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**Implementation of Non-pharmacological Sleep Checklist in Adult Intensive Care
Unit (ICU) to Decrease Delirium**

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Disclosure

Recine Anne Alinea, works as a registered nurse (RN) in the critical care unit (CCU) where this project was conducted. Nancy Lampzey, RN, is also employed at the clinical institution affiliated with the project site. The authors have no financial interests or other conflicts of interest to disclose.

Abstract

Background: Delirium is a prevalent problem in Intensive Care Unit (ICU) patients, affecting up to 80% and resulting in poor outcomes such as increased length of stay in the hospital, prolonged hospitalization, cognitive impairment, and sometimes death. Nonpharmacological therapies, particularly those that promote sleep, have been found to prevent delirium.

Objective/Aim: To determine the efficacy of a nonpharmacological sleep checklist intervention in lowering the incidence of delirium in ICU patients and increasing nurses' knowledge and confidence in the implementation of the sleep bundle/checklist.

Method: A quality improvement project with a pre-post mixed methods design was carried out in a 28-bed ICU. As the primary implementers, nurses were trained extensively on delirium and sleep therapies. Quantitative and qualitative data were assessed to determine the effectiveness of the education given. A nonpharmacological sleep checklist was then implemented for qualified patients for two months to assess the effectiveness of the sleep bundle in reducing ICU delirium emphasizing the critical role of nursing personnel in this process.

Results: Registered nurses (RN) reported enhanced knowledge and confidence following education. Delirium rates dropped from 48.4% pre-implementation to 44.3% after implementation. Staffing concerns and inconsistent documentation were identified as barriers to adoption.

Implications for Practice: Using a nonpharmacological sleep checklist has not only shown encouraging outcomes in lowering delirium rates among ICU patients but also implementation of the sleep bundle checklist has been shown to decrease healthcare costs in the ICU and improve patient outcomes such as functional status. This study emphasizes the significance of continual staff education and assistance for successfully implementing such treatments. Furthermore, it underlines the importance of tailoring interventions to individual patient needs and overcoming implementation challenges in future initiatives, which could improve the quality of care offered.

Keywords: *delirium, ICU, nonpharmacological therapies, sleep promotion, nursing education.*

Implementation of Non-pharmacological Sleep Checklist in Adult ICU to Decrease Delirium

Delirium is a common problem facing hospitalized adults, accounting for over 1.5 million inpatient days, and it is estimated that up to 80% remain undetected and undertreated in intensive care units (ICU) across the country (Ali & Cascella, 2022). Intensive Care Unit (ICU) patients are at an even greater risk for delirium, leading to prolonged hospitalization, increased risk of mortality, cognitive impairment, emotional distress, increased risk for injuries, and increased healthcare costs (Ali & Cascella, 2022). ICU delirium is caused by various factors, including medications, acute conditions, pain, and sleep deprivation (Ali & Cascella, 2022).

Research has shown that non-pharmacological interventions such as early mobilization, reorientation, and sleep-promoting measures can help reduce and prevent delirium in the ICU and improve patient outcomes (Ali & Cascella, 2022). This highlights the importance of early recognition and addressing potential causes of delirium in the ICU as part of overall patient care. Though non-pharmacological measures are effective in preventing and managing delirium, they are not often implemented for various reasons, including lack of awareness, lack of training, staffing shortages, time constraints, costs, and resistance from patients or families (Barnes-Daly et al., 2018).

Healthcare providers must be aware of the benefits of non-pharmacological interventions for preventing and treating delirium and prioritize implementation whenever possible. Registered nurses (RN) play a significant role in preventing delirium because they are often the first to recognize signs and symptoms of delirium and can identify risk factors so that early preventative measures can be implemented. Locally and nationally, numerous institutions, including many in Washington, have adopted the ICU Liberation A-F Bundle, also known as the ABCDEF Bundle,

as recommended by the Society of Critical Care Medicine (SCCM) (Barnes-Daly et al., 2018). In addition, several delirium bundles are used in various nations' intensive care units. Some of the frequently used bundles in other countries are the European Society of Intensive Care Medicine's (ESICM) PADIS Bundle, the Australian and New Zealand Intensive Care Society's (ANZICS) iDECIDE Bundle, and the Canadian Critical Care Society's (CCCS) SPICE Bundle (Barnes-Daly et al., 2018).

It is essential to highlight that while these bundles may have different names and components, all share the common element of utilizing non-pharmacological therapies to reduce the severity and incidence of ICU delirium. Hospitals and healthcare facilities can support the use of non-pharmacological measures by providing training and education to staff, ensuring adequate staffing levels, and making necessary environmental modifications to promote sleep and minimize delirium risk factors (Davis et al., 2021; Liang et al., 2022).

