality care and patient safety</p> <p>Competency -Demonstrates critical and reflective thinking</p> <p>Competency -Advocates for improved quality, access, and cost of health care; monitors costs and budgets</p> <p>Competency -Develops and implements innovations incorporating principles of change</p> <p>Competency - Effectively communicates practice knowledge in writing and orally to improve quality</p> <p>Competency - Develops and evaluates strategies to manage ethical dilemmas in patient care and within health care delivery systems</p>	<ul style="list-style-type: none"> • Worked with a team of advanced practice providers to change current practice to improve patient outcomes • Planned, implemented, and evaluated evidenced based project for quality improvement in healthcare • Wrote DNP paper • Composed and presented DNP project poster
Essential III <i>Clinical Scholarship & Analytical Methods for Evidence-Based Practice</i>	<p>Competency - Critically analyzes literature to determine best practices</p> <p>Competency - Implements evaluation processes to measure process and patient outcomes</p> <p>Competency - Designs and implements quality improvement strategies to promote safety, efficiency, and equitable quality care for patients</p> <p>Competency - Applies knowledge to develop practice guidelines</p> <p>Competency - Uses informatics to identify, analyze, and predict best practice and patient outcomes</p> <p>Competency - Collaborate in research and disseminate findings</p>	<ul style="list-style-type: none"> • Performed literature review • Wrote DNP paper • Implemented a change to current practice by altering the daily rounding checklist • Continuously evaluated project processes and adjusted accordingly • Disseminated project findings at the College of Nursing at East Carolina University
Essential IV <i>Information Systems – Technology & Patient Care Technology for</i>	<p>Competency - Design/select and utilize software to analyze practice and consumer information systems that can improve the delivery & quality of care</p> <p>Competency - Analyze and operationalize patient care technologies</p>	<ul style="list-style-type: none"> • Utilized a health systems electronic health record to collect data for project implementation and evaluation

<i>the Improvement & Transformation of Health Care</i>	<p>Competency - Evaluate technology regarding ethics, efficiency and accuracy</p> <p>Competency - Evaluates systems of care using health information technologies</p>	<ul style="list-style-type: none"> • Modified the daily rounding tool template in the advanced practice providers note template • Performed literature review and searches using the internet and Laupus Library search engine • Utilized excel spreadsheet to keep up with project activities and keep time
	Description	Demonstration of Knowledge
<i>Essential V Health Care Policy of Advocacy in Health Care</i>	<p>Competency- Analyzes health policy from the perspective of patients, nursing and other stakeholders</p> <p>Competency – Provides leadership in developing and implementing health policy</p> <p>Competency –Influences policymakers, formally and informally, in local and global settings</p> <p>Competency – Educates stakeholders regarding policy</p> <p>Competency – Advocates for nursing within the policy arena</p> <p>Competency- Participates in policy agendas that assist with finance, regulation and health care delivery</p> <p>Competency – Advocates for equitable and ethical health care</p>	<ul style="list-style-type: none"> • Advocated for change to improve project outcomes and the experience of patients in the intensive care unit • All patients hospitalized in the intensive care unit were included in the project • Frequently met with and kept communication with the project site partner during project implementation.
<i>Essential VI Interprofessional Collaboration for Improving Patient & Population Health Outcomes</i>	<p>Competency- Uses effective collaboration and communication to develop and implement practice, policy, standards of care, and scholarship</p> <p>Competency – Provide leadership to interprofessional care teams</p> <p>Competency – Consult intraprofessionally and interprofessionally to develop systems of care in complex settings</p>	<ul style="list-style-type: none"> • Collaborated with faculty advisor, project site partner, the nursing staff at the project site, and the advanced practice providers to plan, implement, and evaluate this quality improvement project.
<i>Essential VII Clinical Prevention & Population Health for Improving the Nation's Health</i>	<p>Competency- Integrates epidemiology, biostatistics, and data to facilitate individual and population health care delivery</p> <p>Competency – Synthesizes information & cultural competency to develop & use health promotion/disease prevention strategies to address gaps in care</p> <p>Competency – Evaluates and implements change strategies of models of health care delivery to improve quality and address diversity</p>	<ul style="list-style-type: none"> • Utilized the PDSA framework to complete this quality improvement project and impact the process of delirium screening and management in the intensive care unit

<p>Essential VIII <i>Advanced Nursing Practice</i></p>	<p>Competency- Melds diversity & cultural sensitivity to conduct systematic assessment of health parameters in varied settings Competency – Design, implement & evaluate nursing interventions to promote quality Competency – Develop & maintain patient relationships Competency –Demonstrate advanced clinical judgment and systematic thoughts to improve patient outcomes Competency – Mentor and support fellow nurses Competency- Provide support for individuals and systems experiencing change and transitions Competency –Use systems analysis to evaluate practice efficiency, care delivery, fiscal responsibility, ethical responsibility, and quality outcomes measures</p>	<ul style="list-style-type: none"> • Over the course of four semesters successfully designed, implemented, and evaluated a quality improvement project on ICU delirium. Disseminated the results at the College of Nursing at East Carolina University and the project site. Provided recommendations to the project site champion for future study
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