IMPACT OF DELIRIUM EDUCATION ON A POST SURGICAL UNIT

by

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ABSTRACT

TRU PHAN BYRNES. Impact of Delirium Education on a Post-Surgical Unit (Under the Direction of DR. DONNA KAZEMI)

Background: Delirium is a common problem experienced by older adults in a variety of settings that is problematic for many reasons including prolonged hospital length of stay (LOS) and an increased risk of mortality and health care cost. Although this condition frequently occurs in this population, it is under-recognized and misdiagnosed by nurses and healthcare providers resulting in the delay of treatment. For that reason, the Healthcare Research and Quality (AHRQ) has included delirium, as a marker of the quality of care and patient safety, and it is one of the top three conditions that need to be improved in the elderly population (Inouye, 2016).

Purpose: The purpose of this project was to determine whether the delirium education program increased nurses' knowledge of delirium management and prevention in hospitalized older adults and retention of knowledge three months post intervention.

Methodology: A quasi-experiment mixed method with pre-test and post-test design was used to evaluate the effect of the education program. A convenience sample of 65 nurses who work on two medical-surgical units at a large urban hospital located at the South East region of the U.S. Of 65 participants, 31 were in the control group and 34 participants were in the intervention group. The intervention group received 30-minutes education session while the control group continued the routine care.

Results: The results indicated that at baseline both groups had some knowledge of delirium, but the difference was not statically significant (t (63) = .372, p < .711) with the mean score of 7.74 (control group) versus 7.61 (intervention group). After the

education program, the intervention group mean score increased from 7.61 to 9.24 ($p <$ 0.00) while the control mean score slightly decreased from 7.74 to 7.24. Additionally, to ensure the results were due to the intervention, multiple linear regression was used to analyze confounding variables including NICHE training, education level, and years of nursing experience. NICHE training was the only variable that was statically significant ($p <0.23$). To evaluate the participants' retention three months post-intervention, a follow-up test was given to the intervention group, which showed a slight decrease of the mean score from 9.24 to 8.28. However, the mean score was still higher than the baseline data and was statically significant ($p < 0.038$). As for the qualitative findings, three themes were identified including understand the risk factors, use non-pharmacological prevention and treatment strategies, and advocate for patients.

Conclusion: The finding supported the use of delirium education as a mean to improve nurses' knowledge of delirium prevention and management. However, continued education is necessary help nurses stay up-to-date with the knowledge. Further investigation is needed to correlate clinical outcomes such as Confusion Assessment Method (CAM) complication documentation, delirium prevalence, and hospital length of stay.

Keywords: delirium education, multicomponent non-pharmacological intervention, delirium prevention, nursing education.

DEDICATIONS

I wish to attribute this success to my loving family. Without their encouragement and constant support, I would not be able to through this endeavor. To my loving mother, thank you for always believing and encouraging me to do better. I am forever grateful for your sacrifice so that I can have a better life and achieve higher education. To my loving husband, you are my supporter and cheerleader. Without you, I would not be where I am now. Thank you for inspiring me to be the best and always supporting for whatever I want to do.

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

ADN	Associated Nursing Degree
AGS	American Geriatric Society
AHRQ	Agency Healthcare Research and Quality
BSN	Baccalaureate Science of Nursing
CAM	Confusion Assessment Method
DNP	Doctor of Nursing Practice
GRN	Geriatric Resource Nurse
HELP	Hospital Elder Life Program
LOS	Length of Stay
NICHE	Nurse Improving Care for Healthsystem Elders
MSN	Master Science of Nursing
UBC	Unit-Based Council

CHAPTER 1: INTRODUCTION

1.1. Background

Delirium is a common issue experienced by older adults in a variety of settings that is problematic for many reasons including prolonged hospital length of stay (LOS), higher risk of mortality, and an increased in health care cost (Leslie & Sharon, 2011; Weinrebe, Johannsdottir, Karaman, & Fusgen (2015). Delirium is defined as an acute change in cognitive function characterized by the disturbance in awareness and attention (Huang, 2014; Inouye, 2006). Numerous factors are thought to be contributing to delirium such as surgery, infection, dehydration, malnutrition, medications, immobilization, and organ failure (Ahmed, Leurent, & Sampson, 2014). Some individuals have a higher risk of acquiring hospital delirium, especially those who have underlying dementia or are particularly frail and are more susceptible to acquire this disorder (Ahmed et al., 2014).

Once the patients acquire delirium, they could have one of the three types of delirium: hyperactive, hypoactive, and mixed type. Each type of delirium has its unique characteristics. For instance, in hyperactive delirium, patients often exhibit agitation and hypervigilance, whereas, in hypoactive delirium, patients display a decrease in motor activity and lethargy. Sometimes, patients could have a mixed-type of delirium in which they exhibit characteristics of both hyperactive and hypoactive delirium's features (Inouye, 2006; Wan, & Chase, 2017). Due to the complexity of this condition, it is

difficult for nurses to detect the signs and symptoms resulting in failure to implement appropriate prevention strategies to protect elderly patients. As a result, up to 56% of hospitalized older adults develop delirium during their hospital stay (Ahmed et al., 2014; Inouye, 2016) contributing to $164 billion in health care costs annually and an increased risk of mortality (Leslie et al., 2011; Weinrebe, Johannsdottir, Karaman, & Gusgen, 2015; Witlox et al., 2010).

1.2. Problem Statement

Although delirium occurs frequently, it often goes unrecognized by nurses. Literature indicates that up to 75% of the time nurses fail to recognize this condition for many reasons (Ahmed et al., 2014; Inouye et al., 2001; Rice et al., 2011). One of the reasons is related to lack of knowledge and training because geriatric care is a specialty, so not all nurses received this specialty training, particularly delirium education (Baker, Taggart, Niven, & Tillman, 2015; Hare, McGowan, Wynaden, Speed, & Landsborough, 2008). In addition, the inadequate supportive work environment is another reason as nurses reported that the care environment in hospitals often does not meet older adults' needs (Dahle & Phinney, 2008). To improve quality of care and safety in this population, researchers have recommended using a non-pharmacological multicomponent intervention approach focusing on delirium education targeting its risk factors. This method has shown to be effective in improving nurses' knowledge of delirium management and prevention and decreased delirium prevalence in a geriatric population (American Geriatric Society [AGS], 2014; Chow, Mujahid, Butterfiled, & McNicoll, 2015; Kang, Moyle, Cooke, & O'Dwyer, 2016; Varghese, Macaden, Prekumar, Mathews, & Kumar, 2014).

1.3. Purpose of the Project

Since delirium is a common problem amongst hospitalized older adults, researchers have conducted studies to find the best method to prevent and manage delirium ranging from pharmacological to non-pharmacological interventions. The consensus from the experts is to use multicomponent non-pharmacological interventions, specifically providing nurses with education targeting the six risk factors: dehydration, immobilization, sleeping hygiene, medications, and sensory impairment (AGS, 2014). Hence, the purpose of this project was to determine whether the delirium education program increased nurses' knowledge of delirium management and prevention in hospitalized older adults using a pretest and post-test method.

1.4. The significance of the Project

Since delirium is preventable, a higher rate of delirium is associated with lower quality of care. To improve patient safety and quality of care, the Agency for Healthcare Research and Quality (AHRQ) has included delirium as a quality marker and is one of the top three conditions that need to be improved the geriatric population (Inouye, 2016). Thereby, this evidence-based project intended to improve geriatric patient outcomes by educating nurses who work on a post-surgical unit about delirium prevention and management. Annually, this unit admits 800 to 900 (35% to 40%) of geriatric patients with medical and surgical issues (T. Agnes, personal communication, September 8, 2017). Therefore, it is crucial that nurses have adequate knowledge of delirium prevention and management so they can properly care for this at-risk population.

1.5. Clinical Question

Do medical-surgical nurses who participate in the delirium education program rate their knowledge of delirium management higher than nurses who do not receive education when caring for hospitalized older adults who are at risk of delirium?

1.6. Project Objectives

This evidenced-based project aimed to enhance nurses' expertise in delirium prevention and management. The objectives of this project were: 1) to determine nurses' knowledge of delirium using pre and post-test questionnaires; 2) to develop an education program that focuses on pathology, prevalence, symptoms, prevention, and management of delirium; 3) to conduct education-training sessions; 4) to determine nurses' delirium knowledge post-intervention and retention of knowledge 3 months post-intervention. The short-term outcomes of this project would be nurses' increased knowledge of delirium prevention and management strategies, whereas, the long-term outcome would be a reduction in a delirium prevalence. Unfortunately, due to time constraints, the long-term measurement was not included in the project

CHAPTER 2: LITERATURE REVIEW AND CONCEPTUAL FRAMEWORK

2.1 Literature Search

A comprehensive literature review was conducted using various search databases: the Cochrane Database of Systematic Reviews (CDSR), PubMed, CINHAL, and Google Scholar. The keywords such as delirium, delirium prevention, delirium education, and delirium protocol were used to search for articles. Boolean searches included delirium "AND" nurse education, delirium "AND" medical-surgical patients, delirium "AND" multicomponent intervention. The search was limited to English, human, and age 65 and older. The exclusion criteria were research studies that were done in intensive care settings and pharmacology interventions. Relevant references from key articles were retrieved and reviewed. The final review encompassed twenty-seven studies from 1999-2018.