Background and Significance

Delirium in the ICU dates back to the earliest days of critical care medicine (Kelly et al., 2014). Throughout the 1960s and 1970s, the ICU primarily focused on treating organ dysfunction and supporting vital functions (Kelly et al., 2014). As critical care medicine evolved and patient survival rates improved, the focus shifted to improving the overall quality of life for ICU patients (Kelly et al., 2014). The concept of quality improvement was adapted and made standard, leading to more reliable patient care and the implementation of care bundles to ensure patient safety (Kelly et al., 2014). Early in the 1990s, researchers began examining the occurrence of delirium in the ICU and its effect on patient outcomes (Levkoff, 1994). Research revealed that delirium was correlated with longer ICU and hospital stays, higher healthcare expenses, and increased mortality rates (Levkoff, 1994). As a result, healthcare providers began implementing measures to prevent

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and manage delirium in intensive care units, which included reducing sedatives and analgesics, early mobilization and physical therapy, and promoting sleep hygiene (Levkoff, 1994).

The SCCM issued guidelines in 2013 called the ICU Liberation A-F Bundle, also known as ABCDEF bundle, that provided a framework for developing evidence-based, interprofessional, and patient-centered protocols aimed at assessing, preventing, and treating a variety of distressing symptoms and syndromes in the ICU including delirium (Barnes-Daly et al., 2018). Further, several assessment tools, such as CAM-ICU and the Intensive Care Delirium Screening Checklist (ICDSC), have increased delirium screening and therapeutic accuracy (Barnes-Daly et al., 2018).

Delirium affects 45-87% of adult ICU patients, resulting in \$164 billion in annual healthcare costs in the United States (Esther et al., 2017). The exact causes of delirium are not well understood, and the progression of delirium is the subject of debate, but it is thought to involve alterations in the levels of various neurotransmitters in the brain, including serotonin, acetylcholine, and dopamine (Trzepacz, 2000). It is important to note that the exact roles of these neurotransmitters in delirium still need to be fully understood and may vary depending on the underlying cause (Trzepacz, 2000). Treatment for delirium involves addressing the underlying cause of the condition, managing symptoms, and providing supportive care (CIBS Center, n.d.; Oh et al., 2017).

Delirium, a common problem in intensive care units (ICUs), can severely affect patient outcomes and costs associated with their treatment (Ali & Cascella, 2022). It is estimated that one-third of all ICU admissions result in some form of delirium, which can be even higher when patients cannot get adequate restful sleep (Ali & Cascella, 2022). Sleep, an essential component of health and recovery, is interrupted and fragmented in ICU settings, resulting in a link between sleep deprivation and delirium (Smith & Grami, 2016; Dorsch et al., 2019). The mean sleep time

for an ICU patient may be as little as one to two hours per day, with less than 6% of ICU patients achieving rapid eye movement sleep (Ali & Cascella, 2022). Loud noises, bright lights, frequent monitoring and assessments, mechanical ventilation, and sedative and analgesic medications all contribute to sleep deprivation in the ICU (Avendao-Céspedes et al., 2016; Smith & Grami, 2016).

Non-pharmacological therapies with many components, including sleep promotion, have been demonstrated in randomized control trials and systematic reviews in reducing delirium (Avendao-Céspedes et al., 2016; Fang et al., 2021). To preserve patients' sleep cycles, sleep promotion measures have been accomplished by regulating light and noise, clustering patient care, and lowering nighttime stimuli (Knauert et al., 2018; Tonna et al., 2021; Topcu & Tosgun et al., 2022). To lower the risk of delirium-related consequences, healthcare staff must implement measures to improve the sleep quality of patients in intensive care units (Dorsch et al., 2019).

The proposed Doctor of Nursing Practice (DNP) project seeks to answer a practice question using the following PICOT format: For ICU patients aged 18 and older, how effective is a nursing staff education intervention in increasing nurses' and nursing aides' knowledge, confidence, and consistent implementation of non-pharmacological sleep checklist interventions that reduce patient sleep deprivation delirium as measured by the Confusion Assessment Method for the ICU (CAM- ICU) tool compared to inconsistent or no implementation? Therefore, the purpose of this practice improvement project serves to: 1) provide evidence of the effects of non-pharmacological sleep checklist interventions in delirium prevention; 2) aid in the development of a non-pharmacological sleep checklist intervention checklist and competency training to improve nursing staff knowledge and increase confidence in implementing non-pharmacological sleep checklist intervention; 3) assess any change in nursing practices related to delirium prevention; and 4) determine whether delirium rates decrease with consistent use of non-

pharmacological sleep checklist intervention.

Review of Literature

The literature search focused on the need for a multicomponent non-pharmacological delirium prevention checklist emphasizing sleep promotion to decrease delirium in the ICU setting, as well as the efficacy of nurse education in increasing knowledge and confidence. *A literature review was conducted using the following databases: Cumulative Index to Nursing and Allied Health Literature (CINAHL), PubMed, Clinical Key, and Cochrane Library.* Key search terms derived from the PICO statement included: *ICU delirium, sleep, non-pharmacological, nurse-driven, Delirium*/prevention & control, Delirium, Intensive care units, Non-pharmacological delirium prevention practice, Registered nurses, Nurse-driven Non-pharmacological Sleep Bundle Interventions, Practice Patterns, Nurses'*, Risk Assessment, Critical Illness*, Patient Care Bundles/nursing*, Quality Improvement, and clustered care.* Early exclusions included publications that were not written in English, were not readily accessible in their entirety, were published greater than five to seven years ago, or had a pediatric specialization. Using Boolean operators "AND" and "OR" to generate pertinent phrases reduced and narrowed the search results.

