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Los Angeles

A Nurse-Led Delirium Prevention Program
for Hospitalized Older Adults

A dissertation submitted in partial satisfaction of the
requirements for the degree Doctor of Nursing Practice

by

Anila Noorali Ladak

2020

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ABSTRACT OF THE DISSERTATION

A Nurse-Led Delirium Prevention Program for Hospitalized Older Adults

by

Anila Noorali Ladak

Doctor of Nursing Practice

University of California, Los Angeles, 2020

Professor Janet Mentes, Chair

Background: Delirium, an acute decline in cognition and attention, is a common and severe problem for hospitalized older adults, with incidence rates ranging from 11% to 56%, and 1.5 to 4.0-fold increased risk of death. Despite its multifaceted nature, delirium is preventable in 30% to 40% cases. A California academic community hospital experienced a higher incidence of delirium (30% to 40%) in adult non-critical care units as compared to delirium rates (11% to 29%) in similar hospital settings. The higher rates of delirium were believed to be due to fragmented, inconsistent, and non-individualized delirium care. Purpose/Objectives: The purpose of this evidence-based, quality improvement project was to determine whether a nurse-led Delirium Prevention Bundle (DPB) when compared to usual care, reduces delirium incidence in

hospitalized geriatric patients. Method: The project was a two-group, pre-post design using the nurse-led DPB educational intervention for nurses. The project was implemented in two stages: 1) an educational session for nurses on completing the DPB including the Delirium Risk Factor Identification (DRFI) tool, targeted delirium prevention strategies (based on the Hospital Elder Life Program), and nursing documentation; and 2) the DPB implementation on a 26-bed geriatric unit at a 250-bed academic community medical center. Baseline data on delirium incidence rates were collected on eligible patients on the geriatric unit for one month before the intervention and prospectively on patients who were eligible following the educational intervention. Demographic data on eligible patients and unit nursing staff as well as nurse knowledge of delirium and adherence to the DPB were collected. Statistical analyses included descriptive statistics, t-tests, and chi-square test. Results: implementation of nursing education of the DPB, the addition of the DRFI tool, and documentation template in the hospital Electronic Health Record, was effective in reducing delirium incidence rate from 16% to 14% ($p < .001$) and improving documentation compliance from <1% to 17%. Nurse delirium knowledge was also improved significantly (pre-test mean 80.0, post-test mean 94.3, $p = .029$). Conclusion: Nursing education utilizing the DPB is an effective approach in increasing nurse awareness of preventive care for delirium and decreasing incident delirium in this population.

The dissertation of Anila Noorali Ladak is approved.

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2020

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Ladak, A. & Yeo, V. (2014). A nurse-driven daily interdisciplinary discussion to improve patient quality of care. National 'Geriatrics: Care of the older adult conference, Dallas, Texas.

Chapter 1

Introduction

The Doctor of Nursing Practice (DNP) scholarly project was focused on an evidence-based intervention for the prevention of delirium in the hospitalized geriatric patient population. Delirium, an acute decline in cognition and attention, is a common and severe problem for hospitalized older adults, with incidence rates ranging from 11% to 56%, and 1.5 to 4.0-fold increased risk of death (Inouye, Westendorp et al., 2014). Delirium in hospitalized older adults is of particular concern because patients age 65 and older account for more than 48% of all days of hospital care (Administration on Aging, 2017). The development of delirium is associated with increased morbidity, functional and cognitive decline, nursing time per patient, length of stay (LOS), skilled nursing facility (SNF) placement, healthcare utilization, and caregiver burden (Inouye, Westendorp et al., 2014; Leslie & Inouye, 2011). Despite its multifaceted nature and link up to multifarious morbidity, delirium is preventable in 30% to 40% cases (Fong et al., 2009). There is robust evidence available in the literature for the effectiveness of multicomponent, non-pharmacologic targeted interventions in reducing the incidence of delirium in hospitalized older adults (Inouye, 2018).

Background

Delirium, also known as the acute confusional state, encephalopathy, acute brain failure, organic brain syndrome, is a multifactorial disorder associated with many complex medical conditions. It is characterized as an acute and fluctuating disturbance in awareness, attention, and perception (American Psychiatric Association, 2013). These disturbances develop rapidly, usually over hours to days, and fluctuate over the course of a day. The disturbance is caused by direct physiological consequences of a medical condition, substance intoxication/withdrawal, or

multiple etiologies as evidence from patient clinical history, physical examination, and/or laboratory findings (American Psychiatric Association, 2013). The onset of incident delirium is related to the interaction of patient vulnerability due to predisposing factors present before hospital admission and superimposed precipitating factors such as noxious insults occurring during hospitalization (Inouye, 2018). There is abundant evidence that delirium results in long-term poor outcomes and death in hospitalized older adults twice more likely than those without delirium (Witlox et al., 2010). Delirium often initiates a cascade of events that are linked to patient safety and incidents of falls and related injuries in a hospital setting (Inouye, Westendorp et al., 2014). Besides patients suffering from the negative consequences of delirium, health care workers also undergo distress due to compromised safety, increased workload, uncertain situation, resulting in low morale and job satisfaction (Partridge et al., 2012). Finally, health care institutions also face negative effects including loss of revenue estimated at nearly \$16,306 to \$64,421 per patient (Leslie, & Inouye, 2011). The higher cost of care for delirious patients is directly related to a longer LOS, sitter costs, and reduced reimbursements for hospital-acquired conditions (Rubin, et al., 2011).

The California academic, community medical center selected for this DNP scholarly project experienced a higher rate (30% to 40%) of incident delirium in older adults admitted in adult non-critical care units (hospital Electronic Health Record [EHR] data, 2018) as compared to delirium rates (11% to 29%) in similar hospital settings (Inouye, Westendorp et al., 2014). Patients age 65 and older accounted for more than 30% of the hospital days (hospital EHR data, 2019) and were vulnerable to delirium due to multiple coexisting chronic conditions, frailty, and acute illness. As articulated by expert geriatric nurses in the medical center, the higher rate of delirium in older adults was due to fragmented, inconsistent, and non-individualized delirium

care. Nurses also identified having no standardized delirium prevention program in place for hospitalized older adults as a practice gap. Though the ‘delirium prevention and management’ guideline was in place to direct care, there were significant variations in actual practice across adult units in the hospital. Some of the causes identified by nursing staff for inconsistent care included a lack of familiarity with prevention strategies and management of acute delirium symptoms, time constraints to apply prevention strategies, and availability of supplies (such as delirium tool kit including games, music for cognitive stimulation). Additionally, a lack of documentation of delirium related interventions caused inadequate hand-off communication among staff and interprofessional teams, resulting in inconsistent and non-individualized care delivery.

Problem Statement

Delirium is a widespread and serious condition with high morbidity and mortality rates in hospitalized older adults. The clinical problem addressed in this DNP project was a higher incident rate of delirium in hospitalized older adults.

Aim of Project

The overall aim of this evidence-based quality improvement project was to reduce the incidence rate of delirium in hospitalized geriatric patients, as preventive nursing care can minimize or prevent episodes of delirium in hospitalized older adults.

Clinical Question

The clinical question examined for this DNP scholarly project was: For hospitalized geriatric patients age 65 and older (P), does a Nurse-Led Delirium Prevention Bundle (DPB) (I)

compared to usual care (C), reduce the incidence rate of delirium over a one-month pilot period (T).

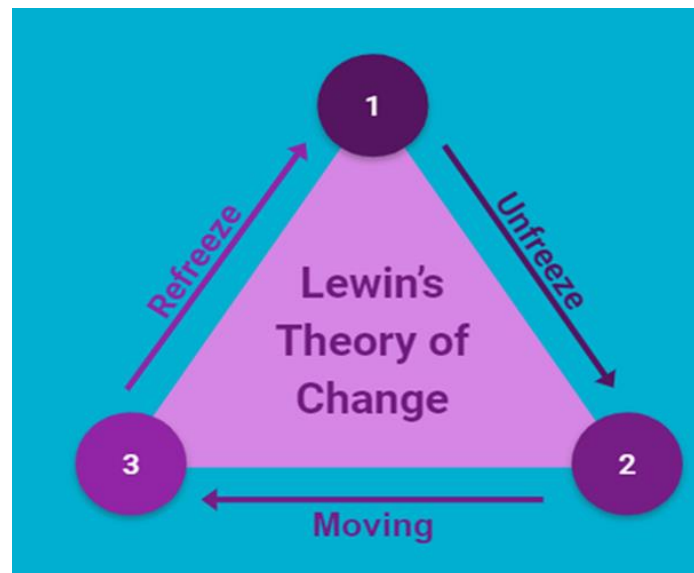
Though older adults are at high risk due to predisposing and precipitating factors, delirium is preventable by nurses in an acute care hospital setting. This DNP project was aimed to lower the incidence of delirium by implementing an evidence-based intervention for the prevention of delirium in the hospitalized geriatric patient population.

Chapter 2

Theoretical Framework

Lewin's Theory of Planned Change was applied to the clinical problem of delirium prevention on an inpatient geriatric unit (see Figure 1). Lewin's change theory values human behavior and its relationship to change and patterns of resistance to change (Lewin, 1951). The theory acknowledges forces that drive change and factors that can disrupt change from occurring (Lewin, 1951). The application of Lewin's change theory was ideal for the clinical problem and success of this evidence-based intervention. Lewin's theory offered strategies for planning the practice change with the stakeholders and the nursing staff's involvement that was required to sustain the new culture. Three stages of Lewin's change theory are described below.

Figure 1: Lewin's Theory of Planned Change



Unfreeze Stage

The unfreeze stage concentrated on preparing the unit and institution for the change. The first step was for the institution to realize that there is a challenge (a higher incidence of delirium) requiring a change. In response to the identified need for improving delirium prevention care, a delirium champions' team was formed by the project lead, and a quality improvement project as a pilot was initiated in the geriatric unit. A delirium champions' team consisted of various members of the unit's interprofessional workforce (geriatrician, hospitalist physician, nurses, physical therapist, and social worker) and hospital leadership. The specific delirium prevention pilot was based on the outcomes of a gap analysis by the delirium champions' team after assessing current practices in the literature review. The baseline data was then collected and arrangements were made for practice change through staff involvement to gain their buy-in (Hussain et al., 2018).

Moving or Transitioning Stage

The improvement plan was implemented by the team during the Moving or Transitioning stage of the change model. The leadership and staff support were very critical in this stage of change (Hussain et al., 2018). Ongoing assessment for hurdles to the change process was monitored by the project lead and efforts were made to overcome them to continue with the change process. This moving stage was complex as individuals responded differently to change and resistance was met to adopt the new process.