2.2. The Three Programs

The three most popular programs that healthcare organizations implemented to improve geriatric outcomes were the Hospital Elder Life Program (HELP), Nurses Improving Care for Healthsystem Elders (NICHE) program, and the multicomponent intervention program. These programs emphasized nonpharmacological interventions and nursing education (NICHE, n.d; HELP, 2018). While the NICHE and HELP programs have been around for more than 20 years and have shown positive results in the geriatric population, it is not always feasible to implement such programs due to lack of

financial and human resources. The following sections describe the characteristics of three programs that researchers have used to improve delirium outcomes.

2.3. The HELP Program

The primary focus of the HELP program is delirium prevention by concentrating on modifying risk factors. Inouye, Levy, and Levy (2012) found that this program was effective in decreasing the prevalence of delirium by targeting these risk factors: cognitive impairment, vision/hearing impairment, immobilization, psychoactive medication use, dehydration, and sleep deprivation. The uniqueness of this program was that it used trained volunteers to provide hands-on, supportive care to at-risk patients. To ensure the volunteers provided quality care, they underwent rigorous training that consisted of 16 hours of education followed by 16 hours of intensive one-on-one coaching with patients, following with quarterly education/support sessions (Inouye et al., 2012). Due to the intensive training, the trainees were required to remain in the program for six months and volunteered to work for at least a four-hour shift/week (Inouye et al., 2012). Although this research reported that this program required rigorous training and commitment of its members, adherence to the program's protocol has shown positive patient outcomes including decreased delirium incidence by 40% and reducing hospital length of stay (LOS) by two days (Zaubler et al., 2013).

2.4. The NICHE Program

NICHE is one of the largest organizations, with 566 member organizations worldwide and is well known for its research and development of geriatric care (NICHE, n.d). Historically, in 1992, the Harford Foundation Institute provided funding support to the New York University (NYU) division of nursing to develop a program called NICHE

(The John A. Hartford Foundation, n.d). This program focused on nursing education and nurse-led initiatives enhancing geriatric care by various methods such as preventing falls, decreasing delirium rates, improving cognitive function, preventing pressure ulcers and skin tears, and improving pain management (NICHE, n.d). Similar to the HELP program, there are specific training and commitment that the NICHE organization requires of its members. These requirements encompass the participation of the senior leadership at the organizational level on the way down to the unit level. At the organizational level, the senior leaders are encouraged to participate in a leadership-training program and exemplify projects that improve geriatric outcomes (Capezuti et al., 2012). Whereas at the unit level, the Geriatric Resource Nurse (GRN) model is utilized to enhance geriatric care. The goal of GRN model is to improve knowledge and expertise of geriatric care of the bedside nurse through education so that they can implement system-wide improvement in the care of geriatric patients (Capezuti et al., 2012).

2.5. Multicomponent Intervention Program

Besides the NICHE and HELP programs, the multicomponent interventions are another method that researchers have used to decrease the delirium incidence. These methods targeted non-pharmacological interventions, which included staff education, geriatric/psychiatrist consultation, delirium protocol, and/or system redesign (Lafever, Bory, & Nelson, 2015; Layne et al., 2015; Lunsstrom et al., 2005; Meako, Thompson, & Cochran, 2011; Milisen et al., 2001; Miller & Campbell, 2004; Mudge, Maussen, Ducan, & Denaro, 2012; Van de Steeg, IJkema, Wagner, & Langelaan, 2015; Tabet et al., 2005). Evidence shows that the multicomponent interventions were as effective in preventing delirium as the HELP and NICHE programs. For instance, one of the Cochran systematic

review studies examined 39 clinical trials and 16,082 participants, assessing 22 different interventions or comparisons (Siddigi et al., 2016). Of these 39 trials, 15 trials evaluated a delirium prevention intervention against usual care, ten trials compared two different interventions, and 14 trials were placebo-controlled. The results showed multicomponent interventions decreased the delirium prevalence (RR 0.69, 95% CI 0.59 to 0.81). Although there were multiple elements embedded within non-pharmacological interventions, one of the components consistently used in all studies was staff education targeting the delirium risk factors. The staff education method has been shown to be effective in improving nurses' knowledge of prevention and management of delirium, increasing delirium intervention self-efficacy (Aikechi et al., 2010; Chow et al., 2015; Kang et al., 2016; Layne et al., 2016; McCrow et al., 2014; Meako et al., 2011; Ramaswamy et al., 2010; Steeg et al., 2015), reducing the duration of delirium (Lundstrom et al., 2005), and decreasing the delirium prevalence (Mudge et al., 2011; Tabet et al., 2005).

2.6. Delirium Training Methods

The AGS (2014) recommends that healthcare professionals, particularly nurses, should be educated about delirium prevention and management because they spend more time with patients compared to other healthcare members. Therefore, it is imperative that nurses have adequate knowledge, so they can implement interventions to prevent and manage this condition effectively. Various strategies of delirium training have been used in previous studies and deemed useful in enhancing nurses' knowledge. These methods included a traditional classroom setting with multiple sessions ranging between forty-five minutes to one-and-half hours (Chow et al., 2015; Kang et al., 2016; Layne et al., 2015,

Ramaswamy et al., 2010), scripted unfolding case study design (Page, Kowlowitz, & Alden, 2010), and web-based learning (McCrow et al., 2014). Regardless of the teaching method, the educational program content that should be emphasized includes pathology, symptoms, prevalence, risk factors, prevention, and management of delirium (Kang et al., 2016; Layne et al., 2015; Tabet et al., 2005). These types of education have shown to be effective in the improvement of nurses' knowledge of delirium risk factors, symptoms, management of delirium, which in turn decreased the delirium incidence rate (Chow et al., 2015; Kang et al., 2016; Varghese et al., 2014; Tabet et al., 2005).

2.7 Conceptual Framework: Iowa Evidence-Based Practice Model

The Iowa Model of evidence-based practice guided this project. This model is comprised of seven steps containing identifying the triggers; stating the purpose; forming a team, analyzing and synthesizing the body of evidence; designing and piloting practice change; integrating and sustaining the practice change; and dissemination of results (The Iowa Model Collaborative, 2017).

During the trigger stage, a need assessment, using the 5Ps concept, was performed to identify the need and feasibility of implementing the project. The 5Ps is comprised of the purpose, patients, professional, purpose, and pattern within the microsystem (AHSP Foundation, 2011). Essentially, this process helps identify the purpose of the project, who are the patients and professionals within the microsystem, what process does the microsystem has in place to identify delirium, prevention, and management, and what are the patterns or outcomes of this project (AHSP Foundation, 2011).

Through this process, the DNP student learned that it was essential to implement the delirium education program to improve quality of care as the microsystem is served

about 900 geriatric patients annually, which was 40% of the unit population. Despite having a large geriatric population, a majority of nurses did not receive any formal delirium education. Henceforth, this could undermine their understanding of the importance of delirium screening and prevention in older adults. In term of the process to identify delirium, the policy indicates that nurses should be performing the Confusion Assessment Method (CAM) delirium screening for all patients age 65 years and older every 12 hours. However, the CAM compliance rate was about 65%. Without appropriate screening, early identification and treatments would not be possible, especially in the hypoactive and mixed-type delirium because the signs and symptoms are difficult to identify compared to hyperactive delirium. Typically, patients with hyperactive delirium often received a sitter to prevent fall or harm to self. Therefore, the DNP student used the sitter usage record to isolate all patients age 65 years older and performed a chart review to identify the delirium incidence, which revealed from January to August 2017, there were 11 cases of hyperactive delirium. An estimated cost of care for 11 patients ranged from $176,000-$715,000. Since hyperactive delirium is easier to diagnose compared to hypoactive and mixed-type delirium, these 11 cases might not capture all the delirium incidence that occurred on the unit.

The second step was to form a team to help facilitate the project. For this project, the DNP student collaborated with the nurse managers and the director of nursing practice (DNO)/NICHE coordinator for support. Step three, the DNP student conducted a literature review focusing on the delirium education program and methods of training. Three common programs were identified in the literature including NICHE program, HELP program, and multicomponent intervention program. Due to cost and time

constraint, multicomponent intervention program, especially providing staff education targeting delirium risk factors was chosen because it was low cost compared to the other two programs. For instance, the only cost that was associated with this method was the time that the DNP student spent on providing staff education. On the contrary, to have all nurses undergo NICHE training, it would cost at least $18,375 to have 35 nurses to complete 14 NICHE modules. It would take around 21 hours to complete the all modules. Similarly, the HELP program would require extensive training and fees associated with the training.

