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Nurses' Knowledge of Delirium in the ICU

Submitted in Partial Fulfillment of the Requirements for the Degree of Doctor of Nursing Practice at
the University of Kentucky

By

Sara Hancock

Louisville, KY

2022

Abstract

Background: Delirium costs the healthcare system \$38 to \$152 billion dollars annually. Nurses have a unique opportunity as healthcare providers to assess for and identify delirium, but often fail to recognize delirium.

Purpose: The purpose of this DNP project was to determine the effect of implementing an educational intervention regarding delirium risk factors, symptoms, prevention strategies, and treatments, on the knowledge of nurses working in an intensive care unit.

Methods: This DNP project used a quasi-experimental pre-test post-test design. Participants completed a pre-test (Appendix A), an educational intervention (Appendix C & D), and a post-test (Appendix B). Pre-test and post-tests were identical and used to determine the effect of the educational intervention on nurses' knowledge of delirium risk factors, symptoms, prevention strategies, and treatments within the ICU. Paired sample t-tests were used to compare participants' responses before and after the intervention.

Results: There was a statistically significant increase in the nurses' overall delirium knowledge after the educational intervention ($p < .001$; see Table 2). Based on a total score of 27, the pre-test mean among all participants was 22.50 ($SD=3.31$) versus 24.94 ($SD=2.69$) in post-tests (see Table 2). Nurses showed a statistically significant improvement in identifying signs, symptoms, treatments, and preventions of delirium post-test. Based on a score of 0-6, the pre-test mean for signs and symptoms was 4.38 ($SD=1.67$) versus a post-test mean of 5.44 ($SD=1.50$) ($p=.004$; see table 2). Based on a score of 0-13, the pre-test mean for treatments and interventions was 11.44 ($SD=1.41$) versus a post-test mean of 12.19 ($SD=1.22$) ($p=.041$; see Table 2). The only area that nurses did not show statistically significant improvement in was delirium risk factors. Based on a

score of 0-8, the pre-test mean for risk factors was 6.69 (SD=1.19) versus 7.31 (SD=1.08) in post-tests (p .086; see Table 2).

Conclusion: This DNP project evaluated the effects of an education intervention on nurses' knowledge of delirium. Nurses were able to independently identify more delirium risk factors, signs, symptoms, treatments, and preventions after an education intervention. Nurses have the potential to improve delirium identification rates if given the knowledge and opportunity to do so. Moving forward, providing nurses with delirium education can be a cost-effective way to improve delirium identification rates and improve overall patient care. This DNP project differs from previous studies because rather than evaluating nurses' ability to use delirium screening tools, this DNP project focused on nurses' knowledge of delirium independently.

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Dedications

I would like to dedicate this project to my dear, late friend Kacy Johnson. Kacy and I began our nursing careers together in one of the most acute trauma centers statewide. We grew together as nurses and relied on one another, both professionally and personally. Kacy passed away at the completion of her own DNP program before she was able to receive her diploma. Kacy was one of the most intelligent, and compassionate people I knew. She was an unyielding nurse that believed patient rights and safety came above everything else. Kacy deserved to be here with me. This is for you, Kacy J.

I would further like to dedicate this moment of my program completion to my son, Ayden. This degree is for you and your future. I am so honored to be your mama and am so proud of you every single day. Thank you for always making me laugh. We did it!

I would like to thank my partner, Thomas Burgett, for loving me through this time in our lives. Thank you for being a wonderful man and a powerful example to our son. I can't wait to begin this new phase with you and Ayden.

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Background and Significance

Problem Statement

Delirium is one of the most common and problematic issues occurring in the intensive care unit (ICU) (Devlin et al., 2011). Delirium is defined as a disturbance in attention, awareness, and cognition that develops over a brief period of time (hours to days), that represents a change from baseline, and fluctuates in severity during the day (American Psychiatric Association, 2013, p. 596). Delirium costs in the United States range from \$38 to \$152 billion dollars annually (Rice et al., 2011). Delirium is a significant contributor to increased mortality, increased complications to the patient, longer lengths of stay in the ICU, and increased healthcare costs (Birge et al., 2017).

Context, Scope and Consequences of the Problem

Every year in the United States, 5.7 million people are admitted to the ICU (Birge et al., 2017). All patients admitted to the ICU have an increased risk for developing delirium (Birge et al., 2017). Delirium occurs in approximately 70-87% of elderly patients admitted to the ICU (Fong, 2009). The average additional cost for delirium care in the ICU is approximately \$600 per patient per day and between \$60,000-\$64,000 per patient per year (Vasilevskis et al., 2018). In addition to delirium being costly, it is also associated with many long-term complications to the patient. Long term complications of delirium include increased risk for dementia, greater chance of institutionalization after discharge, cognitive decline, slower medical recovery rates, and death (Marcantonio et al., 2018). Patients with unresolved delirium are 2.9 times more likely to die

within one year after discharge (Kiely et al., 2009). The severity of these sequelae depend upon how early delirium is identified and if appropriate treatments are implemented. Patients who do not receive appropriate, timely treatment subsequently suffer more severe long-term effects from delirium (Girard et al., 2010). Nurses have a unique opportunity as healthcare providers, to assess for and identify delirium earlier in patients admitted to the ICU. Nurses often don't recognize delirium due to lack of education and resources related to delirium care and identification (Rice et al., 2011; Thomas et al., 2021).

Evidence-Based Interventions

Current tools used to help nurses identify delirium are the Confusion Assessment Method for the ICU (CAM-ICU) or the Intensive Care Delirium Screening Checklist (ICDSC). While these tools are well validated and have shown to accurately identify delirium, there is not a consistent standard of education practices for nurses to identify delirium without these tools (Blevins et al., 2018). Nurses also rely heavily on their subjective judgement over the outcome of delirium assessment tools (Zamoscik et al., 2017). Additionally, CAM-ICU and ICDSC are typically performed intermittently and fail to capture the fluctuating nature of delirium that nurses can more readily identify (Patel et al., 2011). Nurses provided with delirium education could potentially address the gaps in practice where the CAM-ICU or ICDSC fail.