Refreezing Stage

In the Refreezing stage, the focus was on returning to a sense of stability by adopting the change. During this stage of the change process, the attention was drawn to the driving forces that facilitated change and offsetting the restraining forces that hindered the change (Shirey,

2013). The achievements and barriers were assessed by data collection and outcome measurement of the project. Additional steps have been planned to stabilize the change in upcoming months, such as updating practice protocol, further staff training, follow-ups, and coaching to adopt the change permanently and make it a new culture on the unit.

Chapter 3

Literature Review

This evidence-based quality improvement project was focused on implementing an evidence-based intervention to prevent delirium in hospitalized older adults.

Evidence Search Strategies

The databases searched for the scholarly project include PubMed and Cumulative Index of Nursing and Allied Health Literature (CINAHLPlus). The Boolean search of PubMed and CINAHL Plus using the terms ‘delirium,’ ‘prevention’, ‘geriatric’ and ‘protocol’ OR ‘guideline’ along with the filters of 10 years, English language, humans, aged: 65+ years revealed 248 articles. Other databases searched included Cochrane, Google Scholar, and references used to identify subject matter experts, and subsequent searches were conducted to identify additional literature. Ten articles were reviewed based on their evidence on delirium prevention programs implemented for patients age 65 and older admitted in adult non-critical care units including medicine, surgical and geriatric units in acute care hospital settings (See Appendix A). Publications were excluded from the synthesis of evidence if they were not peer-reviewed studies, quality improvement projects, practice standards, protocols, or guidelines.

Synthesis

The literature review uncovered numerous programs that have been developed for delirium prevention. The Hospital Elder Life Program (HELP) originated in 1999, is one of the most cited programs in the literature to prevent functional and cognitive decline in hospitalized older adults by targeting patient risk factors (Inouye, Bogardus, et al., 1999). The HELP protocols include orientation, therapeutic activities, fluid repletion, early mobilization, feeding

assistance, vision, and hearing, and designed to be implemented by the Elder Life Specialist (ELS) nurse or volunteer. The HELP model has proven clinical effectiveness and cost-effectiveness over the years and many programs have been developed based on its principles and procedures. In addition to the HELP model, the National Institute for Health and Clinical Excellence (NICE) guideline published in 2011, provided 13 specific recommendations for the prevention of delirium (O'Mahony et al., 2011). In 2014, Yue and colleagues developed and operationalized 3 new protocols (hypoxia, infection, and pain) and expanded on the existing HELP protocols (dehydration and constipation) to achieve alignment between the HELP protocols and the NICE guidelines.

Using the HELP model, Zaubler and colleagues (2013) implemented a quality improvement project consisting of the multi-component delirium interventions in a 38-bed medical floor of a 600-bed community teaching hospital. The project design was a pre/post-intervention, and patients received protocols adopted from the HELP model including daily visits, therapeutic activities, and assistance with feeding, hydration, sleep, and vision/hearing impairment by the ELS or volunteers. This project excluded the exercise/mobility protocol. The results showed a 40% reduction in the delirium incidence rate and a decrease in LOS from 6 days to 4 days. Chen et al. (2011) also applied the modified HELP protocol in a pre-post-intervention clinical trial to decrease the functional decline in elder patients hospitalized for abdominal surgery. This trial was conducted in a 36-bed general surgery unit of a 2200 bed urban hospital. The interventions delivered by the HELP nurse using the HELP protocols were: early mobilization, nutritional assistance, and therapeutic (cognitive) activities. The results showed reduced functional loss, weight loss, and delirium rate of 16.7% to 0%.

Vidán and colleagues (2009) developed a protocol to implement multidisciplinary targeted delirium interventions in daily clinical practice without additional staff (in contrast to the HELP model) to prevent delirium. They conducted a prospective controlled clinical trial to compare the incidence of delirium in patients age 70 and older admitted to a geriatric unit, and two internal medicine units. The intervention reduced the incidence of delirium and functional decline rates, and also demonstrated 75.7% compliance to interventions. Rubin and colleagues (2011) reported a successful implementation of a quality improvement project replicating the HELP model in a community teaching hospital. The program was then expanded from one to six units that sustained positive outcomes for over 7 years. The program served 7,000 geriatric patients annually and was accepted as a standard of practice throughout the hospital mainly due to dedicated staffing for the program, local adaptations to streamline protocols, availability of volunteers, and efficient data collection. The project outcomes included reduced rate of incidence delirium, decreased LOS, increased patient and nursing staff satisfaction, and cost savings.

Layne and colleagues (2015) implemented the Confusion Assessment Method (CAM) and an evidence-based delirium prevention protocol based on the 2010 National Clinical Guideline Center in a surgical unit. Interventions focused on three areas: cognitive function and reorientation, identification of risk factors, and assessment and response to the underlying causes of delirium. Nurses received a one-hour and Certified Nursing Assistants (CNA) 30 minutes mandatory education. The outcomes demonstrated increased nurses' knowledge, increased delirium identification and protocol usage, and decreased in the rate of delirium in the post-surgery older adult population.

The limitations of the above studies and quality improvement projects included no randomization, a small sample size, and modifications to the HELP protocols, limiting the

generalizability of the studies. Overall, the literature review demonstrated the importance of interprofessional, multicomponent, non-pharmacological, approaches to prevent delirium by targeting individual patient risk factors.

The evidence-based HELP program was selected to conceptualize and design this DNP project's intervention i.e., the nurse-led DPB. However, there were several adaptations made to the HELP model to enable its implementation in the pilot geriatric unit. One of the major modifications included allowing geriatric unit nursing staff to implement prevention strategies as compared to the dedicated nurses or ELS as proposed in the HELP program.

Chapter 4

Method

This DNP quality improvement project examined whether the nurse-led DPB reduces the incidence rate of delirium in hospitalized geriatric patients admitted to the pilot geriatric unit.

Ethics/ Institutional Review Board Statement

The Institutional Review Board (IRB) determined that this project did not meet the definition of human subject research and thus neither certificate of exemption nor approval is required.

Project Design

This DNP scholarly project was a two-group, pre-post design, using the DPB educational intervention for nurses. All patients admitted from January 1 to 30, 2020 served as a control group who received usual care (see Table 1). Patients admitted from March 15 to April 13, 2020, served as the intervention group and received care based on the new intervention i.e., the nurse-led DPB.

Table 1: Comparison of Usual Care versus New Intervention

Usual Care	New Intervention
No risk factor identification tool in EHR	DRFI tool in EHR
Non-targeted delirium prevention intervention such as fall prevention, orientation, feeding assistance	Targeted delirium prevention interventions (based on the HELP model) based on individual patient risk factor/s using the DRFI tool
Random volunteer visit	Purposeful volunteer visit
Frequent orientation	Purposeful orienting conversation

Random activities like puzzle, music	Cognitive stimulation activities (games, reminiscence, reading, music)
Random nursing documentation in the clinical note	Delirium documentation template
Geriatric consult	No automatic geriatric consults available only upon request on medicine units Geriatricians as primary physicians on the geriatric unit
Interdisciplinary rounds (IDR)	Daily on the geriatric unit for geriatric team patients only, however, delirium not discussed; no IDRs on medicine units

Setting

The setting was a 26-bed geriatric unit at a 250-bed academic community medical center. The patients on the pilot unit were age 65 years and older admitted under geriatric (average 60 % of unit patients) and hospitalists (average 40% of unit patients) teams (see Table 2). However, this project included patients admitted under the geriatric team only. The pilot unit was a specialized unit with a traditional academic institutional model consisting of a dedicated team of nursing staff and a rotating team of geriatric physicians and residents. The nursing staff included registered nurses (RNs) supported by a Clinical Nurse Specialist (CNS). The geriatric team also had an Advanced Practice Geriatric Nurse Practitioner (NP) working with them daily. The in-patient geriatric service team was also supported by a geriatric pharmacist, a case manager, a social worker, and a chaplain. Nurse-led interprofessional rounds were conducted daily on the unit to review each geriatric patient's care needs and plan for discharge. Finally, the pilot unit had a designated volunteer group called “Companion Care” who received specialized training to not

only provide one-on-one companionship to the patient but also purposeful orientation, therapeutic activities, feeding assistance, and more.

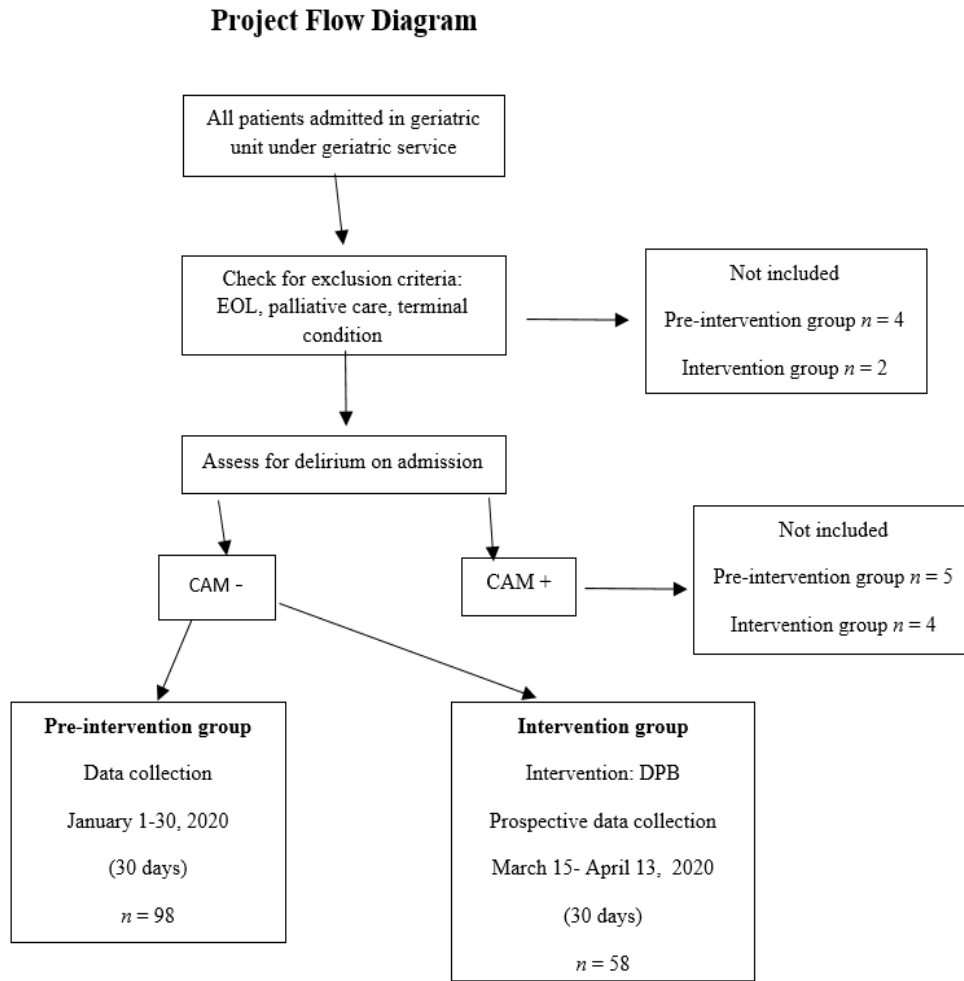
Table 2: Differences between In-Patient Geriatric and Hospitalist Teams