After the literature review was done, the DNP student performed the intervention on a unit to confirm the effectiveness of the intervention before disseminating the program elsewhere. If the outcomes showed positive results, the next step would be to sustain and disseminate the project. Currently, no program like this existed within the organization, so it would be beneficial to disseminate it to other units. The final step would be to share the results at the Unit-Based Council (UBC), local and national conferences, and a nursing journal.

CHAPTER 3: METHOD

3.1. Sample/ Recruitment

A convenience sample consisted of 88 nurses, 48 from a control unit and 40 on an intervention unit, were eligible to participate in this project. As for characteristics of the potential participants, a majority of the participants were female, with only one male nurse in the control unit and four in the intervention unit. These potential participants had either an associated nursing degree (ADN), a baccalaureate nursing degree (BSN), or a master of nursing science (MSN). Their nursing experience ranged from less than one year to over 20 years.

Randomized sample selection was not possible due to the natural of this project because group 2 had many novice nurses that had less than one year of nursing experience. Thus, group 2 needed the education to help enhance their knowledge and skills so that they could provide quality care to the geriatric population. The control group was chosen solely for comparison to see if the education was effective in improving nurses' knowledge in the intervention group. Participants who work on a control unit were assigned as group 1 in which they did not receive the education program, while group 2, the intervention group received a 30 minute education. With the help of the nurse managers, they announced the project at the morning huddles to recruit the potential participants. In addition, the DNP student also approached each potential participant to explain the detail of the project (see Appendix # C). Participation was voluntary.

Exclusion criteria included student nurses, health care tech (HCT) and certified nursing assistants because the education program was designed targeting only nurses. Travel and resources nurses were excluded from the study since they typically work one shift on a particular unit. Therefore, it would be difficult to collect the data.

3.2 Setting

The project took place on two medical-surgical units at an 864 bed level 1 trauma, teaching hospital located in the South East region of the U.S. As these two units admit a large number of geriatric patients annually, it is essential to assess the nurses' delirium knowledge and provide education to improve patient care. The physical layout of the units is similar, and they both belong to the same surgical division. In terms of nurse-to-patient ratio, it ranges from 1:4 to 1:6 nurses to patients. Group 1 was the control unit. The patient population admitted to this unit was predominantly patients who had urological and hematological surgery and overflow medical patients. Group 2, the intervention unit, was composed of patients with abdominal surgery, head and neck surgery, and reconstructive surgery well as overflow medical patients.

3.3. Instrument

The Nurses' Knowledge of Delirium Assessment Questionnaires contained 13 questions, which were divided into three sections: the participants' demographics, knowledge, prevention, management of delirium, and an evaluation of the program (Appendix A). The first subscale was comprised of three questions; two questions asked the participants' demographics, and one question assessed previous delirium training experience.

In addition, the next subscale contained ten questions (eight multiple choices and two true or false questions) measuring the participant's understanding of delirium prevention and management. These questions derived from the NICHE's delirium module and have been validated by the NICHE's experts. For those that seek a NICHE GRN certificate, they must score at least 80% on this particular test. All 566 NICHE organization members from all over the world used the same modules and tests to train their staff. No reliability or validity data is currently available for this test. Since Atrium Health is a member of the NICHE organization, the DNP student has completed the training and received a NICHE GRN certificate. Permission was granted to use the NICHE materials.

The third subscale contained three questions assessing the usefulness of the program. Of the three questions, two were closed-ended evaluating the participants' knowledge and skills to manage this condition, and one question was an open-ended question exploring how the participants would apply the information that has gained from the training.

3.4. Interventions

After receiving the Institutional Review Board (IRB) approval, the DNP student proceeded to the following steps: developed a delirium educational program, developed and distributed the pre-test questions, conducted educational sessions, and collected post-intervention data. Through an extensive literature review and the NICHE experts' recommendation, the education PowerPoint presentation was developed (Appendix E). Using a pre-test and post-test method with a comparison group to evaluate the effectiveness of the intervention, both groups received the same test at different intervals

to measure the participants' knowledge. It would take appropriately 10-15 minutes for the participant to answer the test, and they had two weeks to complete and return it. Once the participants completed the test, they either could give it back to the DNP student or place it in a Manilla envelope labeled as "Delirium Project Completed Test" that was placed next to the pretest questionnaires.

The next step was to provide delirium education to the participants in the intervention group (Group 2) and collect post-intervention data. A majority of the participants received a 30-minute one-on-one teaching to accommodate their work schedule. For those that did not receive one-on-one training, they received the education in a group of two to three participants. Since there were only two groups, there was not necessary to compare the test scores for any possible differences in-group versus one-on-one training. Immediately post-education, the intervention group received the post-test questionnaires (Appendix B). Once the intervention was completed for group 2, the control group received a follow-up test using a method similar as previously indicated. This test contained the same questions as the pre-test. The outcome measures were to compare nurses' knowledge at baseline and after the educational program.

3.5. SWOT Analysis

Strengths. One of the advantages of this project was that supportive literature was abundant. Additionally, having the support of the administration and nurse manager were another great benefit. Cost for implementing this project was relatively low, so the financial burden was not a factor. Since the Atrium Health System is a NICHE member, it was free to use its material.

Weaknesses. Ideally, the patient outcomes such as the incidence of delirium or hospital length of stay should be included in the results. Unfortunately, this data was not available. Therefore, the DNP student could not make a comparison to see if the intervention had any effect on the delirium incidence. Furthermore, due to time constraints, the only measurement included in the project was the results of the pre-test and post-test questionnaires.

Opportunities. This project was the first delirium educational program conducted on a post-surgical unit. If successfully implemented and effective, it could positively reduce the prevalence of delirium in hospitalized older adults (Avendaño-Céspedes et al., 2016) and LOS, which in turn could decrease healthcare cost (Leslie et al., 2008). Collaborating with a geriatrician to establish the delirium incidence cases, falls associated with delirium, and LOS would be a great opportunity as a next step.

Threats. Work environment seemed to be the biggest obstacle. Nurses constantly struggled to balance the demands of patient care with minimal resources while maintaining safety and quality of patient care, resulting in staff burnout, compassion fatigue, and lack of motivation to participate in any project. Many of them have to work overtime to meet the unit's needs due to the vacancy rate. Therefore, when implementing an educational program, it was imperative to be sensitive to their workflow. Seeking their input regarding the method of education and time that best fit their workflow could increase the participation rate.

Marketing Plan. This project affected both the internal stakeholders and external stakeholders. The internal stakeholders were the participants in the program such as nurse managers, nurses, and providers, whereas the external stakeholders were patients,

caregivers, and insurance companies (Longest, 2015). Staff nurses were one of the key stakeholders because they were the participants. Having the leadership support was essential because they can help facilitate policy change or provide funding support if needed.

The marketing plan for implementing the project had three steps. The first step was to perform a need assessment. The second step was to present the findings of the need assessment to the nurse manager to gain her support. Lastly, to achieve the participants' buy-in, the DNP student discussed the project's value, to enhance the participants' knowledge and expertise to improve patient care, at the morning huddle and at the unit-based council monthly meeting.

3.6. Timeline of Data Collection

The data collection involved a series of distributing and collecting the questionnaires. The data collection plan had four phases. The first three phase consisted of a four-week period, while the last phase took place three months post-intervention to evaluate the participants' retention knowledge. Phase one, the DNP student hand delivered the pre-test questionnaires to both units and placed these at the nursing station for visibility. It would take each participant approximately 10 minutes to complete the test. After the participants completed the test, they could return it to the DNP student or place in an envelope that was placed next to the pre-test questionnaires.

Phase 2 of the data collection plan consisted of providing education to the intervention group. Group 2 received 30 minutes of education about delirium assessment, prevention, and management while the control group continued with their usual routine and did not participate in an educational intervention. Due to the staffing

issue on the intervention unit, a majority of education was done via a one-on-one teaching method to accommodate the participant's work schedule. Immediately post-education session, the participants were asked to complete the post-test (Appendix B), which was the same as the pre-test. The goal of the post-test was to determine if there was an improvement in their delirium knowledge. The assumption was that the post-test scores would be higher than to the pre-test scores in the intervention unit. If so, this indicated the education program was effective.