The American Delirium Society's ICU Delirium Management Algorithm (Appendix C) is recognized as a resource for hospital staff regarding delirium assessment, prevention, and treatment. The algorithm uses a multimodal approach to prevent and reduce delirium in those

who are at high risk for needing constant observation (CO) by hospital staff. The acronym “ACE” directs hospital staff to address patient’s activity, comfort, and environment. Utilization of this algorithm in the ICU setting has shown to improve patient outcomes, eliminate need for additional staff for CO patients, and reduced hospital costs (Pinkhasov et al., 2018). Research by Pinkhasov et al. (2018) found that the use of this algorithm was associated with a 15% reduction in length of stay, from seven days to six days, and a savings of over \$750,000 per year.

The American Nurses Association’s (ANA, n.d.) published tool “Delirium Prevention Strategies,” (Appendix D) developed by a panel of delirium topic experts, includes objectives and associated strategies for delirium care. This tool is recognized by the American Nurses Association and the American Delirium Society as a resource for nurses to better understand the complexities of delirium. This tool provides an overview regarding assessment, monitoring, prevention, and treating patients with delirium (ANA, n.d.)

Purpose

The purpose of this DNP project was to determine the effect of implementing an education intervention regarding delirium identification, risk factors, symptoms, prevention strategies, and treatments on the knowledge of nurses working in an intensive care unit at an inpatient acute care hospital. The specific aims of this project were to 1) Provide a delirium education intervention for nurses that included evidence-based practices, 2) Evaluate nurses knowledge of delirium after the education intervention to determine if nurses could

independently identify more delirium risk factors, symptoms, prevention strategies, and treatments.

Theoretical Framework

The Community Organization Theory, founded by Saul Alinsky, focuses on identifying and changing a problem within a community. This theory empowers and mobilizes communities to develop interventions and change aspects of their community that are identified as problematic (Glanz et al., 2005). The Community Organization Theory consists of four phases, including assessment and reassessment, planning and design, implementation, and evaluation and dissemination. These co-occurring phases are used to guide the process of change within a community (Anderson et al., 2002). Delirium has been identified as a problem within the ICU community and this theory was used to guide this DNP project. This DNP project implemented an educational intervention for ICU nurses regarding delirium care and evaluated the effectiveness of the educational intervention by assessing nursing knowledge with a pre- and post-test.

Review of Literature

A literature review was completed to identify gaps in nursing knowledge regarding delirium recognition in ICU patients. A literature search included the following databases PubMed, CINAHL, and Cochranes Database of Systematic Reviews. Databases were searched using specific search terms including Delirium nursing education, Delirium knowledge of clinical staff, Delirium training, Delirium screening, and Delirium assessment. The search yielded over 5,000 articles and included many duplicates. Articles were included if they were

published in the last 5 years, were peer reviewed, published in English, included a full text article, and included best-practice based care. Several articles were excluded because they did not meet the inclusion criteria or did not involve nursing education and delirium.

Five studies were identified and synthesized to address gaps in nursing knowledge for assessing delirium within ICU patients. All studies were completed within ICU's in the U.S, UK, Europe, and Canada. Studies reviewed included quasi-experimental single group with pretest-post-test design (Hicken et al., 2017; Cyrus et al., 2021; Blevins et al., 2018), a qualitative study (Zamoscik et al., 2017), and a multifaceted quality improvement project (Solberg et al., 2021).

Interventions performed within these studies included in-person formal education sessions or multi-sessions, (Cyrus et al., 2021; Hicken et al., 2017), power-point slides that consisted of delirium, pre-disposing and precipitating risk factors, symptoms, and prevention strategies (Cyrus et al, 2021; Hicken et al., 2017; Solberg et al., 2021), review of the Intensive Care Delirium Screening Checklist (ICDSC) (Hicken et al., 2017), review of CAM-ICU (Blevins et al., 2018), and focus group discussions (Zamoscik et al., 2017). Four of the five studies included pre- and post-tests that assessed nurses baseline knowledge of delirium and post education knowledge of delirium (Blevins et al., 2018; Cyrus et al., 2021; Hicken et al., 2017; Solberg et al., 2021). Nurses were chosen to participate who had at least one year of experience (Blevins et al., 2018; Cyrus et al., 2021; Hicken et al., 2017; Solberg et al., 2021), or on a volunteer basis (Zamoscik et al., 2017).

The pre-test and post-tests of delirium knowledge consisted of adapted versions of the Nurses' Delirium Knowledge Assessment (NDKA) (Blevins et al., 2018), "Delirium: A Survey of Healthcare Professional's Knowledge, Beliefs, and Practices" (Cyrus et al., 2021), as well as pre and post-tests formulated to evaluate nurses' knowledge and perception of delirium before and after an intervention (Solberg et al., 2021; Hicken et al., 2017; Zamoscik et al., 2017). All pre and post-tests were paper and pen or available electronically with a link emailed to ICU nursing staff.

The five studies identified and synthesized established 4 key themes that included 1) a nursing knowledge deficit regarding delirium, 2) under recognition and misdiagnosing of delirium in the inpatient settings, 3) delirium impacts nursing care, 4) delirium education improved nurses' ability and confidence in recognizing delirium in patients. Nurses are not typically provided with formal delirium education or training (Solberg et al., 2021; Hicken et al., 2017; Zamoscik et al., 2017). Delirium is more easily recognized in patients who demonstrate what is known as hyperactive delirium, versus hypoactive delirium (Cyrus et al., 2021).