Multicomponent Non-Pharmacological Delirium Bundles

Multiple studies have demonstrated the effectiveness of multicomponent non-pharmacological delirium prevention bundles in reducing the incidence of delirium, shortening the duration of delirium, and improving patient outcomes such as functional status, length of stay, and healthcare costs among patients in the ICU (Avendaño-Céspedes et al., 2016; Martinez et al., 2017; Smith & Grami, 2016). Commonalities of the different delirium prevention bundles included elements that addressed early mobilization, reorientation, pain control, medication

evaluation, family involvement, and sleep promotion (Avendaño-Céspedes et al., 2016; Martinez et al., 2017; Smith & Grami, 2016).

Staff Education and Training

Six publications addressed the educational component aimed at increasing staff knowledge and competence, which involved license (Avendaño-Céspedes et al., 2016; Liang et al., 2022; Martinez et al., 2017; Smith & Grami, 2016; Tonna et al., 2021; Topcu et al., 2022) and unlicensed staff (Smith & Grami, 2016). Education sessions included the distribution of an informative booklet (Avendano et al., 2016), case-based delirium training with vivid cases and videos (Liang et al., 2021), delirium prevention bundle and checklist training (Knauert et al., 2018; Tonna et al., 2022), and emphasized the consistent use of reliable assessment delirium tools such as the Confusion Assessment Method (CAM ICU), Richmond Agitation Sedation Scale (RASS) and the Richards Campbell Sleep Questionnaire (RCSQ) (Tonna et al., 2020; Topcu et al., 2022; Fang et al., 2021).

In some studies, periodic meetings were held between stakeholders to discuss the progress and efficacy of the interventions (Knauert et al., 2018; Martinez et al., 2017). Overall, it was discovered that the training sessions and follow-up meetings with key stakeholders to discuss progress and illicit feedback increased nurses' awareness and a high level of protocol compliance (Knauert et al., 2018; Martinez et al., 2017).

Environmental Interventions to Preserve Sleep

Although multiple interventions were noted under each non-pharmacological bundle, strategies to optimize the patient's environment remain a common theme among the evidence. While multiple interventions in the non-pharmacological bundles have been shown to reduce delirium, there were only four articles found during the literature search that specifically focus on

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sleep promotion interventions in their entirety (Knauert et al., 2018; Fang et al., 2021; Tonna et al., 2021; Topcu & Tosun, 2022).

Efforts to preserve sleep through noise reduction included turning monitor and infusion pump alarms to the lowest level, decreasing the volume of all phones, ensuring that staff communicate with a low voice, and handing out earplugs or headphones to patients (Knauert et al., 2018; Tonna et al., 2021; Topcu & Tosun, 2022), as well as light reduction, which included dimming lights, closing doors, and window curtains (Knauert et al., 2018; Tonna et al., 2021). In addition, avoiding unnecessary sleep interruptions and clustering patient care activities may benefit the patient's normal circadian rhythm and improve overall sleep quality (Knauert et al., 2018; Tonna et al., 2021).

Intervention Strategies and Rationale

All studies integrated non-pharmacological measures as part of a protocol or bundle, increasing the findings' validity and efficacy. In addition, the consistent use of the CAM-ICU (Avendao-Céspedes et al., 2016; Martinez et al., 2017; Smith & Grami, 2016; Tonna et al., 2021; Topcu & Tosun, 2022), a valid and reliable delirium assessment tool that identifies the presence or absence of delirium, provides additional support for the use of a non-pharmacological sleep bundle in reducing ICU delirium. In addition, the RASS scoring system, a standardized approach for evaluating a patient's level of sedation and agitation, has been employed in conjunction with the CAM-ICU to assist healthcare professionals in adjusting sedative drugs and monitoring the patient's neurological condition to enhance care and prevent complications. Furthermore, the RCSQ was used to assess the sleep quality of patients, which has been demonstrated to have moderate to good validity and reliability (Tonna et al., 2021; Topcu & Tosun, 2022). However, this may not be appropriate for evaluating sleep quality in intubated and sedated patients since

they may be unable to respond appropriately to questionnaires.

Overall, the implementation of combined multiple non-pharmacological sleep interventions mentioned above can provide more comprehensive coverage of potential causes or contributors to delirium (Barnes-Daly et al., 2018). Using multiple interventions may also reduce the need for pharmacological treatments, which can have potentially dangerous adverse effect (Barnes-Daly et al., 2018). To decrease the burden, it is important to mimic the nurses' work routine when implementing new interventions (Smith & Grami, 2016). Mimicking existing routines makes it easier for nurses to apply new interventions and allows them to keep up with their regular duties without being overwhelmed.