Phase 3, four weeks after the pre-test, group 1 received a follow-up test (Appendix D) that had the same questions as the pre-test. Phase 4, three month following the education, the intervention group received a follow-up test to evaluate the retention knowledge. The outcome measures were to compare the test scores of group 1 and group 2 at various stages including nurses' knowledge of prevention and management of delirium before and after the intervention. Figure 1 displays the data collection timeline

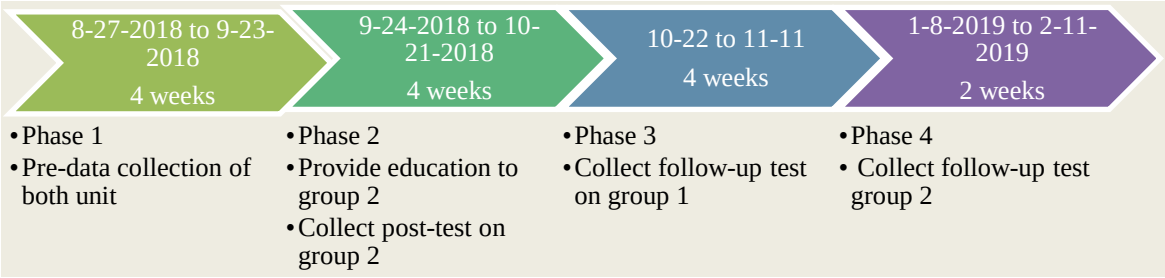

Figure 1. Data Collection Timeline

3.7. Data Analysis

The independent variables (IV) of this project included the quality of the education program (IV#1), the reliability of the test questions (IV#2), and baseline knowledge (IV #3). The outcome variables /dependent variables (DV) were nurses' knowledge of delirium (DV#1). For the data analysis, descriptive, t-tests, and

multivariate linear regression statistics were utilized. The descriptive statistics such as percentage, mean, and median were used to describe the characteristic of the sample and the baseline knowledge. As for the qualitative (open-ended question) part of the questionnaires, the DNP student examined the commonality of how the participants apply their knowledge.

Level of education, years of nursing experience, and NICHE training could potentially influence the outcomes. These three variables are known as confounding variables. Confounding variables are defined as an extraneous variable that affects the outcomes instead of the intervention (Polit & Beck, 2017). Fortunately, there are methods to control these, through either research design or statistical analysis (Polit & Beck, 2017). For this project, multivariate linear regression analysis was used to examine each of the confounding variables of the pre-test results of group 1 and group 2 separately to see if these variables had any statistical significance on the outcome variables. All of the data were transcribed onto Microsoft Excel and then IBM SPSS 25 software for data analysis.

3.8 Maintaining Confidentiality of Data

To maintain the confidentially of the participants, no participants' identification were collected. The tests were kept in sealed envelopes, and in a locked cabinet and office. The DNP student was the only one who had the key to the locked cabinet. Furthermore, all the data was transcribed onto a password protected personal computer. After the project ended, all information related to the project was shredded

CHAPTER 4: RESULTS

4.1 Timeframe of the Project

The first three phases took 12 weeks to complete and two weeks for phase four. Initially, the DNP student's plan was to recruit at least 50 percent registered nurses (RNs) from each unit. However, a two-week timeframe was not enough to achieve the goal. Therefore, it was necessary to extend to the project's timeframe, in which four weeks was dedicated for each phase. During phase 1 from August 27 to September 23, 2018, the pre-data collection was initiated where participants received the pre-test questionnaires. After this phase ended, phase two took place from September 24 to October 21, 2018 where the intervention group received the 30-minutes delirium in-service and the post-test questionnaires, while the control group continued their routine care. Phase 3 occurred from October 22 to November 11, 2018 in which the participants in the control group received a follow-up test to serve as a comparison. Finally, phase 4 three months post intervention, it took two weeks to collect follow-up data in the intervention group to assess the retention of knowledge. Figure 1 (page 18) illustrates the data collection timeframe. Another modification that was made to the project was the method of education conducted. Instead of group education sessions, a majority of the education sessions were provided in one-on-one teaching to accommodate the participants' work schedules. Two group education sessions were conducted at 7:30AM and 4:00PM.

4.2 Sample size and demographic

Of 84 nurses who qualified to participated in this study, sixty-five (*N* = 65) registered nurses (RNs) agreed to participate, which included four male (*n* = 7*)* and 61 (*n* = 61*)* female. Thirty-one participants worked on the control unit while 34 participants were from the intervention unit. The completion rate for the control unit was 80% (25/31 RNs) versus (vs.) 94% (32/34 RNs) for the intervention unit. As for the follow-up test, 28/ 32 (88%) participants in the intervention group completed the follow-up test. Completion rate was defined as when the participants in the control group completed both the pretest and follow-up test. As for the intervention unit, the participants completed both tests and participated in the delirium education. Table 1 displays participants' demographic and completion rate.

In terms of the participants' professional degree (*N* = 65), the majority had either ADN (*n* = 33) or BSN (n = 29*)* degree. Three participants *(n* = 3) held a MSN. In this sample, 56% had 0-4 years of nursing experience and only five participants (7%) had more than 20 years of nursing experience (table 1.). The mean of years nursing experience was 9.3 and the median was 4 years. During their years of nursing experience, 19 participants have received NICHE training; (*n* =7*)* participants worked on the control unit while (*n* =12) participants worked on the intervention unit. Table 2 illustrates professional attributes of participants.

Table 1. Participants' Demographic and Completion Rates

Participants Demographic (*N* = 65) and Completion Rate		**Follow-up test N (%)**
Gender	**n (%)**	
Male	4 (6)	
Female	61 (94)	
Work Location	**n (%)**	
Control Unit	31 (48)	
Intervention Unit	34 (52)	
Completion Rate	**n (%)**	
Control Unit	25 (80)	
Intervention Unit	32 (94)	28 (88)

Table 2. Participants' Professional Degree (*N* = 65*).*

Participants' Professional Degree	**n (%)**
Highest Nursing Degree	
Associate Degree	33 (50)
Baccalaureate Degree	29 (45)
Masters Degree	3(4.6)
Years of RN Experience	**n (%)**
Less than 1 year	9 (14)
1-4 years	27 (42)
5-9 years	9 (14)
10-14 years	8 (12)
15-19 years	4 (6)
> 20 years	5 (7)
Participants Received NICHE Training	n (%)
Control Unit	7 (22.5)
Intervention Unit	12 (35)

4.3 Test Results

Various statistics were used to analyze the data including independent, paired t-tests to measure the participants' knowledge at various stages as well as multivariate linear regression to examine confounding variables: education level, nursing experience, and NICHE training. To examine the baseline knowledge of both groups, an independent t-test was performed, which showed statically insignificant (t (63) = .372, p = .711) results. This indicated that there was no difference in knowledge of delirium in both groups at baseline as expected. In order to see the effects of the education program, another independent t-test was used to examine the post-test results of both groups. Results showed that the intervention group's test scores were higher than the control unit's were, and it was statically significant (Mean = 7.24 control unit vs. 9.24 intervention unit, $p < 0.00$). Therefore, the education program was effective in improving the participants' knowledge of delirium management and prevention. Interestingly, the mean scores of the control group decreased from 7.74 to 7.24, whereas the intervention group's mean scores increased significantly post-intervention from 7.61 to 9.24, which was due to the education.

Furthermore, a paired t-test was used to analyze the pre and post-test scores of the intervention group, which showed the mean test scores increased 1.46 points from 7.75 to 9.21, and it was statistically significant (t (31) = -5.61, $p < 0.00$). Consequently, RNs who participated in the education program did better on the post-test. Three months following the post-intervention, the intervention received a follow-test to assess their retention capability. The mean score of the follow-up test was a small declined compared to the score immediately after the intervention 9.24 vs. 8.29, but it was still higher than

pre-intervention 7.61 vs. 8.29 and was statically significant (t (27) = - 2.17, $p < 0.038$). Table 3 depicts the test results.

Table 3. Test Results: Mean Scores and T-tests

Test Results			
Mean (*M)* test scores	*M* Pre-Test	*M* Post-Test	*M* Follow-up Test
Control Unit	7.74	7.24	
Intervention Unit	7.61	9.24	8.29
T-tests	***P* value**		
Independent t-test at baseline (control unit vs. intervention unit)	$p < 0.711$		
Independent t-test at post-intervention control unit vs. intervention unit	$p < 0.000$		
Paired t-test (pre-test vs. post-test of the intervention unit)	$p < 0.000$		$p < 0.038$

Multivariate linear regression was utilized to examine all confounding variables as mentioned above. A stepwise linear regression method was used to determine which variables (education level, NICHE training, and years of RN experience) could influence the pre-test scores. The results indicated NICHE training was the only variable that was statistically significant (adjusted R square = 0.66, $F = 5.44$, $p < .023$), which means that participants who received NICHE training have better knowledge of delirium and scored higher on the pre-test and could potentially influence outcomes. The other two variables, year of nursing experience and education preparation had no association with delirium knowledge.

4.4 Qualitative Data Analysis

In regards to the third section of the questionnaires, two questions were closed-ended evaluating the participants' knowledge and skills to manage this condition, and one question was open-ended question exploring how the participants would apply the

information they had gained from the training. Results revealed 97% of the participants answered “Yes” that the education program did improve their knowledge as well as the program provided adequate information for them to implement delirium prevention strategies (table 4).