Geriatric	Hospitalist
Patient admitted in a dedicated geriatric unit	Patients admitted to medicine, surgical, intermediate care units
Inpatient geriatric team includes: geriatricians and residents with specialized education in geriatric care	Inpatient hospitalist team includes: hospitalists and residents with no specialized education in geriatric care
Geriatric NP on the geriatric unit	Hospitalist NP
Geriatric pharmacist on geriatric unit	No designated pharmacist on the team
Nurses have special training in geriatric care	Nurses have no special training in geriatric care
Trained volunteers on the geriatric unit	No volunteers

Sampling

A convenience sample of all patients admitted to the pilot unit under the geriatric team within the time frame of this project were included in the project. Patients with a terminal illness, receiving palliative care, hospice care, comfort care, or end-of-life (EOL) care were excluded from the project. Additionally, patients with delirium present on admission were excluded (see Figure 2). The project population was limited by census on the pilot unit. The average LOS of a geriatric team patient on the pilot unit was 4 days, and the unit occupancy was 100 percent on average days. This translated into an average of 16 patients under the geriatric team on the unit on a given day with a turnaround of 4 patients daily. There was a probability of including a sample of 100-120 ($4 \times 30 = 120$) patients over one month in the pre-intervention and intervention periods.

Figure 2: Project Flow Diagram



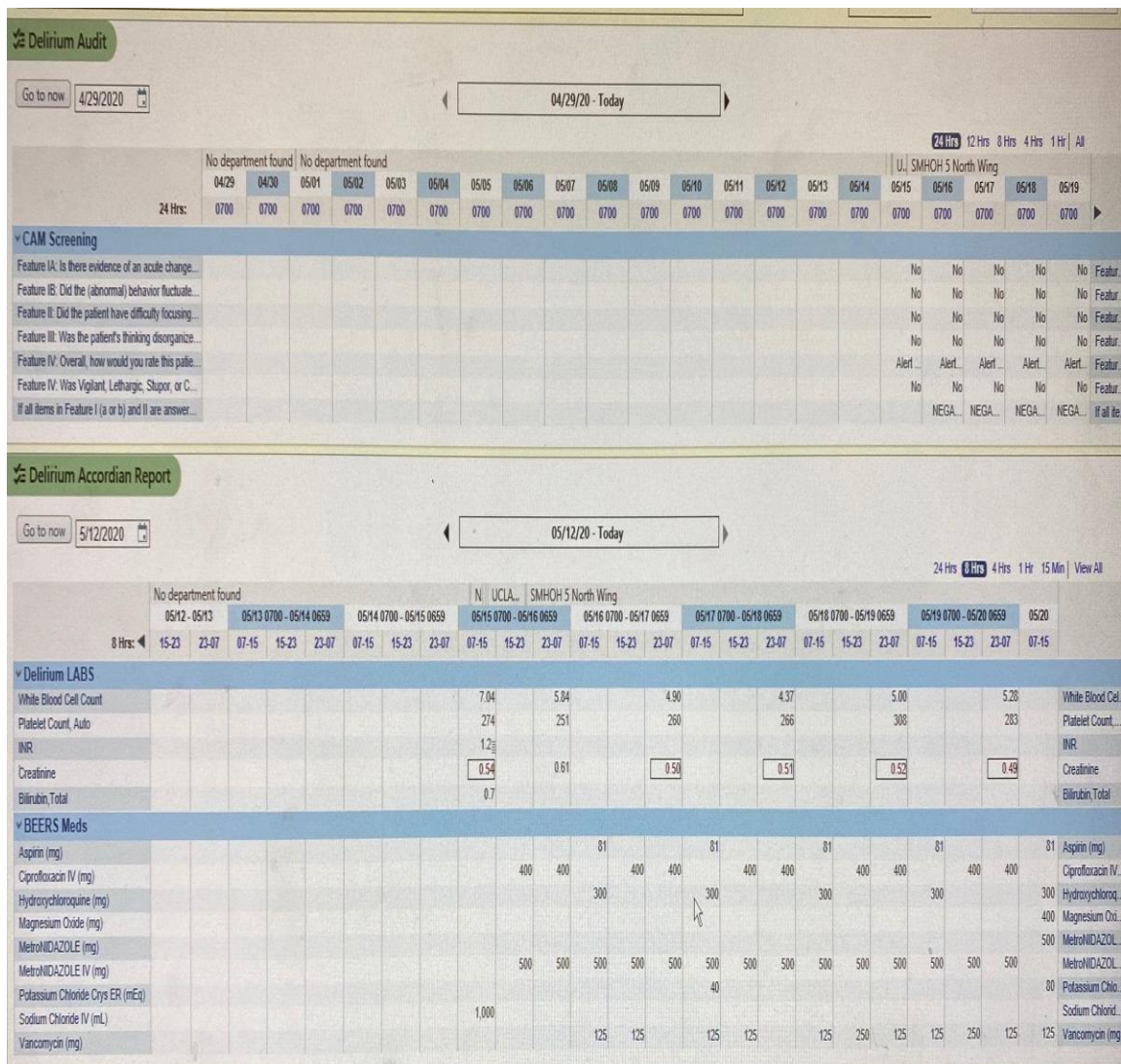
Instruments and Measures

Nurse-Led Delirium Prevention Bundle (DPB)

This evidence-based intervention included three elements: Delirium Risk Factor Identification (DRFI) tool, the HELP model targeted delirium prevention strategies, and the nursing documentation tool for delirium care. The following, a newly created DRFI tool, and the nursing documentation tool were built in the hospital EHR in collaboration with the hospital Informational Technology (IT) team before staff training.

Delirium Risk Factor Identification (DRFI) Tool. The DRFI tool was a live, concurrent, and on-demand visual tool displayed in a table and graph format in the hospital EHR system. The DRFI tool had major individual patient delirium risk factors for developing the condition (see Figure 3).

Figure 3: Delirium Risk Factor Identification (DRFI) Tool (EHR Optimization)



The DRFI tool was developed by the project lead using current evidence (Cerejeira & Mukaetova-Ladinska, 2011; Vasilevskis et al., 2012 & Ahmed et al., 2104) and input from stakeholders, delirium champions' team, nursing staff, and physicians. The specific risk factors included in the DRFI tool were selected from current literature based on being the most common and high risk, as well as the availability of data sources in the hospital EHR system (see Appendix B). The tool was validated by a geriatrician and NP, and approved by the hospital geriatric committee before the EHR build. The DRFI tool was not currently linked to triggering the DBP or documentation in EHR. The mechanism to automatically trigger the targeted delirium prevention strategies and documentation based on individual patient risk factors would be considered for future EHR optimization.

HELP Program Targeted delirium Prevention Strategies. Working in collaboration with delirium champions, stakeholders, and interprofessional teams, delirium prevention strategies were identified based on the HELP model and the NICE guidelines. Using the DRFI tool, nurses assessed patients for risk factors. Based on risk status, targeted interventions were then planned in collaboration with the interprofessional team, and strategically implemented by the nursing staff. The targeted interventions focused on purposeful orientation, therapeutic activities, vision and hearing, feeding assistance and hydration, sleep hygiene, mobilization, pain and agitation management, and patient safety (Hshieh et al., 2018). Staff nurses' also utilized 'Companion Care' volunteers to assist in executing individualized delirium prevention interventions for patients.

Delirium Care Documentation Tool. Standardized documentation decreases the variability in care (Joukes et al., 2018). A delirium nursing documentation template was created by the project lead in collaboration with unit champions to be added to the nursing flowsheet as a

drop-down menu (see Appendix C). The originally proposed tool was not approved by the hospital EHR optimization team. Subsequently, a delirium nursing note template was created and added as a unit-specific documentation requirement for the pilot unit (see Figure 4). The note contained a list of targeted delirium prevention strategies for nurses to choose from (check-off boxes) for ease of charting. Delirium care was recorded in EHR as a nurse initiated documentation. A standardized delirium note served as a communication medium for the interprofessional team to individualize patient care and monitor its effectiveness.

Figure 4: Delirium Nursing Documentation Template

DELIRIUM PREVENTION

Protocols	Strategies	Check if implemented	Comments
Risk factors	>3 present- High risk	<input type="checkbox"/>	
Purposeful orientation	Reorient, purposeful orienting conversation Familiar objects in room	<input type="checkbox"/> <input type="checkbox"/>	
Therapeutic activities	Volunteer visit Cognitive stimulation activities: games, reading, music	<input type="checkbox"/> <input type="checkbox"/>	
Vision & hearing	Assistance with: eyeglasses/vision aid Assistance with: hearing aids/hearing amplifier	<input type="checkbox"/> <input type="checkbox"/>	
Feeding & hydration	Assistance with feeding Assistance with dentures	<input type="checkbox"/> <input type="checkbox"/>	
Sleep hygiene	Shades/blinds/lights on during day, limit naps during day Quiet environment, consolidate care	<input type="checkbox"/>	
Mobilization	BMAT 3-4: Ambulate TID BMAT 2: OOB daily to chair for meals ≤ 2 hours, each time BMAT 1: OOB to cardiac chair daily for meals ≤ 2 hours, each time	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	
Pain	Non-narcotics ATC Non-pharmacological: oil/aromatherapy, massage, music	<input type="checkbox"/> <input type="checkbox"/>	
Maintain safety	Fall precautions, volunteer visit, family at bedside, tele sitter, constant observer	<input type="checkbox"/>	
Manage agitation	Redirect with calm, gentle voice and avoid confrontation Avoid restraints and use alternative to restraints Doll, music or animal therapy, as appropriate Volunteer for companionship if safe and appropriate	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	

DELIRIUM: CAM (+)

Protocols	Strategies	Check if implemented	Comments
New-onset	MD contacted Delirium order-set initiated Bladder scan to R/O retention Assess stool impaction Medication reviewed with pharmacist	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	MD Name:
Existing	Manage and prevent further delirium	<input type="checkbox"/>	

The Confusion Assessment Method (CAM)

The CAM tool in the EHR was utilized by nurses for delirium assessment. The CAM was completed on admission, every shift, and change in patient condition and noted as positive or negative. The CAM is a standardized evidence-based tool that enables non-psychiatrically trained clinicians to identify and recognize delirium. CAM tool has demonstrated sensitivity of 94-100%, specificity of 90-95%, and high inter-rater reliability (Wei et al., 2012). The CAM includes four features found to have the greatest ability to distinguish delirium from other types of cognitive impairment. For this project, delirium was noted as a binary outcome (present or absent) based on positive or negative CAM assessment. A delirium incidence was defined as CAM positive for at least one day per patient, and only one episode per patient was counted.