Theoretical Framework

Research and evidence must be translated into everyday clinical practice utilizing a conceptual model and framework to provide quality healthcare. The Lippitt's change model framework, created by Ronald Lippitt in the 1950s, is the best foundation for achieving practice change. This framework provides a structured method for analyzing and executing organizational transformation (Lippitt et al., 1958). It emphasizes proactive planning, teamwork, and continual evaluation as critical drivers of effective organizational change (Lippitt et al., 1958). Lippitt's methodology has seven major steps: diagnosing the problem, assessing motivation and capability for change, building a shared vision, devising a comprehensive strategy, implementing the plan, evaluating progress, and institutionalizing the changes (Lippitt et al., 1958).

In the context of implementing non-pharmacological sleep checklist measures to reduce delirium rates in the ICU, it is critical to identify the need for change due to delirium's detrimental influence on patient outcomes, as well as the potential advantages of these interventions. Clear goals and objectives will be created, including measurable targets and key performance indicators

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based on documentation rates, consistent use of the non-pharmacological sleep checklist, and decreased delirium. Diagnosing the key variables entails thoroughly evaluating the ICU environment and identifying possible barriers to adoption, such as staff reluctance and resource limitations. Appointing effective change agents, such as nursing champions, is critical for successful implementation because they guarantee that interventions are carried out consistently.

Methods/Approach

This project utilizes a quality improvement approach to consistently monitor and gather data. It utilizes qualitative and quantitative evaluation methods to assess the effectiveness of non-pharmacological sleep interventions in reducing the incidence of delirium in patients. Furthermore, the project aims to enhance knowledge and confidence among nursing staff while identifying barriers to implementing non-pharmacological sleep interventions.

Before initiating data collection, the authors obtained ethical approval from the Institutional Review Board (IRB) at Seattle University and the project site's evidence-based practice (EBP) board committee. Additionally, access to the electronic health records in the Cerner system was obtained. Nurse participation was required as the sleep protocol is standard ICU care, though survey participation was optional. Patient consent was not necessary since delirium assessment is routine ICU practice, and the sleep protocol posed no risk of harm.

Qualitative Aspect of Quality Improvement Project

The project's qualitative component included pre- and post-educational surveys via the Qualtrics platform designed to assess nurses' knowledge and confidence levels regarding non-pharmacological interventions to reduce delirium incidents. The surveys allowed for open-ended responses, enabling participating nurses to identify factors that contributed to the inadequate documentation of CAM-ICU scores and inconsistent application of non-pharmacological

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interventions (Nydahl et al., 2018). The goal was to gain insight into the nursing staff's perceptions and experienced barriers and to determine the necessary next steps to optimize the adoption of the non-pharmacological sleep checklist into practice.

Quantitative Aspect of Quality Improvement Project

The pre-and post-educational surveys used Likert scales to quantify nursing staff's confidence in their knowledge of the impact of uninterrupted sleep on delirium, non-pharmacological sleep interventions for ICU patients, and the likelihood that they would implement non-pharmacological sleep interventions for ICU patients. This method would reveal whether the educational video sent to the nursing staff and huddle visits impacted the nursing staff.

Additionally, the number of patients who were documented as CAM-ICU positive from January 2024 to February 2024 (pre-implementation) and from March 2024 to April 2024 (post-implementation) was obtained from the Cerner charting system and the Critical Care Unit (CCU) Dashboard. The analysis between the pre-implementation and post-implementation phases aimed to identify the impact and effectiveness of the implementation of the non-pharmacological sleep checklist on delirium in the ICU setting.

Setting

This project will be implemented in a medical facility with a twenty-eight-bed ICU in an urban area as part of one of the largest healthcare systems in the Seattle-Tacoma area. Serving approximately four million residents (Korhonen, 2023), the project has the potential to impact a significant number of critically ill patients and inform practice in other local ICUs.

Participants

Medical and surgical ICU patients who met specific criteria received non-pharmacological sleep checklist interventions. Eligible patients included those who were alert and oriented to self,

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place, time, and situation, over 18 years old, communicated effectively in English, had a negative CAM-ICU score on admission, did not depend on sleep aids, and did not have certain psychiatric or neurological disorders. Nurses assessed newly admitted patients for eligibility and included it in the admission process.

A group of four night-shift nurses were designated as unit champions, receiving additional training and information about the project. They ensured checklist completion, tracked CAM-ICU scores, and collected the completed checklists at the end of each shift. Lippitt's seven-step change model guided the change in nursing practice. Nursing champions served as change agents throughout the process, focusing on diagnosing problems, assessing readiness, creating a vision, planning details, implementing and evaluating progress, and institutionalizing changes (Lippitt et al., 1958).

Intervention Plan

Staff Education Session

Before sending the educational video, nurses were asked to complete a pre-education survey. This survey aimed to assess their knowledge and confidence level in assessing, identifying signs of delirium, and implementing sleep interventions for reducing patient delirium. Each nurse recorded their unique, unidentifiable code (known only to them) at the top of their pre-and post-education surveys, allowing the DNP student to assess the change in the nurses' knowledge and confidence level. These unique codes were not linked to the individual nurse's identity.