Table 4. Application Questionnaires Results (N=32)

Questions	**Yes N=32 (%)**
Did the delirium education improve your knowledge about delirium management?	31 (97)
Did the delirium education provides you with adequate information to help you implement appropriate strategies to prevent delirium?	31 (97)

As for the open-ended question, the DNP student entered the participants’ answers onto Microsoft Excel and then read each answer multiple times to identify the commonality of how the participants applied the information that they have gained. Three themes were identified including understand the risk factors, use non-pharmacological prevention and treatment strategies, and advocate for patients.

***Understanding the risk factors*.** Hospitalized older adults are at a higher risk of acquiring delirium due to various factors as mentioned previously. Thus, when nurses understand the risk factors they will be able implement appropriate delirium prevention strategies. For example, one of the participants described, “I plan to use this knowledge on my geriatric patients, especially after surgery when narcotics, Foley catheter etc. are all present, and how these factors play a role in delirium". Having a nurse who has a good understanding of the delirium risk factors can help mitigate this particular issue.

Use non-pharmacological prevention and treatment strategies. Another finding was that the participants thought that the education helped them learned to use a holistic approach to prevent and treat delirium instead of using pharmacological intervention. For instance, one of the participants commented, "I now know how to properly assess for true delirium and many non-pharmacological options vs. going straight to pharmacological solutions." Helping the participants understand the importance of using multicomponent non-pharmacological interventions was one of the goals of this project.

Patients' advocate. An interesting finding was that the participants not only thought that the education program helped improved their knowledge of delirium signs and symptoms as well as prevention and management strategies, they also felt that they could advocate for their elderly patients to help prevent delirium. One of the participants wrote, "Advocate for our patients, pain management, and no benzo." When nurses are equipped with delirium knowledge, they feel more confidence and able to act as a patient's advocate to help improve patient outcomes.

Table 5 displays some of the participants' comments on how they would apply their knowledge. Overall, the comments were positive with respect to improving their skills of identifying early signs and symptoms of delirium, risk factors associated with delirium, and apply multicomponent intervention strategies.

Table 5. Participants' Comments

Participants' Comments
"Able to understand delirium in the elderly and ways to prevent it"
"To better recognize and appropriately care for patients with dementia?
"I will utilize this on my elderly patients and encourage other nurses to think about the same risk factors"
"Easier to identify onset causes of delirium and some of the signs and symptoms because this affects elderly clients, nurse must keep an eye on out for these symptoms"
"I plan to use this knowledge on my geriatric patients especially after surgery when, narcotic, Foleys etc. are all present and play a role in delirium"
"Educate MDs on ordering melatonin instead of Benadryl to promote sleep"
"The knowledge I have gained will allow me to see signs of delirium in patients sooner"
"I will be able to more consistency by identify a patient with delirium"
"I will be more aware during the assessment phase to use holistic approach to Dx and Tx"
"Better understanding confusion vs delirium"
"to screen patient"
"I now know how to properly assess for true delirium and many non-pharmacological options vs. just going straight to pharmacological solutions"
"To prevent in treat delirium"
"CAM assessment more often"
"Education, use in my clinical assessment and practice "
"Every time I have an elderly patient, I will keep all risk factors in the back of my mind and will give recommendation as needed"
"Implement at bedside, advocate for our patients, pain management ,and no benzo"
Protect my patients to be proactive about preventing delirium

CHAPTER 5: DISCUSSION

5.1 Implications for Practice and Future Practice

Delirium is a common hospital complication experienced by many hospitalized older adults. Unfortunately, a majority of nurses do not realize the prevalence and seriousness of this condition. To help raise awareness of this condition and to educate nurses on a post-surgical about the prevalence, signs and symptoms, risk factors, prevention, and treatment, this study was conducted. The findings indicated that the intervention was effective in enhancing nurses' knowledge ($p < 0.00$), which in turn could improve patient outcomes. As noted in Chow et al.'s (2015) study after nurses attended two 45 minutes of education sessions, several quality improvements were found including improved in CAM assessment documentation ($p = < 0.00$), and nurses identified delirium risk factors, medication and delirium management strategies correctly ($p < 0.001$). Since older adults metabolize medications different from young adults, elder adults are at risk for delirium induced by medications. This suggested that if nurses are knowledgeable about delirium risk factors and medication management, they could advocate for their patients when providers prescribed high-risk medications.

The use of multicomponent non-pharmacological intervention such as education as a mean of improving nurses' knowledge has shown to be beneficial. In Van De Steeg et al.'s (2015) study, a stepped wedge cluster randomized trails study showed that when nurses are knowledgeable of delirium they could help reduce the delirium prevalence.

After the education program, the number of patients who acquired delirium decreased from 11.2% to 8.7%, ($p < 0.04$). Similarly, Siddigi et al.'s (2016) meta-analysis study finding of 39 clinical trials with more than 16,00 participants also indicated that the multicomponent interventions including staff education could positively improve the delirium prevalence (RR 0.69, 95% CI 0.59 to 0.81). Another benefit of the education program was that nurses who received the education adhered to the delirium care compared to those that did not receive the training (Van de Steeg, 2015). To help prevent delirium, it is critical to educate nurses, so they can implement appropriate prevention strategies to improve patient care.

Furthermore, when a patient has a cognitive impairment such as dementia, it is even more challenging to identify delirium in this specific population. This condition is referred to as delirium-superimposed dementia (DSD), which is very difficult to detect for untrained nurses. For that reason, delirium, dementia, and DSD conditions are integrated into the education program. The qualitative results showed that nurses felt more confident in distinguishing the signs and symptoms of these conditions, which was consistent with Kang et al.'s (2016) study. As nurses become proficient in knowing how to identify and manage of such conditions, their attitude towards older adults has changed and rectified misconceptions that had previously influenced the care (Kang et al., 2016).

As the geriatric population continues to grow, nurses need to be prepared to care for this population effectively in regards to preventing hospital complications including delirium. One of the methods that could improve the quality care is to invest in programs such as the NICHE, HELP program, or to educate nurses about pathology, signs, and symptoms, medications that could induce delirium, modifiable risk factors, and delirium

management strategies. The results of this project confirmed with the literature that a simple education program could increase nurses' knowledge of delirium and improve their ability to identify risk factors, signs and symptoms, and management of delirium, which in turn could decrease the delirium incidence (Aikechi et al., 2010; Chow et al., 2015; Kang et al., 2016; Layne et al., 2016; McCrow et al., 2014; Meako et al., 2011; Ramaswamy et al., 2010; Steeg et al., 2015). An additional finding of this project was that over time, the participants' knowledge declined from 9.24 to 8.29. This finding suggested that a refresher course should be provided at least one to twice a year to stay up-to-date with delirium. Furthermore, continued education about delirium should be included in a yearly nursing competency for medical-surgical nurses.

The CAM tool has been known for its high-reliability for detecting delirium (Inouye et al., 1999; Rice et al., 2011; Varghese, et al., 2014). For that reason, many hospitals including the facility where the project took place have implemented this tool a few years ago. Typically, for all patients age 65 years and older, the computer system automatically generated a nursing task to remind nurses to perform delirium screening every 12 hours using the CAM tool. Interestingly, during the study, an incidental finding was that many of the participants did not know when they see the delirium-screening task they need to complete the CAM assessment documentation. The participants have asked, "What is delirium screening and where should I chart that? This confirmed that these nurses did not understand or know how to use the tool correctly. Despite having a high-reliability tool, if the users did not use it correctly, it became meaningless. Recognizing this finding was a major concern requiring further investigation across the hospital settings to see if this issue exists elsewhere. The DNP student discussed with the hospital

NICHE steering committee to conduct a study assessing nurses' knowledge of delirium across the hospital settings and then launched an education program using e-module learning. The next step is to use evidence-based research to develop a clinical pathway for delirium prevention and management for at-risk population. Besides educating the nurses, an innovative idea to improve the delirium prevalence is to incorporate the computerized decision support to help identify a high-risk population and build an automatic trigger to prompt nurses to implement delirium prevention and management strategies using the delirium clinical pathway. To do this, it will require the collaboration of the leadership team and the informatics (IT) department.

5.2 Limitations and Recommendations

This project had several limitations including the use of a single unit, and a small sample size consisting of 65 participants. Thus, these limitations and results may not be generalizable. Further investigation with a large sample across the hospital settings is needed to determine the effectiveness of the education program and to validate the pretest and post-test. In addition, the current study only examined the nurses' knowledge gained from the education. Therefore, the recommendation for future studies is to correlate of such program with outcomes such as CAM compliance documentation, delirium prevalence, and LOS.