Hyperactive delirium symptoms include motor agitation such as restlessness, or even aggression (Hicken et al., 2017; Zamoscik et al., 2017). Hypoactive delirium symptoms include motor retardation, apathy, slowing of speech, increased need for sleep (Solberg et al., 2021; Hicken et al., 2017; Zamoscik et al., 2017). Nurses often miss hypoactive delirium because the symptoms are less pronounced and nurses are not trained to recognize subtle delirium symptoms (Cyrus et al., 2021; Hicken et al., 2017; Solberg et al., 2021). The lack of delirium education and training contributes to the knowledge deficit of nurses regarding delirium care (Cyrus et al.,

2021; Hicken et al., 2017; Solberg et al., 2021). Often this knowledge deficit can be a source of additional anxiety and stress for nurses who are caring for delirious patients (Cyrus et al., 2021; Zamoscik et al., 2017). Delirious patients require a lot of additional time and work from nurses (Thomas et al., 2021; Zamoscik et al., 2017). Nurses are often consumed with addressing the behavioral symptoms of delirious patients and this hinders proper diagnosing and treatment (Cyrus et al., 2021; Zamoscik et al., 2017; Thomas et al., 2021). Along with additional stress and anxiety, nurses have also reported feeling unsafe while caring for patients with typical delirium symptoms such as confusion, or combativeness (Blevins et al., 2018; Cyrus et al., 2021; Hicken et al., 2017; Solberg et al., 2021).

Lack of confidence for assessing and managing delirium has been identified as a key theme for nurses in the ICU (Blevins et al., 2018; Cyrus et al., 2021; Zamoscik et al., 2017). Nurses' lack of confidence and knowledge regarding delirium contributes to additional stress and anxiety, as well as the under-recognition and misdiagnosing of delirium (Cyrus et al., 2021; Zamoscik et al., 2017). When delirium is not recognized or diagnosed in a timely manner, it delays treatment (Blevins et al., 2018; Cyrus et al., 2021; Hicken et al., 2017; Solberg et al., 2021). Severe long-term effects of delirium and poorer patient outcomes are a direct response to delayed treatment, as well as higher hospital costs (Hicken et al., 2017; Blevins et al., 2018; Zamoscik et al., 2017).

Nurses' confidence and knowledge increased with the implementation of an education intervention regarding delirium identification and knowledge (Blevins et al., 2018; Cyrus et al., 2021; Hicken et al., 2017; Solberg et al., 2021). The implementation of a multifaceted education

intervention was beneficial for improving nursing knowledge and confidence in delirium identification and treatment (Blevins et al., 2018; Cyrus et al., 2021; Hicken et al., 2017; Solberg et al., 2021). Nursing education is a targetable gap in practice regarding delirium. The desired state in a clinical setting is for nurses to be provided with information necessary to prevent, identify, and treat delirium on a level that is accessible and sustainable.

Methods

Design

This DNP project used a quasi-experimental pre-test post-test design. Participants completed a pre-test, an educational intervention, and a post-test. Pretest and posttests were identical and used to determine the effect of the educational intervention on ICU nurses' knowledge of delirium risk factors, symptoms, prevention strategies, and treatments within the ICU.

Settings

Agency Description

This DNP project was implemented at Norton Brownsboro Hospital. Norton Brownsboro Hospital is a voluntary, non-profit, short term, acute care facility in Louisville, Kentucky. Norton Brownsboro Hospital offers a wide range of inpatient, and outpatient care, and includes intensive care services (nortonhealthcare.com, 2021).

Agency Mission and Project Alignment

Norton Brownsboro Hospital's purpose is to provide quality health care to all they serve, in a manner that responds to the needs of their communities and honors their faith as an organization (nortonhealthcare.com, 2021). This DNP project aligns with Norton Brownsboro Hospital's goal by assessing potential barriers to patient care by evaluating nurses' ability to identify delirium risk factors, symptoms, prevention strategies, and treatments in patients admitted to the ICU. The information obtained through this project will be available to the administrative team of the Intensive Care Unit at Norton Brownsboro Hospital to enhance quality patient care at Norton Brownsboro Hospital. The feasibility of this project is enhanced by the interest and support of the administrators at Norton Brownsboro Hospital. This project has the potential to heighten nurses' ability to identify risk factors, symptoms, prevention strategies, and treatments for delirium among ICU patients. To support the sustainability of this project, the education materials used in this DNP project will be made available for future training purposes for new nurses and as continued education practices for all nursing staff at Norton Brownsboro Hospital.

Project Stakeholders

Project stakeholders included the DNP project committee, Norton Brownsboro Hospital ICU manager and assistant managers, nurses, and patients. Autumn Chapman, the ICU Nurse Manager, agreed to support this DNP project implementation. Assistant nurse managers in the ICU at Norton Brownsboro Hospital helped to collect completed surveys provided by the PI.

Nurses were potentially eligible to participate in the project and benefit from improved knowledge regarding delirium risk factors, symptoms, prevention strategies, and treatments. Patients are benefactors of the project which could result in improved patient outcomes.

Facilitators and Barriers

The facilitators of this project include the administration staff at Norton Brownsboro Hospital. Administration staff helped to collect completed surveys which helped to secure valuable data that enhanced the results of this DNP project. Administration staff also kept additional copies of surveys for nurses to have access to when this PI was not present. The main perceived barrier to this project were the number of full-time nurses employed at the time of this DNP project implementation. Covid-19 impacted the number of full-time nurses staffed at the facility at the time of this DNP project. According to the nurse manager of the ICU at Norton Brownsboro Hospital, 95 ICU nurses could be employed at one time at this facility, but only 64 nurses were staffed at the time of this DNP project. The Kentucky Nurses Association (KNA) reports that even with attempts to retain and hire nurses, Kentucky is 12-20% nurses short on the number needed for patient care (Rickert, 2022). To overcome this perceived barrier pre and post-tests was made available by the PI in person multiple times throughout the week to recruit as many participants as possible. Furthermore, this PI was available by email and phone to be readily accessible and convenient to all participants.