A video summarizing the pilot project was distributed to nurses by the unit manager. The DNP student attended shift huddles to briefly educate staff, provide handouts on project objectives and talking points for consistent communication, and conduct a post-education survey to evaluate nurses' understanding of sleep interventions to reduce delirium.

Non-pharmacological Sleep Checklist

This nurse-driven checklist (Figure 4) allowed nurses to delegate tasks to nursing personnel, including Certified Nursing Assistants (CNAs) and Patient Care Technicians (PCTs), for completion and execution. For each completed intervention, nurses placed a checkmark next to the corresponding intervention on the checklist for assigned patients. The checklist included components such as the completion of the CAM-ICU assessment tool, dimming or turning off room lights, enforcing quiet hours after 10 pm, turning off or lowering the volume of televisions or music, reducing staff conversations near the patient's room, and limiting stimulation (for example, limiting visitors and using earplugs or eye masks to block out external stimuli). Additional components were establishing the lowest safe alarm parameters, clustering nursing care activities, and documenting sleep interventions completed in the EHR.

Implementation

The proposed intervention implemented non-pharmacological sleep checklist interventions on eligible patients for eight weeks, from March 2024 to the end of April 2024. Indirect identifiers of eligible patients were recorded using a data collection template, and the checklist was placed outside their rooms. Nurses and CNAs completed the checklist for selected patients. The completed checklists were submitted to nursing champions, collected by DNP students, and stored securely to ensure patient data privacy and confidentiality (*The Joint Commission, n.d.*).

Data Collection and Measurement

The DNP students used a data collection tool template (Figure 3) to retrieve specific data from electronic health records, including patient admission dates, CAM-ICU scores on ICU admission, checklist completion, and CAM scores recorded at specific times after ICU admission.

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Only fully executed interventions listed on the checklist were considered complete. The DNP students compared the incidence of delirium before and after interventions. The survey included a section for the nursing staff to identify barriers to implementing non-pharmacological sleep interventions.

Data Analysis

Qualitative Data

The survey results revealed that respondents identified various barriers that hindered the consistent application of sleep-promoting interventions and accurate CAM-ICU assessment and documentation in the ICU. However, comparing the pre-and post-education survey responses showed a notable increase in nurses' knowledge and confidence regarding sleep and delirium following the educational initiative. Key themes that emerged included increased knowledge and confidence post-education, high likelihood to implement non-pharmacological sleep interventions (Figure 2), insight into multifactorial barriers affecting CAM-ICU documentation and use of non-pharmacological interventions (Figure 1), and positive reception of the education and huddle visits.

Participant narratives shed light on the complex challenges that impeded optimal delirium assessment and prevention in the ICU setting, such as inadequate training, time constraints, competing priorities, lack of standard protocols, and limited resources (i.e., inadequate nurse-to-patient ratio). One respondent explained, "In my experience, the poor recording of CAM-ICU scores and nonpharmacological interventions not conducted in a standardized manner were often due to lack of knowledge and training of ICU staff." Another participant shared, "Based on what I've seen, not keeping adequate records for CAM-ICU scores and inconsistent use of non-pharmacological approaches could be blamed on a few things. For one, people just didn't know

enough about it. People hadn't been trained well which is why it wasn't used often."

These narratives underscored the need for ongoing education, standard protocols, and adequate resources to support ICU nurses in prioritizing sleep promotion and delirium prevention. The positive feedback regarding the educational offerings suggested promise for this initiative in empowering the nursing staff to consistently implement evidence-based strategies to enhance sleep and reduce delirium in critically ill patients.

Quantitative Data

A total of 19 staff members participated in the pre-education survey. The results indicated that 78.95% of the respondents were certain of their understanding regarding the adverse effects of sleep deprivation on delirium. Additionally, 88.89% of the participants were certain of their knowledge regarding non-pharmacological sleep interventions. Finally, 94.74 percent of staff agreed to implement these interventions with ICU patients.

The results of the post-education survey could have been skewed due to the tiny sample size of five respondents. However, the outcomes indicate that knowledge was enhanced following the educational intervention. Every single participant (100%) exhibited a high level of confidence in their understanding of the effects of uninterrupted sleep on delirium as well as non-pharmacological sleep interventions. The results of this project demonstrate that the educational intervention was successful in deepening the understanding, self-assurance, and eagerness of personnel to integrate sleep-promoting techniques into their patient care procedures.

The Confusion Assessment Method for the ICU (CAM-ICU) identified a significant incidence of delirium among intensive care unit patients before the implementation phase. Out of 281 patients, 136 (48.4%) of them tested positive for delirium between January and February 2024. The results of this study before implementation emphasize the need for efficacious

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interventions to address this widespread problem in the intensive care unit. During implementation, 199 patients were considered CAM-ICU negative. However, only 118 received the non-pharmacological sleep checklist intervention for at least 48 hours. The remaining 81 patients had undocumented CAM-ICU scores and as a result, did not get the checklist completed on them. This intervention aimed to improve sleep quality and reduce the risk of developing delirium. The non-pharmacological sleep checklist included noise reduction, light management, and promoting a consistent sleep-wake cycle. After the implementation phase, 158 (44.3%) of the 357 patients were CAM-ICU positive, indicating a 4.1% reduction in the incidence of delirium compared to the pre-implementation phase. Although this reduction may seem modest, it highlights the potential of non-pharmacological interventions in addressing delirium in the intensive care unit setting.