5.3 Summary and Conclusion

To improve quality care and decrease the delirium incidence in hospitalized older adults, it was critical that nurses have adequate knowledge of this condition so that they could implement appropriate prevention strategies. To that end, this study aimed to evaluate delirium knowledge of nurses who participated in the education program. The hope was that the participants would apply the knowledge that they gained from education in clinical practice to prevent hospital-acquired delirium in the geriatric population. Thus, to examine the effect of the intervention and to ensure the results were due to the intervention, t-tests and multivariate linear regression methods were used in the data analysis. The finding revealed that at baseline, the participants had some knowledge about delirium, but it was not statistically significant ($p < 0.711$). After education, there was a statistically significant increase in the participants' knowledge ($p < 0.00$) and they continued to retain the knowledge after three months after the intervention ($p < 0.038$). Consequently, the study's findings proved that educational intervention achieved the overall goal in enhancing the nurses' knowledge of delirium prevention and management.

Since this facility is a member of the NICHE organization, of 65 participants, 29 participants have received NICHE training. It was postulated that nurses with higher education, years of nursing experience, and previous NICHE training would have more knowledge about this condition. To assess if that hypothesis was supported, it was vital to examine these confounding variables to ensure the results were purely due to the intervention. Through multiple regression analysis, the result showed the participants with NICHE training scored higher on the pre-test. Hence, NICHE training was the only variable that could influence the outcome measure ($p < .023$). In contrast, years of

nursing experience and education level variables had no association with delirium knowledge. NICHE training was effective in improving quality care and preventing geriatric syndromes (Capezuti et al., 2012). Hence, nurse leaders at this facility should encourage their staff to undergo NICHE training, but they have to keep in mind that there would be a cost associated with it because nurses have to be compensated for spending at least 14 hours to complete the modules.

In conclusion, the results of this study are similar with previous studies that education programs are effective in improving nurses' knowledge of delirium and increase their confidence in identifying symptoms, implementing appropriate prevention strategies, and managing the condition effectively (McCrow et al., 2016). However, continued education of delirium is essential to help nurses stay abreast with the information. Further investigation is needed to correlate of such programs with clinical practice outcomes such as delirium incidence, LOS, and hospital-acquired complications (Kang et al., 2016).

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Appendix A

Pre-Test: Nurses' Knowledge of Delirium Assessment Questionnaires

Please list your cell phone number #_____ Unit: __

Answer the following demographic questions

1) Education Preparation

Diploma
ADN
BSN
MSN

2) Please list number of years of your nursing experience _____

3) Have you received NICHE training and/or received delirium education training?

Yes
No

Please select one correct answer in the following questions

4) Which environmental intervention may help to reduce factors that may exacerbate delirium?

Select one answer

a. Promote sleeping during daytime hours
b. Discourage family visits
c. Reorient patient frequently
d. Use bed or chair alarm

5) The MMSE appears to be less influenced by a patient's educational level than the Mini-Cog.

Select one answer

True

False

6) Delirium is characterized by which of the following?

Select one answer

a. Patient exhibits disturbance of consciousness with impaired attention and disorganized thinking

b. Patients has impaired judgment, concealed deficits, and failing noticed by family

c. Patient exhibits self-depreciation, perceptual disturbance absent, and neglect or self

d. Patient exhibits hopelessness, somatic complaints, and failing to be noticed by individual

7) An appropriate assessment parameter for delirium includes which of the following?

Select one answer

a. Initial observation of patient upon admission

b. Systematic screening with GDS

c. Detailed physical assessment

d. Differentiation from other pathological conditions of cognitive impairment

8) A consequence of delirium may include which of the following?

Select one answer

a. Increased mortality

b. Decreased hospital length of stay (LOS)

c. Decreased healthcare costs

d. Short term cognitive decline

9) A class of medications known to precipitate delirium includes which of the following?

Select one answer

a. Antacids

b. Vasodilators

c. Narcotics

d. Statins

10) The incidence of delirium in long-term care facilities is approximately 40%.

Select one answer

True

False

11) The CAM is a standardized tool to assess for delirium that addresses which of the following?

Select one answer

a. Predisposing medications, feelings of hopelessness, nutritional habits

b. Altered level of consciousness, psychomotor agitation, altered sleep/wake cycle

c. Functional ability, polypharmacy, social support

d. Altered sleep/wake cycle, polypharmacy, functional ability

12) A multicomponent approach that incorporates risk factors is an effective method for the prevention and management of delirium.

Select one answer

True

False

13) Precipitating factors for delirium include which of the following?

Select one answer

a. Polypharmacy, bed rest, untreated pain

b. Lack of social support, quiet environment, gentle lighting

c. Adequate hydration, consistent caregiver, structured environment

d. Consistent routine, consistent caregiver, structure activities

Appendix B

Posttest: Nurses' Knowledge of Delirium Assessment Questionnaires

Please write you cell phone number #_____ Unit _____

Did you complete the pretest questionnaires?

- ○ Yes
- ○ No

Please select one correct answer in the following questions

1) Which environmental intervention may help to reduce factors that may exacerbate delirium?

Select one answer

- ○ a. Promote sleeping during daytime hours
- ○ b. Discourage family visits
- ○ c. Reorient patient frequently
- ○ d. Use bed or chair alarm

2) The MMSE appears to be less influenced by a patient's educational level than the Mini-Cog.

Select one answer

- ○ True
- ○ False

3) Delirium is characterized by which of the following?

Select one answer

- ○ a. Patient exhibits disturbance of consciousness with impaired attention and disorganized thinking
- ○ b. Patients has impaired judgment, concealed deficits, and failing memory? noticed by family
- ○ c. Patient exhibits self-depreciation, perceptual disturbance absent, and neglect or self ?
- ○ d. Patient exhibits hopelessness, somatic complaints, and failing to ?noticed by individual

4) **An appropriate assessment parameter for delirium includes which of the following?**

Select one answer

- ○ a. Initial observation of patient upon admission
- ○ b. Systematic screening with GDS
- ○ c. Detailed physical assessment
- ○ d. Differentiation from other pathological conditions of cognitive impairment

5) **A consequence of delirium may include which of the following?**

Select one answer

- a. Increased mortality
- b. Decreased hospital length of stay (LOS)
- c. Decreased healthcare costs
- d. Short term cognitive decline

6) **A class of medications known to precipitate delirium includes which of the following?**

Select one answer

- a. Antacids
- b. Vasodilators
- c. Narcotics
- d. Statins

7) **The incidence of delirium in long-term care facilities is approximately 40%.**

Select one answer

- True
- False

8) **The CAM is a standardized tool to assess for delirium that addresses which of the following?**

Select one answer

- a. Predisposing medications, feelings of hopelessness, nutritional habits
- b. Altered level of consciousness, psychomotor agitation, altered sleep/wake cycle
- c. Functional ability, polypharmacy, social support
- d. Altered sleep/wake cycle, polypharmacy, functional ability

9) **A multicomponent approach that incorporates risk factors is an effective method for the prevention and management of delirium.**

Select one answer

- True
- False

10) **Precipitating factors for delirium include which of the following?**

Select one answer

- a. Polypharmacy, bed rest, untreated pain

- ○ b. Lack of social support, quiet environment, gentle lighting
- ○ c. Adequate hydration, consistent caregiver, structured environment
- ○ d. Consistent routine, consistent caregiver, structured activities

14**) Did this course improve your knowledge about delirium management? Yes No**

15) **Did the course provide you with adequate information to help you implement appropriate strategies to prevent delirium? Yes No**

16) **How are you planning to use the information that you have gained from this course?**

Appendix C

Participant's Information about Impact of Delirium Education Project

This study is being conducted by Tru Byrnes, MSN, CNL, RN, CMSRN, DNP Student
You are invited to participate in a project: Impact of Delirium Education. The purpose of this project study is to assess and improve the participant's knowledge of delirium prevention and management. To participate in this study, you must work on the participant units, which is 10Tower and 5Tower at Atrium Health. You will be asked to complete a pre-survey and a post-survey that contains 13 questions. The survey will not take more than 10 minutes to complete. If you are in the intervention group, you will be asked to participate in a 30 minutes education delirium training session. As a result, you will gain a better understanding of delirium prevention and management in hospitalized older adults. There are no known risks to participate in this project.

Your decision to participate is voluntary. Completion of the survey will serve as a consent. However, if you decided not to participate or want to stop, this will not affect your relationship with your supervisor or Atrium Health.

The data will be collected by the project leader and will not contain any identifying information or any link back to you or your participation in this project. If you have any question about the project, please contact Tru Byrnes (704-355-6250 or 60348). If you have any questions about the conduct of this study or about your right as a participant, you may call the Institutional Review Board (IRB) Office Compliance at the Atrium Health (704-355-3158) or IRB Office Compliance at UNC Charlotte (704) 687-1871.

Appendix D

1) Did you complete the pre-test, education, and post-test

- Yes
- No

Please select one correct answer in the following questions

2) Which environmental intervention may help to reduce factors that may exacerbate delirium?

Select one answer

- a. Promote sleeping during daytime hours
- b. Discourage family visits
- c. Reorient patient frequently
- d. Use bed or chair alarm

3) The MMSE appears to be less influenced by a patient's educational level than the Mini-Cog.