Sample

The target population of this project included all ICU nurses that provided direct patient care at Norton Brownsboro Hospital. A convenience sample of 18 ICU nurses were included for this project. Inclusion criteria consisted of 1) Nurses who were state board-certified RN's that provided care within the ICU at Norton Brownsboro Hospital, 2) Registered Nurses with at least one year of experience in the ICU, and 3) Nurses who worked full-time in the ICU at Norton Brownsboro Hospital. Exclusion criteria consists of 1) Nurses who had less than one year of experience as an ICU nurse, 2) Nurses who did not provide direct patient care in the ICU at Norton Brownsboro Hospital, 3) Nurses who were part-time or student nurses.

Procedure

IRB Approval

Prior to implementing this DNP project, Institutional Review Board (IRB) approval was obtained from The University of Kentucky. A letter was obtained prior to submitting the IRB, from the Norton Institute of Education and Development that provides support for this project. A secondary IRB approval was then obtained from Norton Institute of Education and Development to implement the project at the site.

Description of Intervention

A stapled packet was supplied to all voluntary participants of this study by the PI. The stapled packet included a cover letter, a demographic survey, a pre-test, a self-guided education intervention, and a post-test. Participants were asked to complete the demographic survey and pre-test before reviewing the educational material. The education material was self-guided and included an algorithm displaying a step-by-step education model for delirium care (Appendix C), and a list of evidenced based practices for delirium care (Appendix D). After participants reviewed the educational intervention, they were asked to immediately complete the post-test.

Measures and Instruments

The instruments used for this DNP project included a demographic survey, a pre- (Appendix A) and post-test (Appendix B), an ICU delirium algorithm (Appendix C), and a list of delirium prevention strategies (Appendix D). Demographic information included: age, sex, education level, and number of years of ICU experience. The pre- (Appendix A) and post-test (Appendix B) were created by the PI and identical. The pre- and post-test included ‘select all that apply’ knowledge-based questions formulated from the educational material. The total possible score for the pre- and post-test was 27 and included eight delirium risk factors, six signs and symptoms, and thirteen intervention and treatment strategies.

Data Collection

Nurses were recruited on a voluntary basis by the PI of this project. A stapled packet was supplied to all voluntary participants of this study by the PI. The stapled packet included a cover letter, a demographic survey, a pretest, a self-guided education intervention, and a posttest. Once data was obtained, it was transferred to SPSS a data analysis software for analysis. In the stapled packet participants were given a document that outlined the purpose, methodology, risks/benefits, survey process, and PI's contact information. Completing the survey packet was considered consent to participate in the study. Data was housed in a HIPAA compliant environment and encrypted during transmission. Data was protected and stored on a password protected and firewall protected computer which was linked to the UK server. The survey was anonymous and the only people that had access to the data or study records were the people affiliated with the study personnel and the statistician.

Data Analysis

Descriptive statistics were used to summarize demographic data collected on the pre-intervention survey. The paired t-test was used to determine changes in delirium knowledge pre- and post-intervention. All data was analyzed using SPSS, version 25 with an alpha level of .05.

Results

Sixty-four stapled packets with surveys were distributed for this project based on the number of staff available at the time. Thirty-two surveys were returned, however fourteen of

those did not meet the inclusion criteria or were turned in incomplete. The total sample yielded eighteen participants who met inclusion criteria and submitted complete pre- and post-tests. More than half of all participants identified as female (55.6%), and Caucasian (83.3%). More than half of all participant's age ranged between 19-29 (52.4%) and 38.9% of participants' age ranged between 30-39. Most participants had their BSN (66.7%) and years of experience ranged from 1-10 years. Only 16.7% of participants had 10 or more years of experience. An equal number of participants had 1-2 years of experience, 3-5 years of experience, and 6-9 years of experience (See table 1).

There was a statistically significant increase in the nurses' overall delirium knowledge after the educational intervention ($p < .001$; see Table 2). Based on a total score of 27, the pre-test mean among all participants was 22.50 (SD=3.31) versus 24.94 (SD=2.69) in post-tests (see Table 2). Nurses showed a statistically significant improvement in identifying signs, symptoms, treatments, and preventions of delirium post-test. Based on a score of 0-6, the pre-test mean for signs and symptoms was 4.38 (SD=1.67) versus a post-test mean of 5.44 (SD=1.50) ($p = .004$; see table 2). Based on a score of 0-13, the pre-test mean for treatments and interventions was 11.44 (SD=1.41) versus a post-test mean of 12.19 (SD=1.22) ($p = .041$; see Table 2). The only area that nurses did not show statistically significant improvement in was delirium risk factors. Based on a score of 0-8, the pre-test mean for risk factors was 6.69 (SD=1.19) versus 7.31 (SD=1.08) in post-tests ($p = .086$; see Table 2).

Discussion

The purpose of this DNP project was to determine the effect of implementing an education intervention regarding delirium identification of risk factors, symptoms, preventions, and treatments on the knowledge of nurses working in an Intensive Care Unit at an inpatient acute care hospital. Implementing this education intervention at Norton Brownsboro Hospital improved nurses' overall knowledge of delirium care. Test scores increased after the education intervention thus proving this project intervention to be a significant tool for delirium education. The findings from this DNP project are consistent with existing literature. Previous studies have shown that nurses' knowledge of delirium improves with educational interventions (Blevins et al., 2018; Cyrus et al., 2021; Hicken et al., 2017; Solberg et al., 2021; Zamoscik et al., 2017). This aligns with the results of this DNP project.

The primary aim of this DNP project was to provide a delirium education intervention for nurses that included evidence-based practices and encouraged nurses to identify delirium independently in the ICU. This aim was met. An educational intervention was implemented that was based on evidenced-based practices. Nurses were able to identify more delirium risk factors, symptoms, preventions, and treatments after reviewing the education material. Many of the nurses reported that they were surprised that some of the information given in the educational material was, in fact, delirium symptoms and that they found this information was helpful.