A chi-square test was used to determine if the changes in CAM-ICU scores before and after implementing the non-pharmacological sleep checklist were statistically significant, where $p < 0.05$ based on a 95% confidence interval (Table 2). The p-value calculated was 0.2976 which then rejects the null hypothesis that there was no association between the implementation of non-pharmacological sleep checklist and incidence of delirium and is therefore not statistically significant.

A test of odds ratio was conducted to evaluate the presence of a relationship between the intervention and the decrease in delirium rates. The odds ratio (OR= 0.847), which is less than one, indicates no association between implementing the nurse-driven non-pharmacological checklist and CAM-ICU delirium scores (Table 3).

Discussion

Strengths and Limitations

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This DNP project demonstrated several strengths, including the fact that most of the interventions listed on the non-pharmacological checklist were already being implemented for many patients, regardless of their CAM-ICU scores. Additionally, many night nurses found the educational video and huddle visits to be informative, particularly regarding how to conduct CAM-ICU assessments on Cerner. These findings suggest that the project was well-received and built upon existing practices, potentially increasing the likelihood of sustainable implementation.

However, the project also faced several limitations. Some patients were charted as CAM-ICU positive during the day due to the effects of medications (e.g., benzodiazepines and analgesics) administered for pain and anxiety, but these medications were not given at night or vice versa. As a result, patients who were documented as CAM-ICU negative automatically tested positive due to fluctuating mental status in the last 24 hours. Even if the interventions were being done, the checklist was not completed due to the requirement that patients needed to be CAM-ICU negative. Furthermore, there was no control over condition changes from infections, neurological disorders, or complications from procedures, which could affect neurological status and lead to CAM-ICU positive scores. The project also had no control over ordered frequent assessments (e.g., q1-2hr neurovascular checks). However, the night team was able to liberalize the frequency for some patients to help prevent delirium and enhance sleep. Additionally, some interventions were not applicable to certain patients, as some prefer white background TV noise or some lighting. A few nurses were inconsistent with completing the CAM-ICU documentation, which is required once per shift, and only charted RASS scores every two hours.

Another limitation of the study was the unequal number of survey responses between the pre-education (n=19) and post-education (n=5) phases, which may have skewed the data and potentially exaggerated the positive results. The small sample size, particularly in the post-

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educational survey, may have limited the generalizability of the findings. Moreover, the short duration of one week between the educational intervention and the post-educational survey may not have allowed sufficient time for the nursing staff to fully internalize and apply the knowledge gained from the educational video. Future studies could benefit from a larger and more balanced sample size across both phases and an extended time frame between the intervention and post-assessment to better evaluate the long-term impact of the educational program on the nursing staff's knowledge and practices.

In addition to the limitations listed above, it would have been interesting to observe the long-term effects of the project implementation, as it takes time to change the culture in a workplace. Assessing CAM-ICU scores in patients who were not able to speak or understand English proved to be challenging, even with the presence of remote online translators.

Despite a 4.1% reduction in the incidence of delirium post-implementation, a chi-square test and odds ratio test revealed that the result was not statistically significant, indicating no association between implementing the nurse-driven nonpharmacological checklist and CAM-ICU delirium scores. The lack of statistical significance may have been influenced by various factors, such as the short two-month implementation period, inconsistent use of the checklist among eligible patients, and unaccounted confounding variables like patient comorbidities or medication usage. Future investigations should prolong the implementation duration to enhance the sample size, guarantee uniform application of the checklist for all suitable patients, and gather data on potential confounders to accurately assess the impact of the checklist on delirium rates.

Recommendations for the Future

Based on the project's findings and limitations, it is important to incorporate interventions that align with the nurses' nightly schedule and work on factors that can significantly affect their

motivation to carry out these interventions, such as inadequate nurse-to-patient ratio. Future projects should consider addressing staffing issues and providing ongoing support to ensure the consistent implementation of non-pharmacological interventions and accurate CAM-ICU documentation. Additionally, strategies to adapt interventions to individual patient preferences and needs should be explored, as well as methods to overcome language barriers in delirium assessment. Lastly, future projects can aim at providing staff with regular, frequent, and adequate training or developing standardized protocols that can be accessible to any ICU nurse for reference to reduce the incidence of delirium. By addressing these challenges and building upon the project's strengths, future initiatives can continue to improve sleep promotion and delirium prevention in the ICU setting, ultimately enhancing patient outcomes and quality of life.