Delirium Reports

Two delirium reports were built in the EHR with the support of IT to assist with the extraction of patient data from the EHR using discrete data fields. The monthly report provided data for the pre-intervention phase retrospective chart audits. The daily delirium report facilitated with the prospective data collection during the intervention phase.

Data Collection

The project lead collected data on the pilot unit patients who met the criteria via the EHR. This included: baseline data (age, gender, race/ethnicity, admitting diagnosis, dementia history and cognitive impairment), and outcome data (delirium incidence rate) (see Appendix D). Secondary outcome data was collected on LOS and delirium days in patients affected by delirium. The project lead also collected data on covariates of interest including demographics of unit nurses involved in the project, which consisted of nursing education, ANCC gerontological nursing certification, geriatric experience, and knowledge of delirium.

Project Phase Implementation

This 2-phased project included an observation phase that began with the collection of baseline data obtained from eligible patient's EHRs for demographics (age, gender, race/ethnicity, admitting diagnosis, dementia history, and cognitive impairment) and outcome (delirium incidence rate) measures. Data were collected over 30 days from January 1 to 30, 2020 with care delivered as usual. Usual Care included care provided by RNs, CNAs, geriatric physician team, and volunteers on the unit as usual.

The second phase began with an educational session prior to the delivery of the intervention. All RNs on the pilot unit received a mandatory one-hour education on the DPB including the DRFI tool, HELP delirium prevention approaches, and documentation of care, before the implementation of the intervention. The mandatory education sessions were conducted by the project lead in a formal classroom setting using PowerPoint presentations and patient case studies (see Appendix E). A total of four sessions were offered over February 2020 to ensure nursing participation. Geriatric physicians and NPs were educated on the DRFI tool via emails, unit meetings, and one-on-one interactions. CNAs education was conducted as one-on-session on the unit.

Following the educational intervention, demographic data and delirium incidence rates were collected from the EHR prospectively over 30 days from March 15 to April 13, 2020. Descriptive data were collected on the unit nurses who participated in the educational sessions and implemented the assessments and documentation for the project. The process outcomes were assessed by measuring compliance with the use of the DPB through nursing documentation. Data were managed in a spreadsheet maintaining the Health Insurance Portability and Accountability

Act compliance. Each patient in the study was assigned an identification number to organize and manage information and to ensure anonymity.

Analysis

Data were analyzed using SPSS software (version 26; IBM Inc. Armonk, New York, USA). Statistical significance was considered at $p < 0.05$. Descriptive statistical analyses were performed for the pre-intervention and intervention groups. For continuous variables, measures of central tendency e.g. mean, median, and standard deviation were provided, and proportions were used for categorical variables. Baseline demographic and outcome (delirium incidence rate) data were collected on eligible patients before and after the interventions and compared using the t-test for continuous variables (if distributions approximate normality) and chi-square test for categorical variables. When normality assumptions were not satisfied with continuous variables, the Mann-Whitney U test was utilized. The nursing documentation of DPB interventions was measured in percentage.

Timeline of Project

Thirty days of pre-intervention data from January 01, 2020, to January 30, 2020, were compared with thirty days of post-implementation data from March 15, 2020, to April 13, 2020 (see Appendix F). The education intervention was conducted during February 2020. The DRFI tool and delirium documentation went live in EHR on March 14, 2020

In summary, this project was a quality improvement using evidence-based DPB educational intervention to reduce the incidence rate of delirium in hospitalized older adults admitted to a geriatric unit of an academic medical center. A convenience sampling was used and data were collected at baseline and following intervention over one-month.

Chapter 5

Results

This DNP quality improvement project examined whether the evidence-based nurse-led DPB reduces the incidence rate of delirium in hospitalized geriatric patients.

Patient Demographics

A total of 156 patients were included in the project, with 98 patients in the pre-intervention group and 58 in the intervention group. The average age of all participants was 87.8 years (SD=7.24). Sixty-one percent of the patients were female and fifty-nine percent were white. Patients in both groups had comparable characteristics except cognitive impairment (see Table 3). There were more cognitively impaired patients in the pre-intervention group as compared to the intervention group (54% versus 34%, $p=.038$).

Table 3: Baseline Characteristics in Pre-Intervention and Intervention Groups, $n=156$

	Pre-Intervention ($n = 98, 63\%$)	Intervention ($n = 58, 37\%$)	<i>P</i> - Value ^a
Age (y)			.070
mean \pm SD	88.5 \pm 6.4	86.8 \pm 8.4	
Median	89	88	
Gender			.43
Male n (%)	36 (37%)	25 (43%)	
Female n (%)	62 (63%)	33 (57%)	
Race/Ethnicity			.30
White n (%)	59 (60%)	33 (57%)	
African American n (%)	8 (8%)	8 (14%)	
Hispanic n (%)	7 (7%)	1 (2%)	
Asian n (%)	7 (7%)	9 (16%)	

Other <i>n</i> (%)	17(17%)	7 (12%)	
Diagnosis			
Pneumonia <i>n</i> (%)	8 (5 %)	5 (3%)	.47
Urinary Tract Infection <i>n</i> (%)	4 (3%)	0 (0%)	
Septicemia/Sepsis <i>n</i> (%)	8 (5%)	2(1%)	
Gastrointestinal Bleed <i>n</i> (%)	4 (3%)	2 (1%)	
Respiratory Failure/distress <i>n</i> (%)	6 (4%)	3 (2%)	
Altered Mental Status <i>n</i> (%)	4 (3%)	1 (1%)	
Influenza <i>n</i> (%)	1 (1%)	0 (0%)	
Delirium <i>n</i> (%)	3 (2%)	1 (1%)	
Other ^b <i>n</i> (%)	60(38%)	44 (28)	
Dementia History <i>n</i> (%)	26 (27%)	12 (21%)	.41
Cognitive Impairment <i>n</i> (%)	53 (54%)	20 (34%)	.038
^a Based on the χ^2 test for categorical variables and the t-test/Mann-Whitney U test for continuous variables			
^b Other diagnoses include, but not limited to, cellulitis, Heart failure, dehydration, fall, fracture, failure to thrive, fever, bronchitis, diarrhea, colitis, chest pain, COPD, syncope, rectal bleed, anemia, atrial fibrillation, small bowel obstruction, abdominal pain, renal insufficiency, weakness.			

Overall, more patients who suffered delirium were females (10 out of 12, 83%) as compared to males ($p=.097$), though not a statistically significant finding (see Figure 5). Among racial/ethnic groups, a higher number of delirious patients were white (6 out of 12, 50%) as compared to other groups ($p=.020$) (see Figure 6). Nearly half of the patients who developed delirium during hospital stay (5 out of 12, 42%) had underlying dementia ($p=.146$), however, this finding did not achieve statistical significance (see Figure 7).

Figure 5: Comparison of Patient Demographics (Gender) and Development of Delirium, n 156

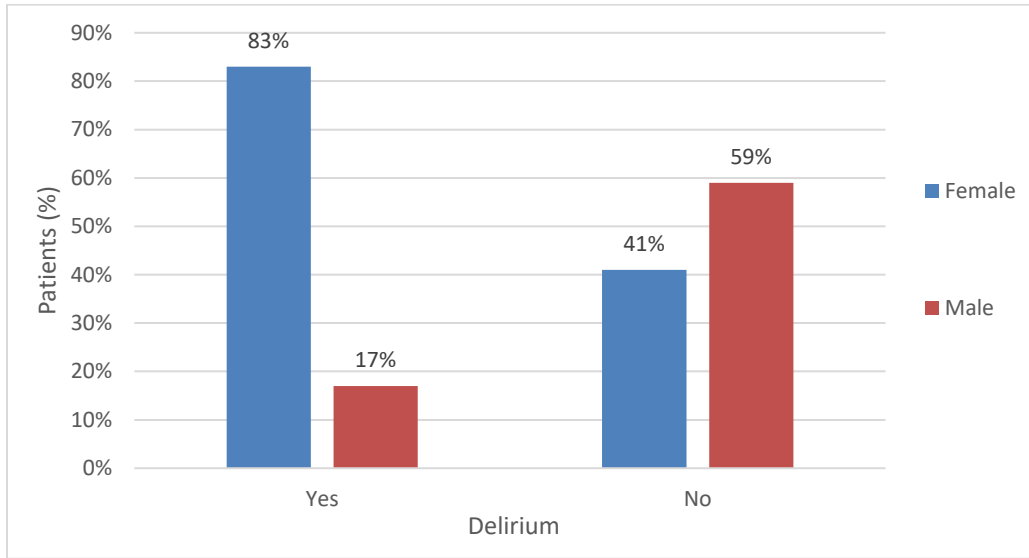


Figure 6: Comparison of Patient Demographics (Race/Ethnicity) and Development of Delirium, n = 156