The secondary aim of this DNP project was to evaluate nurses' knowledge of delirium after an education intervention, to determine if nurses could independently identify more delirium signs, risks, preventions, and treatments. This aim was met. Based on the results of this

DNP project, implementing a delirium education intervention for nurses in the ICU increased nurse' knowledge of delirium post-intervention. Nurses were able to independently identify delirium risk factors, symptoms, preventions, and treatments after reviewing the education material. The greatest area of improvement on the post-tests was identifying delirium signs and symptoms, and in identifying delirium preventions and treatments. These results suggest that nurses possess adequate knowledge of delirium risk factors, but that they may benefit from further education on delirium symptoms, preventions, and treatments.

The findings of this study prove to be remarkable. The recommendation of this study is that delirium nursing education should be considered for all nursing staff. Nurses who can identify more signs and symptoms of delirium have a greater chance of identifying delirium earlier in patients.

Implications

Nurses play a crucial role in delirium identification. Nurses possess a unique wide range of knowledge and skills that is built upon continuously throughout their careers. As well as improving patient care, increasing nurses' knowledge of delirium could potentially reduce nurses' anxiety and improve their confidence with caring for patients with delirium. Healthcare is constantly changing and requires continued education for nurses. Implementing updated education for nurses regarding delirium identification, prevention, and treatment is crucial moving forward. As delirium identification continues to improve, it will be important to determine if patients' length of stay in the ICU decreases and if overall healthcare costs decrease in the future as well. If this DNP project were to be repeated in the future, including electronic

surveys and data collection could improve participation rates. Also, including part time nurses, travel nurses, and other specialty nurses could improve the number of participants as well. Furthermore, if this project is used or repeated in the future, face validity should be established by having delirium experts review the surveys used in this DNP project.

Limitations

There were several limitations to this study. The most notable limitation of this study was the sample size. 95 ICU nurses are typically staffed for this facility but a total of 64 nurses were employed at the time this study was implemented. The sample size was greatly affected because of this. Another limitation of this study was data collection methods. It might be easier in the future to conduct electronic surveys vs pen and paper surveys like with this study. Electronic surveys may yield more participants going forward. Another limitation of this study is that participants could have completed the post-education survey without looking over the education material provided. Results assume the participants reviewed the education material provided and its entirety.

Conclusion

Prevention, early detection, and early treatment are essential for improving outcomes for patients with delirium. These factors require nurses to be knowledgeable about delirium and possess the ability to properly screen patients for risk factors and early signs. Nurses were able to independently identify more risk factors, signs/symptoms, and treatments/preventions after an

education was provided. Nurses have the potential to improve delirium identification rates if given the knowledge and opportunity to do so. Moving forward, providing nurses with delirium education can be a cost-effective way to improve delirium identification rates and improve overall patient care.

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Table 1. Demographic Data (*n*= 18)

Characteristic	<i>n</i> (%)
Age	
19-29	8 (44.4%)
30-39	7 (38.9%)
40-49	2 (11.1%)
50-59	1 (5.6%)
Gender	
Male	6 (33.3%)
Female	10 (55.6%)
Transgender	1 (5.6%)
Prefers not to answer	1 (5.6%)
Race	
Hispanic	2 (11.1%)
Caucasian	15 (83.3%)
Black	1 (5.6%)
Type of Degree	
ADN	5 (27.8%)
BSN	12 (66.7%)
MSN	1 (5.6%)
Years of Experience	
1-2	5 (27.8%)
3-5	5 (27.8%)
6-9	5 (27.8%)
10+	3 (16.7%)

Table 2. Changes in Delirium knowledge before and after the educational intervention ($n = 18$)

	Potential range	Pre-education Mean (SD)	Post-education Mean (SD)	p
Risk score	0-8	6.69 (1.19)	7.31 (1.08)	.086
Sign and symptoms	0-6	4.38 (1.67)	5.44 (1.50)	.004
Intervention/prevention	0-13	11.44 (1.41)	12.19 (1.22)	.041
Total score	27	22.50 (3.31)	24.94 (2.69)	<.001

Appendix A

Pre-education Questionnaire

Do you think any of the patients below might be at risk for delirium?

Select all that apply

- Patients who are older
- Patients who are in the hospital for one day or less
- Patients with dementia
- Patients with an infection
- Patients who had recent surgery
- Patients who are dehydrated
- Patients experiencing change in surroundings such as admission to a hospital or change to another part of the hospital
- Patients who are mechanically ventilated
- Patients started on a new medication

If your patient had signs of sudden confusion, would you:

Select all that apply

- Orient patient to time and day frequently
- Wait 24 h to see if the person gets better
- Let the patient sleep during the day to recover

- Do nothing
- Inform other members of the care team right away
- Inquire about medication changes
- Initiate restraints to keep them in the bed

Do you think any of the patients described below might have delirium?

Select all that apply

- Patient slowly becomes more confused over a few months and becomes forgetful and seems to get more confused later in the day.
- Patient suddenly becomes confused and begins seeing things that are not there.
- Patient suddenly becomes confused, sleeps more during the day, and suddenly becomes aggressive toward staff.
- Over the course of a few days/hours the patient begins to fluctuate in and out of confused states and has difficulty concentrating.
- Suddenly the patient has trouble getting to the bathroom on time
- An elderly post operative patient has disorganized speech when first waking up
- A mechanically ventilated patient has fluctuating periods of lethargy, reduced motor activity, restlessness, agitation, and aggression
- An elderly patient post operative day 4 becomes apathetic, lethargic, less active, and has periods of staring off into space

What interventions can effectively prevent delirium?