Conclusion

Enhancing sleep in the ICU can be achieved by optimizing the patients' surroundings by reducing noise, light, and interruptions in patient care. The research has shown evidence for using a non-pharmacological sleep bundle to reduce and prevent delirium in the ICU. While there was no statistically significant decrease in delirium among patients during the post-implementation period, existing evidence still indicates a correlation between sleep deprivation and delirium in the ICU. Additional research is required to ascertain whether the implementation of multicomponent non-pharmacological sleep bundles can effectively decrease the occurrence of ICU delirium.

To achieve sustainability, further endeavors are required to maintain the change in practice. Adapting the knowledge translation into annual competencies and reeducation is needed to ensure knowledge retention about monitoring, managing, and preventing ICU delirium through sleep-promoting techniques. The QI project has been assisted by incorporating the CAM-ICU tool into the EHR system and requiring nursing documentation throughout each shift. While paper

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checklists may not be environmentally sustainable, the unit champions and other nursing staff possess the motivation and capability to integrate non-pharmacological sleep therapies into their nightly care routine. It may be necessary to discuss the feasibility of incorporating the checklist into the electronic health record with the information technology department to enhance nursing responsibility through electronic documentation and ensure long-term viability. Due to the simplicity and practicality of integrating nurse-driven checklist interventions in clinical care, this QI project has the potential to be utilized in future quality improvement initiatives, expanded to different settings, and have beneficial effects on healthcare practice.

Conflict of Interest

None.

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Table 1

Delirium Prevalence Pre-Implementation and Post-Implementation

CAM-ICU Assessment	Pre-Implementation (n=281)	Post-Implementation (n=357)
Negative	145 (51.6%)	199 (55.7%)
Positive	136 (48.4%)	158 (44.3%)

Note: Numbers in parenthesis indicate column percentages.

IMPLEMENTATION OF NON-PHARMACOLOGICAL SLEEP CHECKLIST IN THE ICU 29

Table 2

Observed Values (O)

CAM-ICU Assessment	Pre-Implementation	Post-Implementation	Total
Negative	145	199	344
Positive	136	158	294
Total	281	357	638

Expected Values (E)

CAM-ICU Assessment	Pre-Implementation	Post-Implementation	Total
Negative	151.5	192.5	344.0
Positive	129.5	164.5	294.0
Total	281.0	357.0	638.0

$(O-E)^2/E$

CAM-ICU Assessment	Pre-Implementation	Post-Implementation
Negative	0.2798	0.2202
Positive	0.3274	0.2577

Chi-Square p-value

X ²	1.0851
Degrees of Freedom (df)	1
p-value	0.2976

Table 3

Odds Ratio Test

CAM-ICU Assessment	Pre-Implementation	Post-Implementation	Total
Negative	145	199	344
Positive	136	158	294
Total	281	357	638

CAM-ICU Assessment	Pre-Implementation	Post-Implementation	Total
Negative	a	b	a+b
Positive	c	d	c+d
Total	a+c	b+d	a+b+c+d