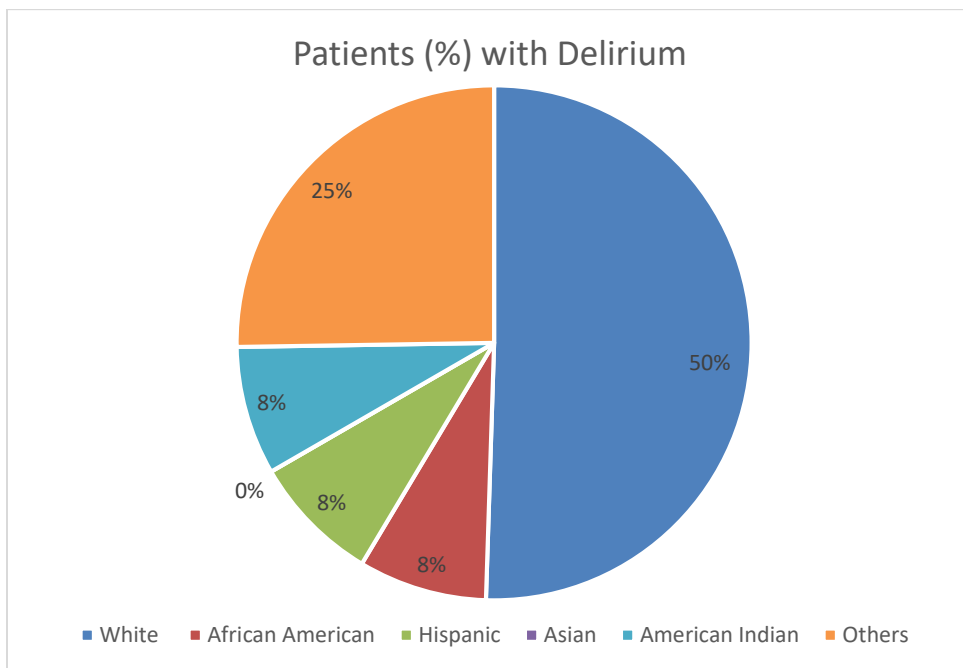
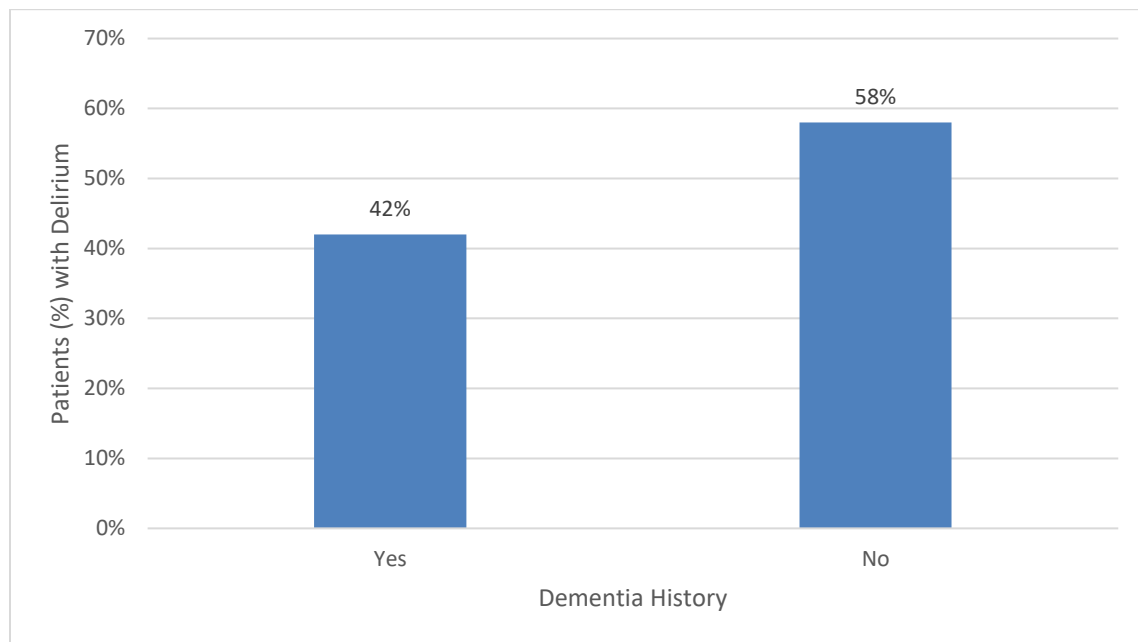


Figure 7: Comparison of Patient Demographics (Dementia History) and Development of Delirium, n = 156



Delirium Outcomes

The delirium incidence rate was significantly decreased in the intervention group (n=3) as compared to the pre-intervention group (n=9) (14.31% versus 16.01%, $p < .001$) (see Table 4). The duration of delirium episodes (delirium days) decreased from a mean of 2.1 days in the pre-intervention group to a mean of 1.6 days in the intervention group ($p = .19$) (see Figure 8). The LOS (inpatient-days), decreased from a mean of 4.6 days in the pre-intervention group to 3.2 days in the intervention group ($p = .32$) (see Figure 9). Among delirious patients (n=12), the mean LOS in the pre-intervention was 7.6 days versus 5.3 days in the intervention group ($p = .51$) (see Figure 10). However, the above findings (delirium days and LOS) did not achieve Statistical significance. Finally, the compliance of delirium documentation in EHR was 17% in the intervention group as compared to <1% in the pre-intervention group.

Table 4: Outcomes: Delirium and LOS, n=156

	Pre-Intervention (n = 98)	Intervention (n = 58)	P- value*
Delirium incidence rate (%)	16.01%	14.31%	< .001
Delirium duration (d) (mean ± SD)	2.1 ± 1.2	1.6 ± 0.5	
Median	1.0	2.0	.192
LOS for all patients (d) (mean ± SD)	4.6 ± 3.9	3.2 ± 3.8	
Median	4.0	2.0	.323
LOS for delirious patients (d) (mean ± SD)	7.6 ± 5.0	5.3 ± 2.3	
Median	7.0	4.0	.511
LOS for non-delirious patients (d) (mean ± SD)	3.0 ± 1.1	1.1 ± 1.5	
Median	3.0	2.0	.188

*Based on the χ^2 test for categorical variables and the Mann-Whitney U test for continuous variables.

Figure 8: Delirium days: Comparison between Pre-Intervention and Intervention Groups, n=12

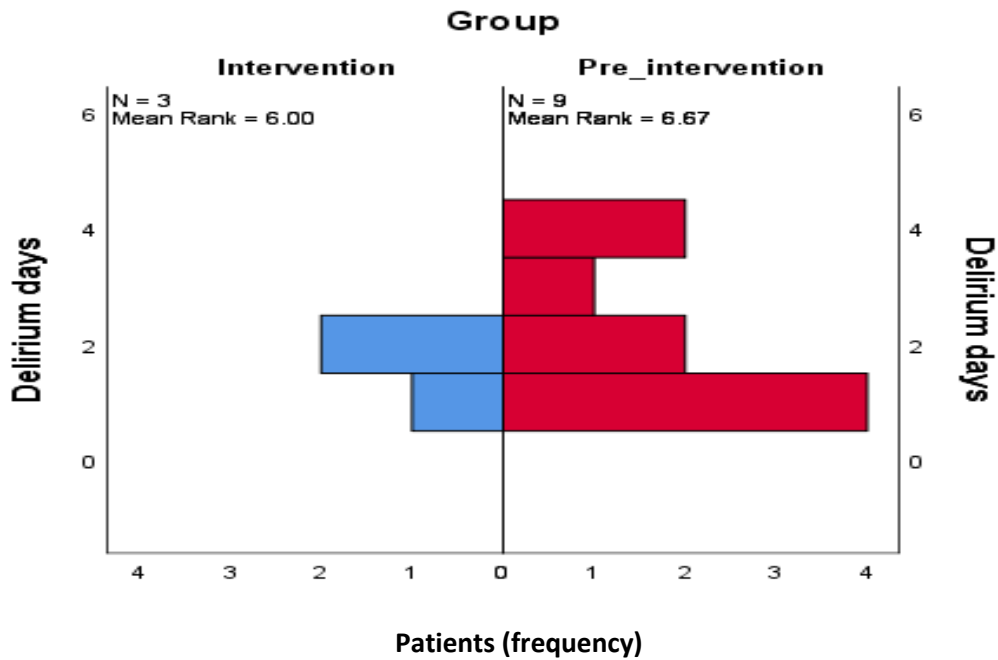


Figure 9: LOS in days: Comparison between Pre-Intervention and Intervention Groups, n=12

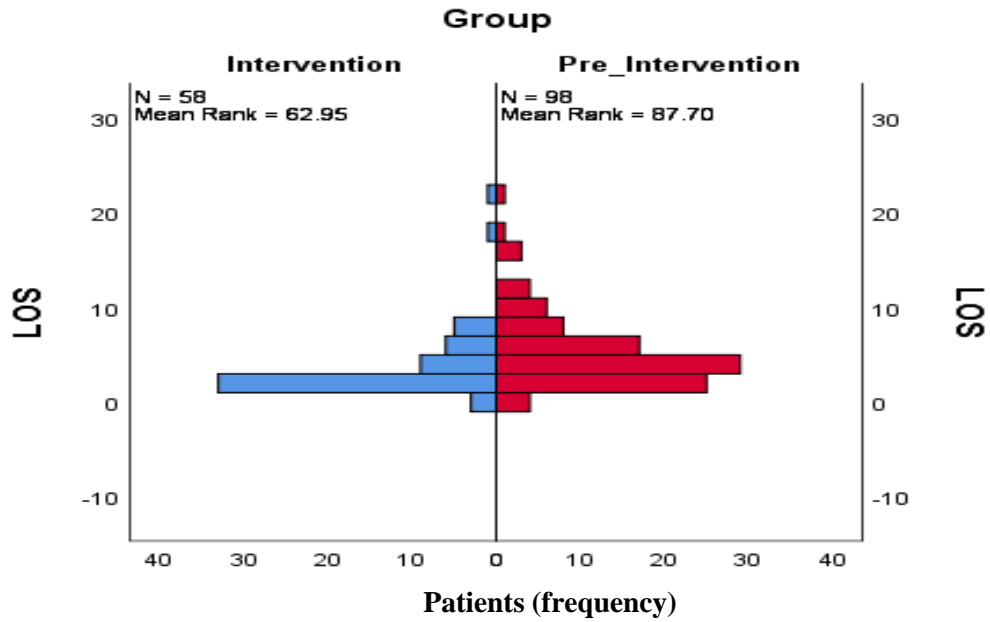
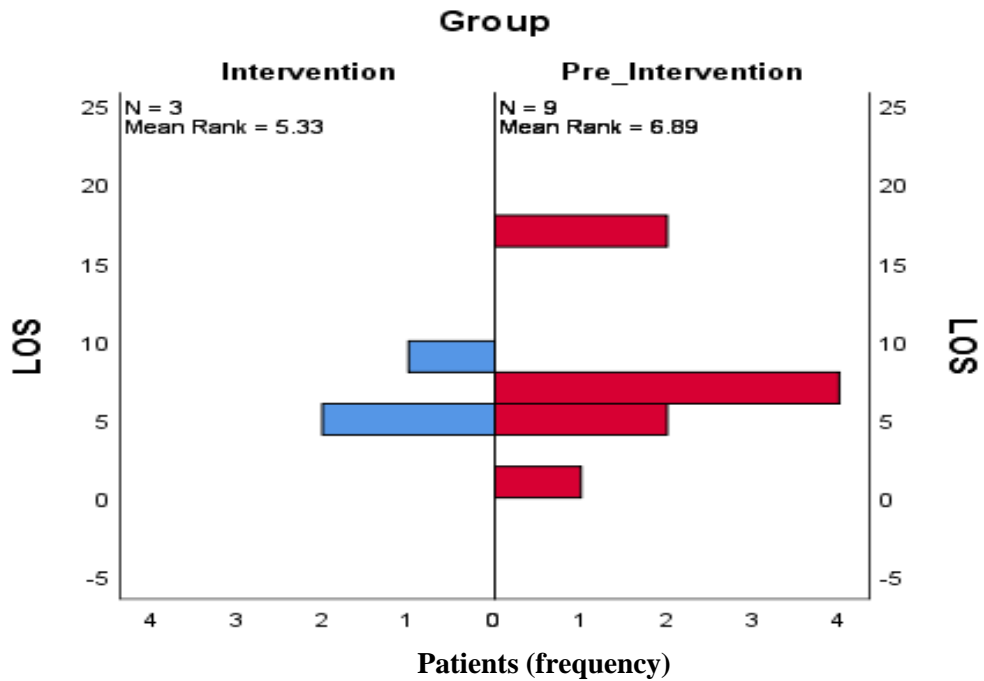