Select all that apply

- Use Acetaminophen PO or IV for pain treatment when possible
- Avoid or minimize use of benzodiazepines/Anticholinergics/Opiates
- Initiate early ambulation, even with ventilated patients when possible
- Provide sensory support to the patient e.g, eyeglasses, hearing aids, interpreter devices, temperature, or bed adjustments
- Open the patients window curtains, exposing the patient to light during the day
- Allow the patient to take naps during the day to rest
- Avoid giving baths after 11pm when possible
- Cluster care
- Keep the patients tv on all night to help them sleep
- Encourage fluid intake, unless the patient is on a fluid restriction
- Encourage family presence where possible
- Record accurate I/O's and reassess NPO and diet restriction orders
- Do not update the white board unless the patient asks you to do so
- Leave lines such as foleys, central lines, NG tubes, EKG leads in and on as long as possible

Appendix B

Post-education Questionnaire

Do you think any of the patients below might be at risk for delirium?

Select all that apply

- Patients who are older
- Patients who are in the hospital for one day or less
- Patients with dementia
- Patients with an infection
- Patients who had recent surgery
- Patients who are dehydrated
- Patients experiencing change in surroundings such as admission to a hospital or change to another part of the hospital
- Patients who are mechanically ventilated
- Patients started on a new medication

If your patient had signs of sudden confusion, would you:

Select all that apply

- Orient patient to time and day frequently
- Wait 24 h to see if the person gets better
- Let the patient sleep during the day to recover

- Do nothing
- Inform other members of the care team right away
- Inquire about medication changes
- Initiate restraints to keep them in the bed

Do you think any of the patients described below might have delirium?

Select all that apply

- Patient slowly becomes more confused over a few months and becomes forgetful and seems to get more confused later in the day.
- Patient suddenly becomes confused and begins seeing things that are not there.
- Patient suddenly becomes confused, sleeps more during the day, and suddenly becomes aggressive toward staff.
- Over the course of a few days/hours the patient begins to fluctuate in and out of confused states and has difficulty concentrating.
- Suddenly the patient has trouble getting to the bathroom on time
- An elderly post operative patient has disorganized speech when first waking up
- A mechanically ventilated patient has fluctuating periods of lethargy, reduced motor activity, restlessness, agitation, and aggression
- An elderly patient post operative day 4 becomes apathetic, lethargic, less active, and has periods of staring off into space

What interventions can effectively prevent delirium?

Select all that apply

- Use Acetaminophen PO or IV for pain treatment when possible
- Avoid or minimize use of benzodiazepines/Anticholinergics/Opiates
- Initiate early ambulation, even with ventilated patients when possible
- Provide sensory support e.g, eyeglasses, hearing aids, interpreter devices, temperature, or bed adjustments
- Open the patients window curtains, exposing the patient to light during the day
- Allow the patient to take naps during the day to rest
- Avoid giving baths after 11pm when possible
- Cluster care
- Keep the patients tv on all night to help them sleep
- Encourage fluid intake, unless the patient is on a fluid restriction
- Record accurate I/O's and reassess NPO and diet restriction orders
- Do not update the white board unless the patient asks you to do so
- Leave lines such as foleys, central lines, NG tubes, EKG leads in and on as long as possible
- Encourage family presence where possible