Odds Ratio Calculations

Variables

a = 145

b = 199

c = 136

d = 158

Equations

$a/c = 1.066$

$b/d = 1.259$

Odds Ratio

$OR = (a/c) / (b/d) = 0.847$

IMPLEMENTATION OF NON-PHARMACOLOGICAL SLEEP CHECKLIST IN THE ICU 31

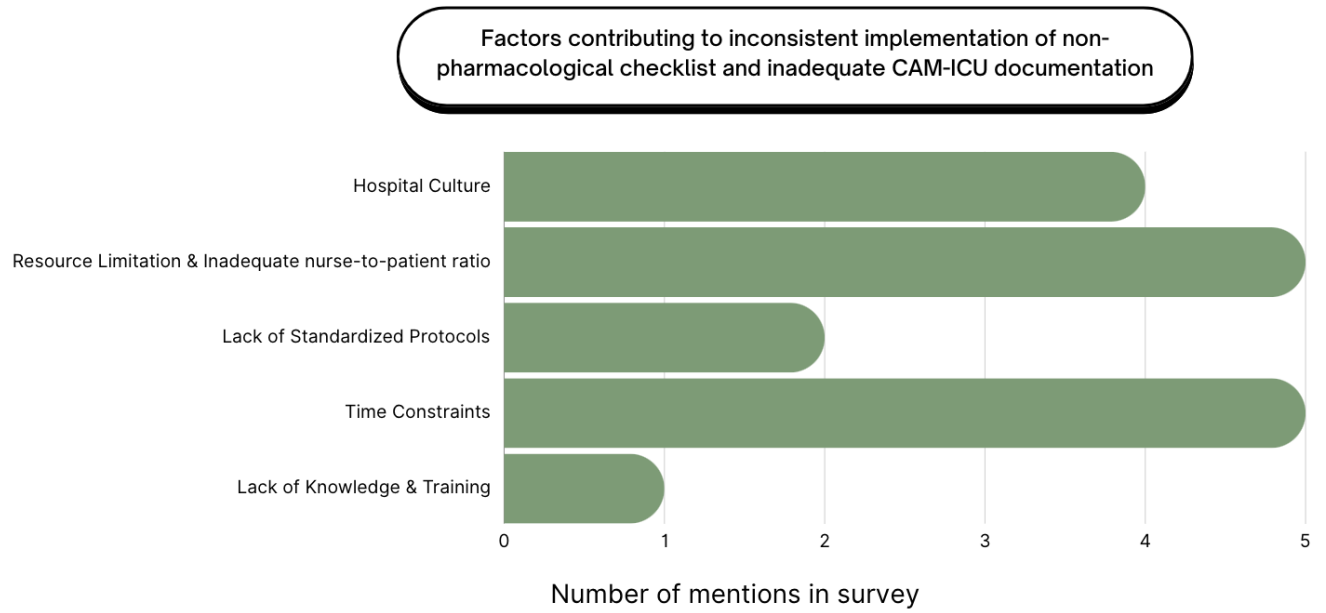


Figure 1. Common themes were noted in the open-ended survey questions on the post-education survey. Note that only 5 responses were recorded.

COMPARISON CHART

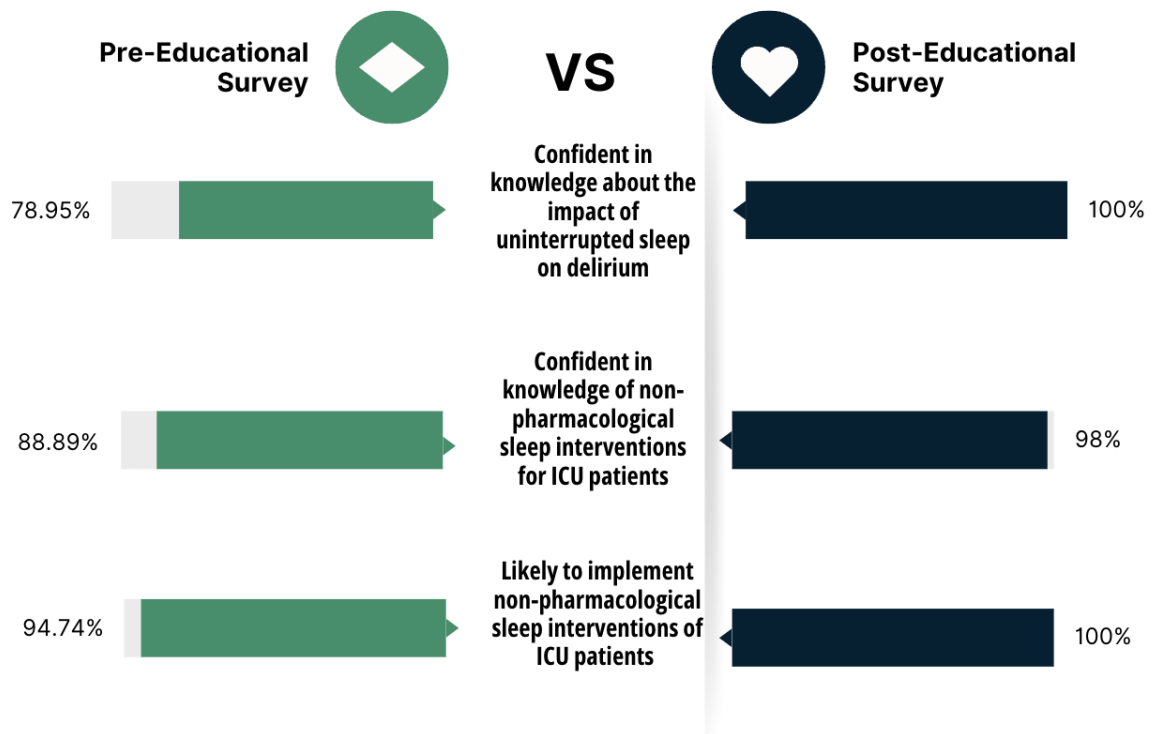


Figure 2. Comparison chart of the pre-educational survey and post-educational survey. Note that 19 responses were recorded in the pre-educational survey, and 5 responses were recorded in the post-educational survey.

IMPLEMENTATION OF NON-PHARMACOLOGICAL SLEEP CHECKLIST IN THE ICU 33

Data Collection Tool Template										
Date of EHR Review	Patient #	Admit Date	RM #	Admit CAM ICU	Date Sleep checklist started	CAM ICU 24hr	CAM ICU 48hr	CAM ICU 72hr	Transferred/ Discharge Date	Notes

Figure 3. Data Collection Tool Template that was utilized to monitor patients during the implementation of the non-pharmacological sleep checklist.



NON PHARMACOLOGICAL SLEEP CHECKLIST

DATE: _____

RM: _____

- Complete CAM ICU
- Room lights off or dimmed
- Quiet Hours 2200 - 0500
- TV/music off or at lowest volume
- Reduce staff conversation in/near room
- Establish alarm parameters with night team

Please submit completed checklist in drop box located in huddle room. Thank you!

Figure 4. Non-pharmacological sleep checklist used in patients who were CAM-ICU negative.