Figure 10: LOS in days in Delirium Positive Patients: Comparison between Pre-Intervention and Intervention Groups, n=12



Nursing Demographics

There were a total of forty-nine nurses in the pilot unit during the project implementation (see Table 5). Thirty-six (74%) of nurses had a Baccalaureate of Science in Nursing (BSN) degree, nineteen (39%) had American Nurses Credentialing Center (ANCC) gerontology nursing certification, and the geriatric experience ranged from <1 year to 24 years with an average of 7.38 years (see Figure 11-13).

Table 5: Nursing Demographics, Total Number of Participants, n=49

Nursing Education <i>n</i> (%)	
AA	9 (18%)
BSN	36 (74%)
MSN	4 (8%)
ANCC Gerontological Nursing Certification <i>n</i> (%)	
Yes	19 (39%)
No	24 (49%)
Not eligible	6 (12%)
Geriatric Experience (y) mean	7.38

Figure 11: Nursing Demographics: Nursing Education, n=49

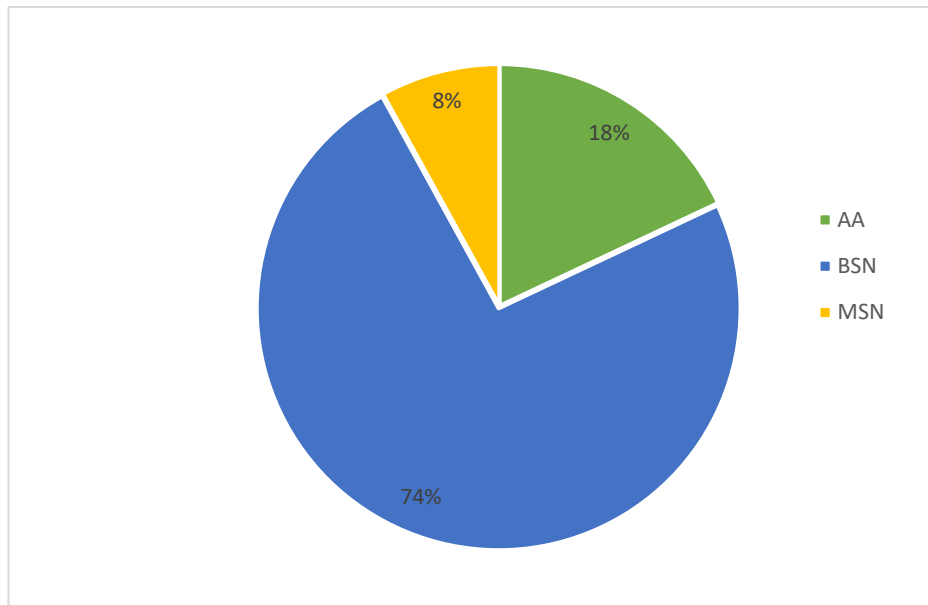


Figure 12: Nursing Demographics: ANCC Gerontological Nursing Certification, n=49

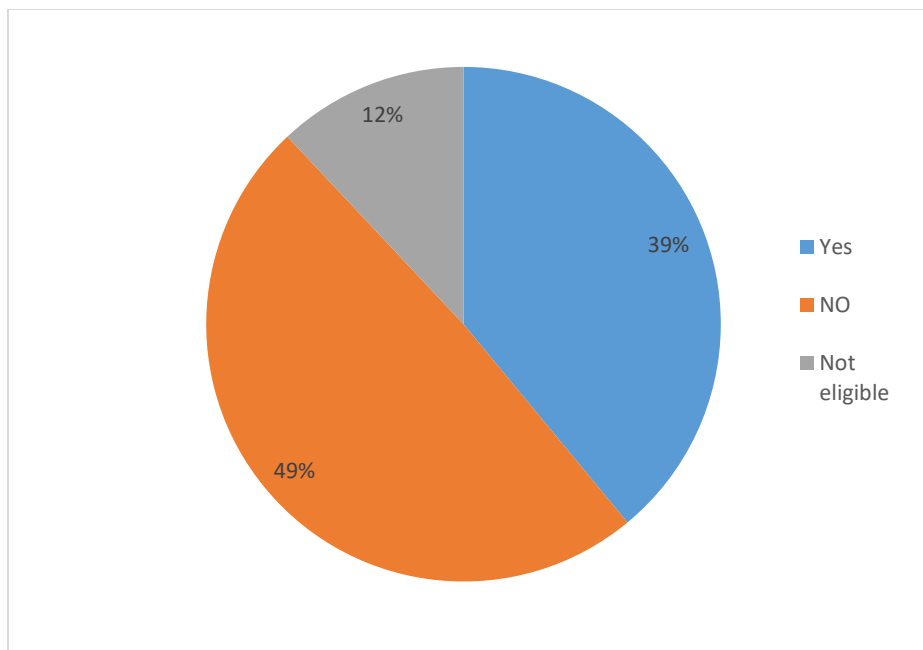
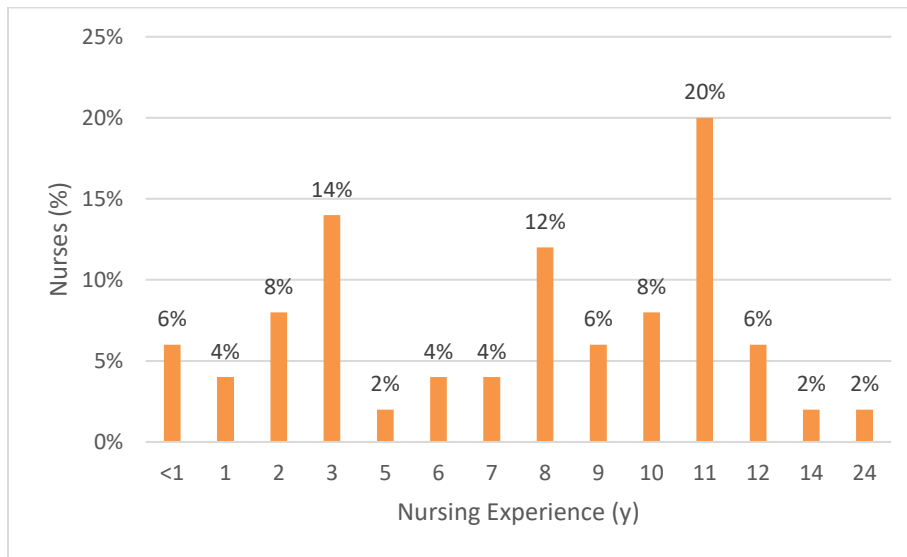


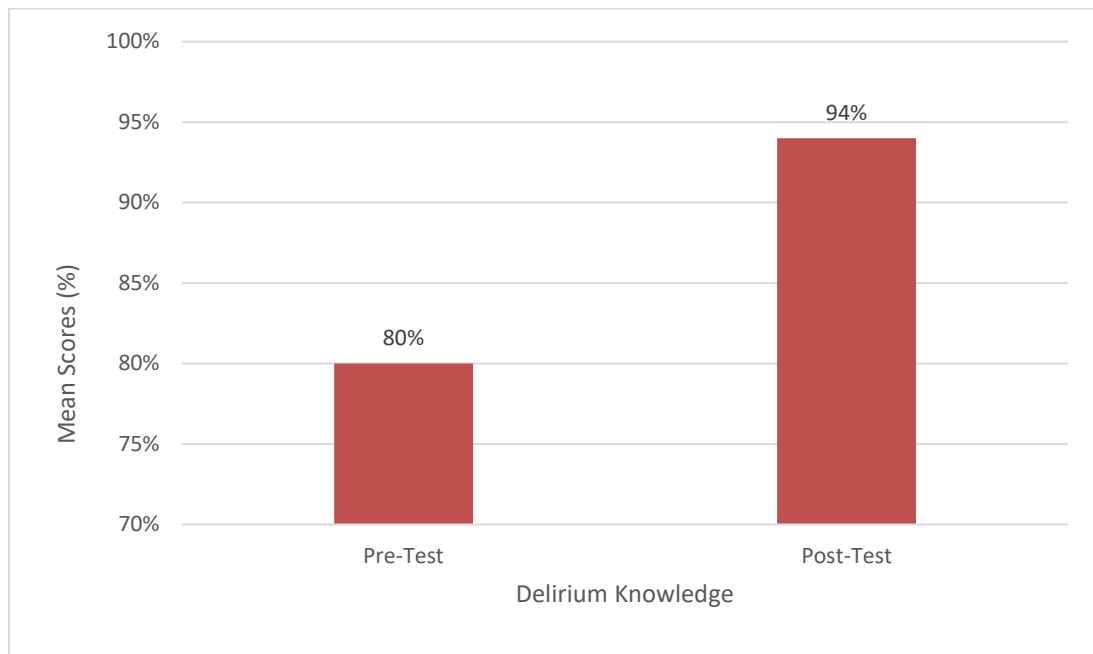
Figure 13: Nursing Demographics: Geriatric Experience in Years, n=49



Nursing Delirium Knowledge

One hundred percent of nurses received education on delirium prevention and participated in the pre-post knowledge test. Forty-seven (95.9%) out of forty-nine nurses on the pilot unit received education in a formal classroom setting. Two nurses who were not able to attend the formal training (due to personal leave) were educated in a one-on-one session by the project lead. There was a significant improvement in delirium knowledge (pre-test mean 80.00, SD=23.0 versus post-test mean 94.29, SD=22, $p=.029$) among nurses after the education session (see Figure 14). No significant association was noted in education degree and delirium knowledge (pre-test $p=.22$, post-test, $p=.044$). Similarly, having ANCC gerontological nursing certification proved no difference in delirium knowledge (pre-test, $p=.10$, post-test $p=.034$). Finally, nurses with more experience providing care to geriatric patients demonstrated no difference in delirium knowledge (pre-test $p=.58$, post-test $p=.81$).