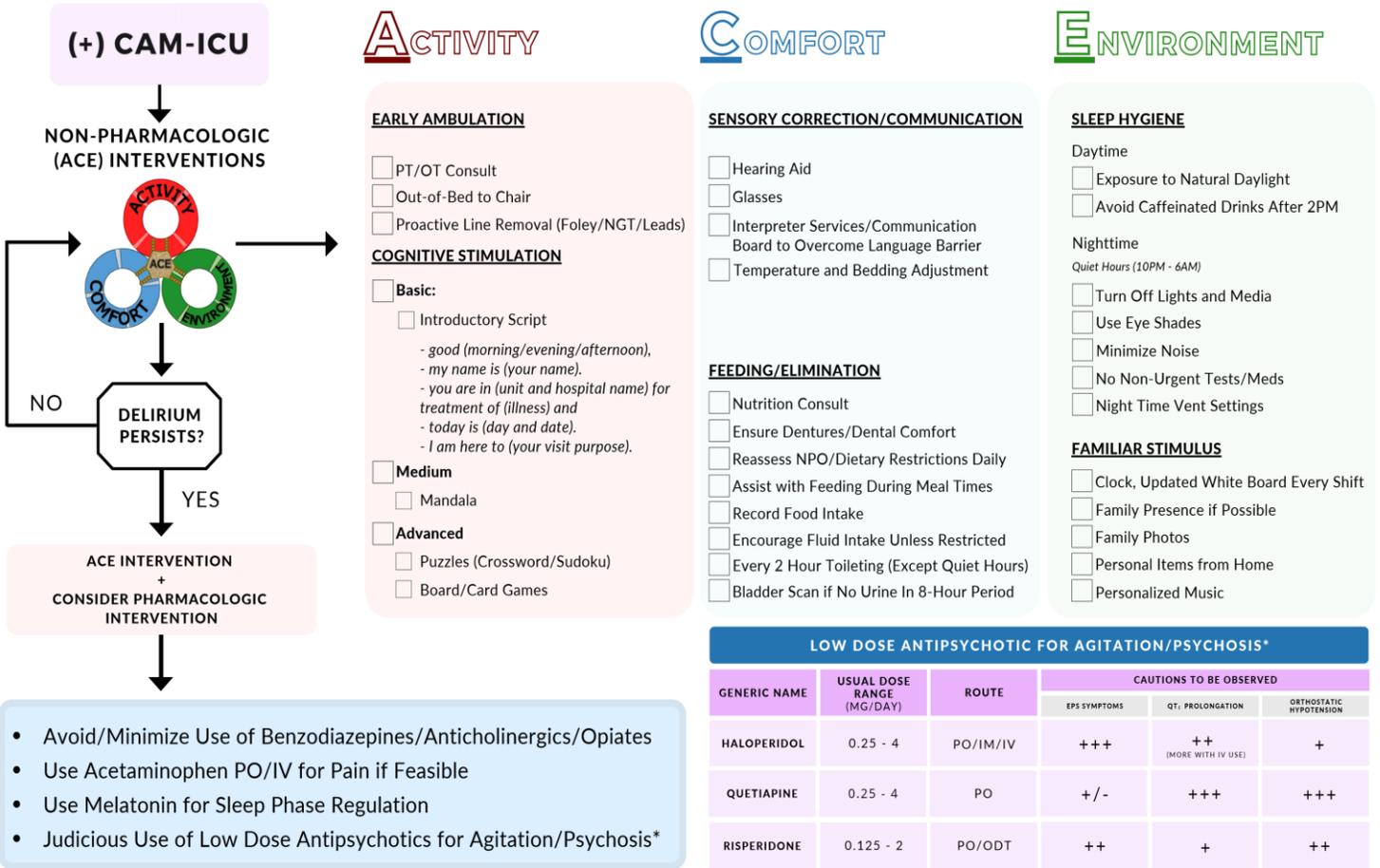
Appendix C

ICU Delirium Management Algorithm (americandeliriumsociety.org, 2020)



ICU DELIRIUM MANAGEMENT ALGORITHM

Pinkhasov et al. 2020



ACTIVITY

- EARLY AMBULATION**
- PT/OT Consult
 - Out-of-Bed to Chair
 - Proactive Line Removal (Foley/NGT/Leads)
- COGNITIVE STIMULATION**
- Basic:**
 - Introductory Script
 - good (morning/evening/afternoon),
 - my name is (your name),
 - you are in (unit and hospital name) for treatment of (illness) and
 - today is (day and date),
 - I am here to (your visit purpose).
 - Medium**
 - Mandala
 - Advanced**
 - Puzzles (Crossword/Sudoku)
 - Board/Card Games

COMFORT

- SENSORY CORRECTION/COMMUNICATION**
- Hearing Aid
 - Glasses
 - Interpreter Services/Communication Board to Overcome Language Barrier
 - Temperature and Bedding Adjustment
- FEEDING/ELIMINATION**
- Nutrition Consult
 - Ensure Dentures/Dental Comfort
 - Reassess NPO/Dietary Restrictions Daily
 - Assist with Feeding During Meal Times
 - Record Food Intake
 - Encourage Fluid Intake Unless Restricted
 - Every 2 Hour Toileting (Except Quiet Hours)
 - Bladder Scan if No Urine In 8-Hour Period

ENVIRONMENT

- SLEEP HYGIENE**
- Daytime
- Exposure to Natural Daylight
 - Avoid Caffeinated Drinks After 2PM
- Nighttime
- Quiet Hours (10PM - 6AM)
- Turn Off Lights and Media
 - Use Eye Shades
 - Minimize Noise
 - No Non-Urgent Tests/Meds
 - Night Time Vent Settings
- FAMILIAR STIMULUS**
- Clock, Updated White Board Every Shift
 - Family Presence if Possible
 - Family Photos
 - Personal Items from Home
 - Personalized Music

LOW DOSE ANTIPSYCHOTIC FOR AGITATION/PSYCHOSIS*					
GENERIC NAME	USUAL DOSE RANGE (MG/DAY)	ROUTE	CAUTIONS TO BE OBSERVED		
			EPS SYMPTOMS	QTc PROLONGATION	ORTHOSTATIC HYPOTENSION
HALOPERIDOL	0.25 - 4	PO/IM/IV	+++	++ (MORE WITH IV USE)	+
QUETIAPINE	0.25 - 4	PO	+/-	+++	+++
RISPERIDONE	0.125 - 2	PO/ODT	++	+	++

- Avoid/Minimize Use of Benzodiazepines/Anticholinergics/Opiates
- Use Acetaminophen PO/IV for Pain if Feasible
- Use Melatonin for Sleep Phase Regulation
- Judicious Use of Low Dose Antipsychotics for Agitation/Psychosis*

Appendix D

Delirium Prevention Strategies (Nursingworld.org, 2016)

This document was developed by a panel of delirium topic experts and is intended as a guidance resource only.

Objective	Strategies
Evaluate delirium risk and precipitating factors	<p>Check for the following, using this mnemonic device, MIND SPACES:</p> <p>M-Medications: Polypharmacy, and/or anti-cholinergic burden, medication weaning/withdrawal</p> <p>I-Infection and advanced illness</p> <p>N-Number of co-occurring conditions/comorbidities (e.g. hypertension, heart failure, COPD, OSA)</p> <p>D-Substance or alcohol use disorders (including withdrawal)</p> <p>S-Surgery and/or invasive procedures</p> <p>P-Pain (uncontrolled), perfusion problems</p> <p>A-Age- young children and older adults are most at risk, BUT may occur at any age</p> <p>C-Cognitive impairment and/or dementia</p> <p>E-Emotional or mental illness (e.g. depression, anxiety)</p> <p>S-Sleep disturbances and altered patterns</p>
<p>Assess for delirium with a validated instrument*</p> <p><i>*(Multiple screening tools are available, many of whose links are provided on ANA's Delirium Resources webpage)</i></p>	<p>Assess upon admission, every shift and with any change</p> <p>Determine baseline</p> <p>Consistently administer all elements of a validated instrument for accurate results. Do not modify!</p>
Assess and treat abnormal diagnostic findings as appropriate	<p>Monitor, as appropriate:</p> <p>Serum chemistries (e.g. electrolytes, BUN, creatinine, BUN/creatinine ratio, liver and thyroid, ammonia, lactic acid)</p> <p>UA, CBC, ABGs, cultures, drug levels (e.g. digoxin, phenytoin), and CXR</p> <p>Change in vital signs including pulse oximetry</p>