Select one answer

- True
- False

4) Delirium is characterized by which of the following?

Select one answer

- a. Patient exhibits disturbance of consciousness with impaired attention and disorganized thinking
- b. Patient has impaired judgment, concealed deficits, and failing noticed by family
- c. Patient exhibits self-depreciation, perceptual disturbance absent, and neglect or self
- d. Patient exhibits hopelessness, somatic complaints, and failing to noticed by individual

5) **An appropriate assessment parameter for delirium includes which of the following?**

Select one answer

- a. Initial observation of patient upon admission
- b. Systematic screening with GDS
- c. Detailed physical assessment
- d. Differentiation from other pathological conditions of cognitive impairment

6) A consequence of delirium may include which of the following?

Select one answer

- a. Increased mortality
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7) A class of medications known to precipitate delirium includes which of the following?

Select one answer

- a. Antacids
- b. Vasodilators
- c. Narcotics
- d. Statins

8) The incidence of delirium in long-term care facilities is approximately 40%.

Select one answer

- True
- False

9) The CAM is a standardized tool to assess for delirium that addresses which of the following?

Select one answer

- a. Predisposing medications, feelings of hopelessness, nutritional habits
- b. Altered level of consciousness, psychomotor agitation, altered sleep/wake cycle
- c. Functional ability, polypharmacy, social support
- d. Altered sleep/wake cycle, polypharmacy, functional ability

10) A multicomponent approach that incorporates risk factors is an effective method for the prevention and management of delirium.

Select one answer

- True
- False

11) Precipitating factors for delirium include which of the following?

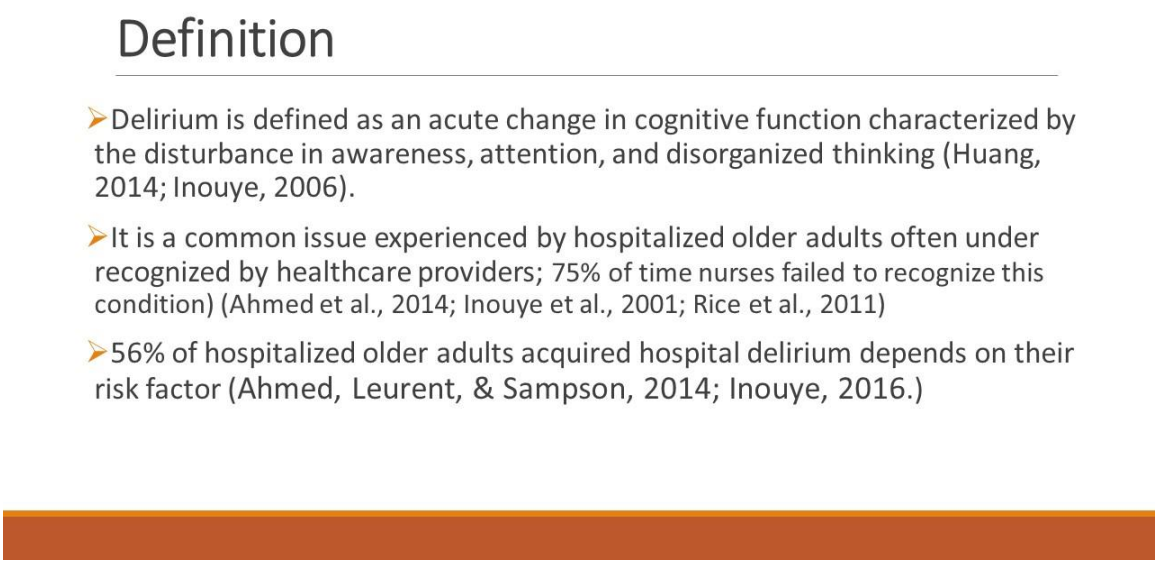
Select one answer

- a. Polypharmacy, bed rest, untreated pain

- b. Lack of social support, quiet environment, gentle lighting
- c. Adequate hydration, consistent caregiver, structured environment
- d. Consistent routine, consistent caregiver, structure activities

Appendix F


Delirium
TRU BYRNES
5TOWER
ATRIUM HEALTH-MAIN


Definition
Delirium is defined as an acute change in cognitive function characterized by the disturbance in awareness, attention, and disorganized thinking (Huang, 2014; Inouye, 2006).
It is a common issue experienced by hospitalized older adults often under recognized by healthcare providers; 75% of time nurses failed to recognize this condition) (Ahmed et al., 2014; Inouye et al., 2001; Rice et al., 2011)
56% of hospitalized older adults acquired hospital delirium depends on their risk factor (Ahmed, Leurent, & Sampson, 2014; Inouye, 2016.)

Contributing Factors

- Surgery
- Infection
- Dehydration
- Immobilization (catheterization)
- Malnutrition
- Medications (anesthesia, narcotic, sleeping medication, medications that are on the Beers list)
- Organ failures (e.g. liver, kidney)
- Sensory impairment
- Untreated pain

Who's at risk for acquiring hospital delirium?

- Older adults age 70 years and older
- Frailty
- Malnutrition
- Hx. Dementia
- ETOH

Assessment

- Perform a comprehensive assessment to differentia from other pathological conditions of cognitive impairment.
- Ask the patient's family to see if the patient's behavior is normal

Assessment tools: Confusion Assessment Method (CAM)Diagnostic Algorithm

Feature 1: Acute Onset or Fluctuating Course-Is there evidence of an acute change in mental status from the patient's baseline? Did the (abnormal) behavior fluctuate during the day, that is, tend to come and go, or increase and decrease in severity?

Feature 2: Inattention- Did the patient have difficulty focusing attention, for example, being easily distractible, or having difficulty keeping track of what was being said?

Feature 3: Disorganized thinking- Was the patient's thinking disorganized or incoherent, such as rambling or irrelevant conversation, unclear or illogical flow of ideas, or unpredictable switching from subject to subject?

Feature 4: Altered Level of consciousness Overall, how would you rate this patient's level of consciousness? (alert [normal]), vigilant [hyperalert], lethargic [drowsy, easily aroused], stupor [difficult to arouse], or coma [unarousable])

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

Inouye et al. (1990).

Mini-Mental State Examination (MMSE)

Patient's Name: _____ Date: _____

***Instructions:* Ask the questions in the order listed. Score one point for each correct response within each question or activity.**

Maximum Score	Patient's Score	Questions
5		"What is the year? Season? Date? Day of the week? Month?"
5		"Where are we now: State? County? Town/city? Hospital? Floor?"
3		The examiner names three unrelated objects clearly and slowly, then asks the patient to name all three of them. The patient's response is used for scoring. The examiner repeats them until patient learns all of them, if possible. Number of trials: _____
5		"I would like you to count backward from 100 by sevens." (93, 86, 79, 72, 65, ...) Stop after five answers. Alternative: "Spell WORLD backwards." (D-L-R-O-W)
3		"Earlier I told you the names of three things. Can you tell me what those were?"
2		Show the patient two simple objects, such as a wristwatch and a pencil, and ask the patient to name them.
1		"Repeat the phrase: 'No ifs, ands, or buts.'"
3		"Take the paper in your right hand, fold it in half, and put it on the floor." (The examiner gives the patient a piece of blank paper.)
1		"Please read this and do what it says." (Written instruction is "Close your eyes.")
1		"Make up and write a sentence about anything." (This sentence must contain a noun and a verb.)
1		"Please copy this picture." (The examiner gives the patient a blank piece of paper and asks him/her to draw the symbol below. All 10 angles must be present and two must intersect.) 
30		TOTAL

(Adapted from Rovner & Folstein, 1987)

Instructions for administration and scoring of the MMSE

Orientation (10 points):

- Ask for the date. Then specifically ask for parts omitted (e.g., "Can you also tell me what season it is?"). One point for each correct answer.
- Ask in turn, "Can you tell me the name of this hospital (town, county, etc.)?" One point for each correct answer.

Registration (3 points):

- Say the names of three unrelated objects clearly and slowly, allowing approximately one second for each. After you have said all three, ask the patient to repeat them. The number of objects the patient names correctly upon the first repetition determines the score (0-3). If the patient does not repeat all three objects the first time, continue saying the names until the patient is able to repeat all three items, up to six trials. Record the number of trials it takes for the patient to learn the words. If the patient does not eventually learn all three, recall cannot be meaningfully tested.
- After completing this task, tell the patient, "Try to remember the words, as I will ask for them in a little while."

Attention and Calculation (5 points):

- Ask the patient to begin with 100 and count backward by sevens. Stop after five subtractions (93, 86, 79, 72, 65). Score the total number of correct answers.
- If the patient cannot or will not perform the subtraction task, ask the patient to spell the word "world" backwards. The score is the number of letters in correct order (e.g., dlrow=5, dlorw=3).