Figure 14: Nursing Delirium Knowledge: Pre-Test versus Post-Test ($p=.029$), $n=49$



Chapter 6

Discussion

The impact of this quality improvement project was demonstrated in three important ways.

Decrease in Delirium Incidence Rate

This quality improvement project demonstrated the effectiveness of the nurse-led DPB in reducing delirium incidence rate in patients age 65 and older on the pilot unit. The overall delirium incidence rate on the pilot unit was better (baseline at 16%) than the expected rate (30% - 40%) in similar adult non-critical hospital settings. This finding suggests that the geriatric unit can serve as a role model for other adult units. There could be several reasons that contributed to a lower incidence rate including the designated geriatric unit, geriatric in-patient team, geriatric nurses, geriatric CNS, interdisciplinary rounds, and companion care volunteers. Also, the companion care volunteer group started training on delirium prevention (as part of the 'care and share' program supported by a grant) in November 2019 before this project's commencement. This may have had an impact on the overall incidence rate of delirium.

Decrease in Duration of Delirium Episodes and LOS

Besides a significant decrease in delirium incidence rate, the duration of delirium episodes (delirium days) also decreased from a mean of 2.1 days to 1.6 days. Other findings of interest were a decrease in overall LOS by 1.4 days among patients enrolled in the intervention group. Though this finding was not statistically significant, reduced LOS indicates that DPB benefited non-delirious patients by minimizing the precipitating factors and reducing physical and cognitive decline during hospitalization. Also, among delirious patients, the LOS decreased by 2.3 days in the intervention group. Again although this finding was not statistically

significant, it still supports the idea that nurses continued to implement delirium prevention intervention to patients who became delirious. These outcomes were consistent with previous quality improvement projects which utilized the modified HELP program models for delirium prevention in similar settings (Chen et al., 2011; Zaubler et al., 2013; Rubin et al., 2011 & Vidan et al., 2009).

Increase in Delirium Knowledge among Nurses

There was a significant improvement in delirium knowledge among nurses following the education session. This was consistent with findings in the literature suggesting that educational intervention has a positive impact on nurses' knowledge of delirium (Middle & Miklancie, 2015; Speed, 2015). Following the education intervention, post-knowledge test results demonstrated significant improvement in nurse delirium knowledge regardless of their background related to education, certification, or experience. Previous studies have demonstrated insufficient delirium knowledge and marginal education in nursing schools caused poor delirium recognition, prevention, and management (Akechi et al., 2010). These findings highlight the importance of delirium education for nurses that provided reinforcement as well as tools for prevention to positively impact patient outcomes regardless of educational, experiential, or certification status. This project supported the idea that increasing nurses' awareness of delirium can be achieved through an inexpensive and brief education intervention as well as the project can be easily rolled out across to other adult units caring for the geriatric population in the medical center.

Efforts to prevent the development of delirium in at-risk patients have been well documented. The multidisciplinary, multicomponent, non-pharmacological approaches to prevent delirium by targeting individual patient risk factors have shown to improve outcomes (Inouye, Bogardus et al., 1999 & Inouye, 2018). Multicomponent strategies varied greatly in the

literature but often included staff education plus additional components such as geriatric consultation, targeted interventions, mobility and insomnia protocols, adequate pain management, and minimizing psychoactive or sedating medications. This DNP scholarly project intervention was based on the evidence-based HELP program. The HELP program is one of the most referenced programs in the literature for the prevention of cognitive decline in hospitalized older adults (Inouye, 2018). Frontline nurses with direct contact with patients are best positioned to drive delirium prevention (Schreier, 2010). Thus, this project intervention was a nurse-led prevention bundle to optimize its effectiveness and adaptability to achieve positive outcomes. The project intervention following the educational component for nurses was three-fold: the DRFI tool, HELP model targeted delirium prevention strategies and nursing documentation tool for delirium care.

Identification of delirium risk is imperative to target delirium prevention (Kostas et al., 2012). Multiple risk factors including advanced age, co-morbid conditions and acute illnesses, surgical procedures, and environmental factors (e.g., use of a bladder catheter, noise) are associated with delirium (Inouye, 2018). The DRFI tool was developed by the project lead using available evidence in the literature, input from the interprofessional team and was validated before including in the hospital EHR. Though the reliability of the DRFI tool was not tested, the delirium risk factors contained within the tool were evidence-based. Utilizing the DRFI tool embedded in the EHR system, prompt identification of individual patient risk factors for applying targeted delirium prevention interventions was feasible. The interprofessional team verbally expressed that their efficiency improved and time was saved in navigating patient information, ultimately allowing for more time with the patient. The team also appreciated the fact that data mined from patient EHR was reliable and accurate more than manually extracted

data. The tool was not only effective in identifying risk factors for prevention but also possible causative factors for delirium, thus supporting healthcare providers with management of delirium as well. Lastly, a single-screen display of delirium risk factors assisted clinicians to envision a cumulative picture of the patient and to utilize a holistic approach in preventing and managing the condition.

The second component of the intervention was the HELP targeted delirium prevention strategies. This DNP project made several adaptations to the HELP program protocols to enable its implementation in the geriatric unit. Several previous quality improvement projects had made modifications to the HELP program protocols and yet demonstrated positive outcomes (Chen et al., 2011 & Rubin et al., 2011). One of the major modifications for this project was empowering the unit nursing staff to implement delirium prevention strategies (by embedding them into their routine workflow) versus dedicated nurses or ELS as designed in the HELP program (Vidan et al., 2009). Due to financial and time constraints, it was not promising to demand dedicated HELP staff. However, there were many advantages to having bedside nurses implement the strategies. One of the benefits was that numerous patients received targeted delirium prevention consistently by expert geriatric nurses throughout the day and night shifts. Also, since frontline nurses are being empowered to make patient care decisions, delirium prevention would eventually become a culture of the institution that is sustainable without additional cost. In conclusion, allowing primary nurses to assess for delirium and then apply the prevention strategies versus ELS could overall be valuable for patients and institutions.

This DNP scholarly project was intended to serve as a pilot in the geriatric unit and then be replicated in other areas of the medical center and healthcare system. This is one more reason that the HELP model was chosen for this quality improvement project. The HELP model has

shown an added value of sustainability and replicability in a variety of health care settings including community and academic medical centers (Rubin et al., 2011).

The third component of the project intervention was the implementation of the delirium nursing documentation template in EHR. Standardized documentation reduces variability and improves the quality and compliance of nursing charting (Nahm & Poston, 2000). The intention was to increase documentation compliance for individualization and continuity of patient care. The compliance of the DPB implementation was also measured through nursing documentation. The documentation compliance rate was low as compared to similar quality improvement projects (Layne et al., 2015 & Vidán et al., 2009). This could be attributed to the project limitations including system issues requiring multiple layers of approval and ultimately not receiving the EHR optimization for user-friendly documentation. Also, a shorter duration of project implementation had not granted nurses enough time to buy-in and adopt the practice change into their workflow. Finally, the unprecedented COVID-19 pandemic during the implementation phase caused deviations from the unit normal routine that may have resulted in low compliance rates for the new documentation process.

Limitations of Project

There were several limitations of this DNP scholarly project. The selection bias was a potential threat to the internal validity of the project. Though both groups were comparable in characteristics, patients with cognitive impairment did differ in pre-intervention and intervention groups. Preexisting cognitive impairment is one of the major risk factors for developing delirium (Morandi et al., 2015). There were more cognitively impaired patients in the pre-intervention group versus the intervention group, which may have affected the incidence rate of delirium. The project used a small convenience sample and there was no randomization of the assignment as all

patients on the pilot unit admitted under the geriatric team were included in the project. However, applying the procedure to both groups (the geriatric and hospitalist team patients) during the same time was not practical. Patients were not assigned to concurrent control and intervention groups due to the risk of contamination as the same nurses would have been taking care of all patients on the unit. The impact of this threat was minimized by the shorter duration of the project. Also, assigning a control group to other units was not feasible because the pilot unit was a specialized unit which would have created variations in group characteristics. Numerous modifications to the HELP model were made to enable its implementation. Additionally, the project tools were developed by the project lead and therefore no reliability data are available. Moreover, the interventions consisted of multiple elements and not a single component. Thus, it was not possible to distinguish which element made a difference in the outcomes of this project.

One of the major challenges to the implementation of the project was the COVID-19 pandemic. This public health crisis was unprecedented. It not only had immediate effects on the project but also will have a long-lasting impact on the healthcare system and economy nationally and globally in the years to come. The pandemic affected California during February 2020 with a peak in March-April 2020. This primarily delayed the go-live date of the project and then affected its implementation. The hospital priorities changed concentrating efforts on preparation for the surge of expected COVID-19 cases. The focus was on staff education, supplies, and other strategic planning to meet the needs of the public health crisis. Also, urgencies altered for nurses, interprofessional, leadership, and the project lead. The assignments were changed to meet the needs of patients and the institution. The project lead was reassigned and was not on the unit as regularly for rounding, audits, and follow-ups. Also, reminders through emails or huddle

messages were not consistently sent during the implementation period. This may provide an explanation for the overall outcomes of this project including low documentation compliance.

The implementation of the project intervention was not consistent. During the implementation phase, there was an increase in sick calls of nursing staff, thus requiring substitution by resource nurses from the hospital float pool to meet the pilot unit's staffing needs. These resource nurses were not familiar with the unit and had not received the delirium prevention education. Furthermore, the companion care volunteers were temporarily not allowed to provide their services to the unit due to the risk of COVID-19 exposure. Likewise, no visitors were allowed to visit or stay with patients, resulting in no family/caregiver at the bedside with the patient. Therefore, nurses did not receive support with the provision of preventative strategies like companionship, orienting conversation, playing games. Subsequently, the pilot unit's fifty percent of the beds were closed (from April 6-13, 2020) for unit cleaning due to the COVID exposure. The unit staff rotated to take days off for one week for respite care and were replaced by resource nurses. In a given shift, there were only two out of six nurses from the pilot unit staff and the remaining were resource nurses. Last but not least, the anxiety and fear of the pandemic had taken a toll on all nursing staff, physicians, and leadership that may have impacted the outcomes of the project. Thus, even though this quality improvement project demonstrated a positive impact of the intervention in reducing delirium incidence rate, with the COVID-19 pandemic it is difficult to know whether the impact would have been even stronger.