Prevent nosocomial infection	<p>Practice infection control precautions, including excellent hand hygiene</p> <p>Avoid and remove unnecessary invasive lines, tubes and drains</p> <p>Provide regular oral care paying special attention to patients who are NPO or have tube feedings</p> <p>Maintain a seated position/elevate head of bed (60°) or encourage OOB to chair during meals to prevent aspiration</p> <p>Utilize CLABSI, CAUTI, and VAE checklists</p>
Appropriate medication management	<p>Ensure appropriate medications</p> <p>Perform a medication reconciliation</p> <p>Monitor mood altering medication effects</p>

	<ul style="list-style-type: none"> • Use lowest effective dose • Avoid sudden discontinuation of psychoactive medications • For those on continuous sedation, achieve the appropriate sedation target using a standardized sedation scale • Evaluate number and type of medications • Eliminate all non-essential medications • Identify inappropriate medications that can be eliminated or substituted (e.g. Beers' Criteria for Potentially Inappropriate Medication Use in Older Adults OR consult with pharmacist for an updated list)
Maintain cognition	
Orientation	<ul style="list-style-type: none"> • Introduce self and role • Use calm, short, concise instructions and explanations • Use patient's name • Address weather outside and time of day when intervening • Continually reorient • Encourage family pictures and familiar objects in room • Validate feelings and perceptions • Encourage family visits and calls • Engage in respectful and developmentally appropriate communication (e.g. avoid elder speak)
Sensory stimulation	<ul style="list-style-type: none"> • White boards that include personalization and prompts for patient care needs and sensory deficits including family input • Provide morning newspaper

	<ul style="list-style-type: none"> • Supply current calendar and clock in room • Maintain normal schedules and routines • Provide adequate and appropriate lighting • Encourage family and friends to visit regularly • Use clean and properly working glasses, hearing aids, amplification devices, and magnifying glasses • Keep window blinds open during the day and closed during night hours • Provide personalized age-appropriate television and radio options • Engage in meaningful conversation to stimulate memory and logic (e.g. children, ages, job) • Offer and use activity boxes: word games, deck of cards, magazines, music, checkers, sorting, crossword puzzles, picture books, coloring pictures and crayons/pencils • Offer mirror if appropriate • Consider consult with OT, recreational therapy, pet therapy, Child Life therapy • Provide a sitter (family if able or trained volunteer) to facilitate
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	orientation, engagement, and safety measures
Adequate pain control	<ul style="list-style-type: none"> • Use appropriate pain assessment tool for ongoing pain assessment • Document and treat pain every 2-3 hours, then reassess pain • Individualize a pain management plan consisting of pharmacological and non-pharmacological measures
Early, and aggressive, progressive mobility	<ul style="list-style-type: none"> • Avoid restraints • Mobilize 2-4 times per day progressing from: <ul style="list-style-type: none"> a.) passive ROM b.) active ROM c.) muscle strengthening d.) sitting balanced at the edge of bed e.) standing f.) transferring g.) walking with assistance h.) independent walking in increasing distances • Encourage use of prescribed assistive devices • Encourage self-care activity independence

	<ul style="list-style-type: none"> • Provide adequate footwear • Consider consult for PT\OT • If family is willing and able, encourage them to walk with the patient when appropriate
Adequate oxygen saturation	<ul style="list-style-type: none"> • Assess for hypoxia via pulse oximetry • Perform spontaneous breathing trial (SBT) if mechanically ventilated (if appropriate) • Encourage evidence-based sedation cessation and weaning protocols for ventilated patients • Deliver oxygen at appropriate rate of flow as necessary
<p>Adequate nutrition and hydration</p> <p>Prevent and manage constipation</p>	<ul style="list-style-type: none"> • Offer oral fluids often • Administer parenteral fluids as necessary • Perform ongoing nutrition and hydration assessments • Assess ability to order food and feed self • Monitor weight • Consider a dietary consultation • Provide companionship during meals • Supply dentures for meals • Assess for proper fitting dentures • Feed patient as necessary • Increase hydration • Ensure regular toileting <ul style="list-style-type: none"> • Provide adequate dietary fiber intake • Administer pharmacological treatment as appropriate • Monitor urinary output • Check for bowel impaction

	<ul style="list-style-type: none"> • Consider medical causes of sleep disturbance • Enforce designated sleep period • Dim overhead lighting • Reduce noise to minimum ~levels during sleep hours • Turn off computer, TV, radio, smart phone, and all other electronics for at least one hour prior to sleep time • Evaluate and limit hypnotic use • Evaluate daytime napping • Re-evaluate frequency of vital signs overnight • Delay morning bloodwork/testing to a later time if appropriate • Use non-pharmacologic measures: <ul style="list-style-type: none"> a. Relaxing music b. Behavioral/relaxation techniques(e.g. guided imagery, Reiki) c. Massage (back, hand/foot) d. Limit caffeine in late day e. Provide warm non-caffeine drink f. Toilet before bedtime g. Cluster activities as much as possible h. Sleep masks and ear plugs i. Sleep kit (lotion, fragrances, warmth)
Ongoing and extensive education Staff Providers Family members, patients, informal care-givers	<ul style="list-style-type: none"> • Provide and require during orientation & annual updates • Interprofessional learning (e.g. simulations) • Partner with educational institutions • Provide and require during orientation & annual updates • Provide comprehensive delirium resources at preoperative clinic through treatment and follow-ups
Large-scale Implementation	Strategies
Unit Level	<ul style="list-style-type: none"> • Develop or obtain relevant checklists • Recruit champions • Maintain quality assurance
System Level	<ul style="list-style-type: none"> • Obtain stakeholder/administrator support • Identify a champion in leadership at the executive level • Develop and participate in a quality committee • Encourage national designations and certifications to increase expertise and quality outcomes