Recall (3 points):

- Ask the patient if he or she can recall the three words you previously asked him or her to remember. Score the total number of correct answers (0-3).

Language and Praxis (9 points):

- Naming: Show the patient a wrist watch and ask the patient what it is. Repeat with a pencil. Score one point for each correct naming (0-2).
- Repetition: Ask the patient to repeat the sentence after you ("No ifs, ands, or buts."). Allow only one trial. Score 0 or 1.
- 3-Stage Command: Give the patient a piece of blank paper and say, "Take this paper in your right hand, fold it in half, and put it on the floor." Score one point for each part of the command correctly executed.
- Reading: On a blank piece of paper print the sentence, "Close your eyes," in letters large enough for the patient to see clearly. Ask the patient to read the sentence and do what it says. Score one point only if the patient actually closes his or her eyes. This is not a test of memory, so you may prompt the patient to "do what it says" after the patient reads the sentence.
- Writing: Give the patient a blank piece of paper and ask him or her to write a sentence for you. Do not dictate a sentence; it should be written spontaneously. The sentence must contain a subject and a verb and make sense. Correct grammar and punctuation are not necessary.
- Copying: Show the patient the picture of two intersecting pentagons and ask the patient to copy the figure exactly as it is. All ten angles must be present and two must intersect to score one point. Ignore tremor and rotation.

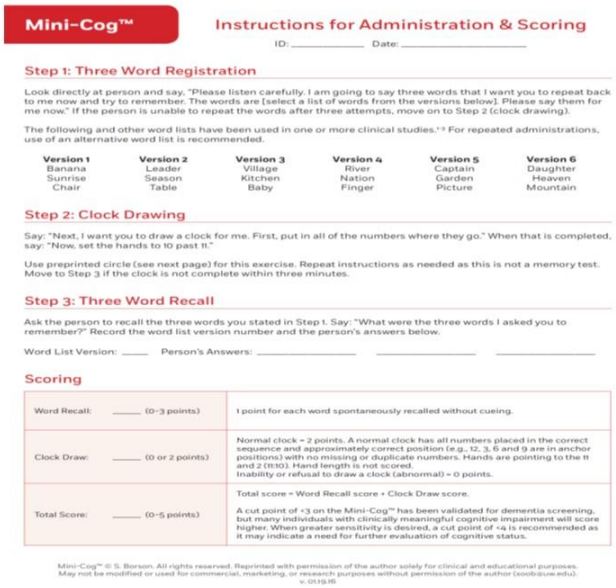
(Folstein, Folstein & McHugh, 1975)

Interpretation of the MMSE

Method	Score	Interpretation
Single Cutoff	<24	Abnormal
Range	<21	Increased odds of dementia
	>25	Decreased odds of dementia
Education	21	Abnormal for 8th grade education
	<23	Abnormal for high school education
	<24	Abnormal for college education
Severity	24-30	No cognitive impairment
	18-23	Mild cognitive impairment
	0-17	Severe cognitive impairment

Mini-Cog

It is a 3-minute instrument that can increase detection of cognitive impairment in older adults It consists of two components, a 3-item recall test for memory and a simply scored clock drawing test. As a screening test, however, it does not substitute for a complete diagnostic workup



Mini-Cog™ Instructions for Administration & Scoring

ID: _____ Date: _____

Step 1: Three Word Registration

Look directly at person and say, "Please listen carefully. I am going to say three words that I want you to repeat back to me now and try to remember. The words are [select a list of words from the versions below]. Please say them for me now." If the person is unable to repeat the words after three attempts, move on to Step 2 (clock drawing).

The following and other word lists have been used in one or more clinical studies.[1-3] For repeated administrations, use of an alternative word list is recommended.

Version 1	Version 2	Version 3	Version 4	Version 5	Version 6
Banana	Leader	Village	River	Captain	Daughter
Sunrise	Season	Kitchen	Nation	Garden	Heaven
Chair	Table	Baby	Finger	Picture	Mountain

Step 2: Clock Drawing

Say: "Next, I want you to draw a clock for me. First, put in all of the numbers where they go." When that is completed, say: "Now, set the hands to 10 past 11."

Use preprinted circle (see next page) for this exercise. Repeat instructions as needed as this is not a memory test. Move to Step 3 if the clock is not complete within three minutes.

Step 3: Three Word Recall

Ask the person to recall the three words you stated in Step 1. Say: "What were the three words I asked you to remember?" Record the word list version number and the person's answers below.

Word List Version: ____ Person's Answers: _____ _____ _____

Scoring

Word Recall:	____ (0–3 points)	1 point for each word spontaneously recalled without cueing.
Clock Draw:	____ (0 or 2 points)	Normal clock = 2 points. A normal clock has all numbers placed in the correct sequence and approximately correct position (e.g., 12, 3, 6 and 9 are in anchor positions) with no missing or duplicate numbers. Hands are pointing to the 11 and 2 (11:10). Hand length is not scored. Inability or refusal to draw a clock (abnormal) = 0 points.
Total Score:	____ (0–5 points)	Total score = Word Recall score + Clock Draw score. A cut point of <3 on the Mini-Cog™ has been validated for dementia screening, but many individuals with clinically meaningful cognitive impairment will score higher. When greater sensitivity is desired, a cut point of <4 is recommended as it may indicate a need for further evaluation of cognitive status.

Mini-Cog. (n.d). *Instruction for administration and scoring.* Retrieved from http://mini-cog.com/wp-content/uploads/2015/12/Universal-Mini-Cog-Form-011916.pdf

Delirium Prevention

- Mobilize patient
- Schedule non-narcotic pain medication is preferred rather than PRN narcotic
- Avoid these medications: benzodiazepines, anticholinergics, sedative-hypnotics,diphenhydramine, hydroxyzine, histamine- 2 receptor antagonists and meperidine.
  - Acceptable to use benzodiazepines for alcohol withdraw, seizure, or chronic benzodiazepines users
- Sleeping hygiene (keep patient awake during the date and sleep at night)
- Discontinue Foley catheter
- For sensory impairment patients:
  - Make sure they wear glasses or hearing aids
- Hydration (oral or IV fluid)

Delirium Management: nonpharmacological

- nonpharmacological management is recommended over pharmacological
- Identify the sources that cause delirium
- Implement multicomponent interventions include: reorientation, mobilization, individualized therapeutic activities, cognitive stimulation, sleep hygiene, nutrition, hydration, sensory aids and geriatric consultation

Waszynski,C. (2016). *Delirium. In NICHE Knowledge Center.* Retrieved from http://elearningcenter.nicheprogram.org/course/view.php?id=352&pageid=1393

Pharmacological Management

- This method is used when nonpharmacological is proven to be ineffective.
- Antipsychotics at the lowest dose for the shortest duration may be used for severe agitation or distress due to hyperactive delirium.
- Benzodiazepines should not be used as the first line of treatment unless related to alcohol withdrawal
- Do not use antipsychotic medication to treat hypoactive delirium

Waszynski,C. (2016). *Delirium. In NICHE Knowledge Center.* Retrieved from http://elearningcenter.nicheprogram.org/course/view.php?id=352&pageid=1393

Waszynski,C. (2016). *Delirium. In NICHE Knowledge Center.* Retrieved from http://elearningcenter.nicheprogram.org/course/view.php?id=352&pageid=1393

Consequences of Delirium

- Increase mortality during hospitalization and death up to two years
- Prolonged hospital stay
- Increase rate of hospital readmission
- Increase cost in health care ($164 billion cost annually)
- Increase facility placement
- Decline in cognitive impairment
- Permeant brain damage – development of Alzheimer disease
- Worsening pre-existing dementia

Waszynski, C. (2016). *Delirium. In NICHE Knowledge Center.* Retrieved from http://elearningcenter.nicheprogram.org/course/view.php?id=352&pageid=1393

Nursing Implications

- Prevention of delirium is best
  - Mobilizing, sensory aid, sleeping hygiene, schedule non narcotic medication, hydration, remove Foley catheter as soon as possible
- Early identification of delirium and the cause of delirium to reverse the condition
  - Older adults with UTI often exhibits confusion (delirium)
- Notify MD immediately
- Avoid high dose narcotic
- Avoid Benadryl as a sleeping aid for older adults (melatonin is preferred)

References

Ahmed, S., Leurent, B., & Sampson, E. (2014). Risk factors for incident delirium among older people in acute hospital medical unit: a systematic review and meta-analysis. *Age and Aging*, *43*, 326-333.

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Inouye, S. K., Van Dyck, C. H., Alessi, C. A., Balkin, S., Siegal, A. P., Horwitz, R. I. (1990). Clarifying confusion: The confusion assessment method a new method for detection delirium. *Annals of Internal Medicine, 113,* (12), 941-948.

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Waszynski,C. (2016). *Delirium. In NICHE Knowledge Center.* Retrieved from http://elearningcenter.nicheprogram.org/course/view.php?id=352&pageid=1393