Although the results of the project implementation showed a positive impact of the intervention, they may have been affected by the COVID crisis. For instance, the reduced LOS could be attributed to the pandemic and not to a reduced hospital stay for not developing delirium. Patients were discharged earlier to minimize their exposure and also to have hospital

beds available for the expected surge. The hospital, as well as the pilot unit census dropped significantly to make room for patients with COVID. If conditions allowed, patients were treated at their residential facility or SNF as much as possible to avoid admission to hospital. This greatly affected the number of patients enrolled in the intervention group and most likely their demographics. The plans for the future are to continue to sustain the project on the pilot unit and measure outcomes again at 3 and 6 months (June 2020 and December 2020). The project will then be replicated to other adult non-critical care units in the medical center and healthcare system to achieve better patient outcomes.

Future Implications

Future nursing research and quality improvement projects need to be carried out in a larger geriatric patient population to analyze the effects. There is further inquiry required to implement the DRFI tool in a variety of clinical settings to measure its validity and reliability. The subsequent quality improvement project focus could be on measuring the success of the DRFI tool among clinicians by analyzing tool utilization data. Also, it needs to be further established which specific intervention made a difference in improving outcomes as multiple strategies were implemented instantaneously. Besides measuring the data via documentation, audits/observations of the delirium prevention interventions implementation would be ideal. Similar to the HELP program, the option of dedicated staff or ELS should also be explored with hospital leadership support. Finally, consideration of interprofessional education for future projects to improve communication and teamwork for the prevention of delirium is imperative.

Conclusion

With the aging of the population, there is a need to have a major focus on reducing morbidity, mortality, and costs associated with delirium in acute care hospitals. As demonstrated

through this project, the advanced practice DNP-prepared nurse can play a valuable role in implementing evidence-based quality improvement projects to enhance delirium prevention in the at-risk patient population. Standardized multicomponent delirium prevention protocols are useful, however, implementation of targeted strategies based on individual patient risk factors is the most successful approach. Nursing education utilizing the DRFI tool is an effective method for increasing nurse awareness of preventive care for delirium. The insertion of a DPB in EHR can improve bundle compliance and documentation of care. Despite challenges, the outcomes of this DNP scholarly project are promising and sustainable in the future.

Appendix A

Table 6: Table of Evidence

Citation	Purpose	Sample/Setting	Methods (Design, Interventions, Measures)	Results	Discussion, Interpretation, Limitation of Findings
<p>Babine, R., Hyrkäs, K., Wierman, H., Bachand, D., Chapman J., & Fuller, V. (2017). Falls and delirium in an acute care setting: A retrospective chart review before and after an organization-wide interprofessional education. <i>Journal of Clinical Nursing</i>, 27, e1429– e1441. https://doi.org/10.1111/jocn.14259</p>	<p>To assess the effects of interprofessional (IP) delirium education on the identification of delirium, LOS, discharge locations in patient samples of falls</p>	<p>A 637-bed urban tertiary teaching hospital in Portland, ME</p> <p>Sample size 22%-24% of the 454 beds</p> <p>Study subjects identified through the hospital safety reporting system</p>	<p>Retrospective, observational study using pre/post design</p> <p>2 Chart reviews in 2 different time intervals conducted:</p> <p>Before IP delirium education; 98 falls within a 3-month period in 2009-2010 After IP delirium education; 108 falls within a 3-months period in 2012</p> <p>Data collection instrument by Lakatos et al., 2009:</p> <p>Demographics data (admission & discharge dates, data & location of fall, service at the time of fall & discharge location), use of symptoms to describe delirium, evidence of physiological derangements, surgeries &/or procedures performed on the day of</p>	<p>There were few statistically significant differences in both groups but largely comparable</p> <p>The Mean age 66.8 years & 64.2</p> <p>>half of male fallen</p> <p>Knowledge uptake post-education showed consistent knowledge retention at 58% 1 year after</p>	<p>An organization-wide interprofessional education and implementation of institution policy can improve delirium care and reduce fall</p> <p>Limitation:</p> <p>All reported results may not be due to education</p> <p>Due fluctuating nature of delirium, may have missed</p>

			<p>admission or day of fall & 2 days preceding the fall.</p> <p>The original tool was modified to add results of CAM for the second review.</p> <p>Data extracted for both review by 4 certified clinical nurse specialists, 1 certified nurse practitioner, 2 nurse administrators, & 1 geriatrician</p> <p>2 reviewers examined the same set of variables to ensure consistency & inter-rater reliability.</p> <p>IP education:</p> <p>The program was developed by the interprofessional team for all staff (nurses, resident physicians, nursing assistants, PTs, OTs, social workers) and presented to all 3 services lines including adult inpatient medicine, surgical & cardiology (12 units, 24-44 beds) over 12 month period.</p> <p>An evidence-based “The Concepts in Common: Quality Care for Hospitalized Elders” (CIC) module 1 was used, featured in 1-hour lecture on delirium prevention, identification, and management including how to administer CAM & AHRQ TeamSTEPPS SBAR script for communications with teams.</p> <p>Continuous follow-through re-education & re-enforcement based on weekly audits based on new delirium care practice and policy compliance by Clinical Nurse Specialist (CNS)</p>	<p>Compliance to policy achieved at 75%</p> <p>Delirium diagnoses documented 14.3% vs 29.6%</p> <p>CAM scores accuracy results comparisons provided in table 4</p> <p>LOS shortened to 3.6 days which was statistically significant (p=.016)- table 2</p> <p>Half of the patients who fell were discharged home and a half to SNF</p> <p>Fall rate:</p> <p>In 2010 3.26/1000 patient days, in 2011 & 2012 3.01 & 2.82, after IP education fall rate in 2013 2.16</p>	<p>CAM was included in 2nd review</p> <p>Data collected at 2 different time intervals & 2 slightly different patient samples</p> <p>Change staff composition, experience, knowledge & changes in hospital & unit culture over time</p>
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			<p>Knowledge test using multiple choice questions at baseline, after education, 3, 6 & 12 months post-education surveys</p> <p>Institutional Policy change:</p> <p>Developed in collaboration with physicians, staff nurses and pharmacy representatives</p> <p>Data analysis:</p> <p>SPSS version 18</p> <p>Descriptive statistics (frequencies, percentages, means & SD)</p> <p>Fisher exact test</p> <p>Wilcoxon rank-sum test</p> <p>Freeman-Halton test</p> <p>Contingency tables to compare CAM & delirium variables</p> <p>Logistic regressions</p> <p><i>P</i>-values at or <.05 were considered statistically significant</p>		
<p>Chen, C., Lin, M., Tien, Y., Yen, C., Huang, G., & Inouye, S. (2011). Modified hospital elder life program: effects on abdominal surgery patients. <i>Journal of</i></p>	<p>To study the effects of modified HELP program in decreasing functional decline & delirium in elder patients hospitalized for</p>	<p>Settings:</p> <p>This trial was conducted in a 36 beds general surgery unit of a 2200 bed urban hospital.</p> <p>Sample:</p>	<p>Method:</p> <p>A pre-post-intervention clinical trial</p> <p>Design:</p> <p>The control group received usual care from August 2007 to April 2008 and the intervention</p>	<p>Results:</p> <p>the modified HELP protocol prevented functional loss, decreased weight loss and reduced delirium rate (16.7% to 0%) in intervention group as</p>	<p>-the program required commitment & collaboration between nursing leadership and physician to have compliance</p> <p>-the reductions in functional decline are</p>

<p><i>American College of Surgeons, 213, 245-52.</i></p>	<p>abdominal surgery</p>	<p>The control group n=77 and the intervention group n=102</p>	<p>group received modified HELP interventions from May 2008 to April 2009.</p> <p>Interventions: Delivered by the HELP nurse using the HELP hospital-based care protocol: early mobilization, nutritional assistance & therapeutic (cognitive) activities.</p> <p>2 trained researchers used the standardized and culturally valid MMSE and CAM to assess for cognitive decline.</p> <p>Measures:</p> <ul style="list-style-type: none"> -ADL performance -nutritional status -cognitive function 	<p>compared to the control group</p>	<p>independent of baseline function, education, diagnosis, comorbidity, surgical procedure & duration of surgery.</p> <ul style="list-style-type: none"> -the program was feasible. One nurse managed 4-5 patients each day with 3 daily visits. <p>Limitation:</p> <ul style="list-style-type: none"> -no randomization of subjects -temporal separation of study groups - small sample size -limited generalizability due to interventions tested at only one unit -the modification of HELP protocol.
<p>Deschodt, M., Braes, T., Flamaing, J., Detroyer, E., Broos, P., Haentjens, P., Boonen, S. & Milisen, K. (2012). Preventing delirium in older adults with recent</p>	<p>To evaluate the effect of inpatient geriatric consultation teams (IGCTs) on delirium & overall cognitive function in older adults with hip</p>	<p>2 trauma units in the Leuven University Hospitals, Belgium</p>	<p>Controlled trial</p> <p>Parallel-group trial</p> <p>Verbally testable, ages 65 & older, admitted to the ED with a traumatic hip fracture were included in study</p> <p>Exclusion criteria:</p>	<p>No statistically significant differences in baseline characteristics in both groups</p> <p>Intervention reduced the incidence of delirium & cognitive decline significantly. However, participants who</p>	<p>Authors conclude that delirium can be prevented in a frail hip fracture population by interprofessional IGCT</p> <p>Overall 30% lower incidence of post-op delirium, not only</p>

<p>hip fracture through multidisciplinary geriatric consultation. <i>Journal of American Geriatric Society</i>, 60, 733-739. doi:10.1111/j.1532-5415.2012.03899.x</p>	<p>fracture on non-geriatric units</p>		<p>Polytrauma Life expectancy <6 months Refused Pathological fracture No surgery Non-native speaker No admission via ED Hard of hearing 170 participant assigned to intervention (n=94) or usual care (n=77) No blinding possible due to face-to-face contact b/w participants & IGCT but blinded to study outcomes Intervention: Both groups received usual care protocol including evaluation of living situation, General clinical assessment, ECG pre-op, mobilization by PT after surgery, anticoag & opioid pain med, & hip X-ray follow-up. Intervention participants received additional IGCT consultation IGCT consisted of: A geriatrician, a nurse, a social worker, an OT & a PT all with extensive experience in geriatric care. Other discipline available on demand. IGCT intervention: A prep-op comprehensive geriatric assessment by the team's nurse & evaluation by geriatrician; any</p>	<p>developed delirium, a geriatric consultation had no effect on severity or duration of the delirium episode Delirium incidence rate at any point after surgery: Intervention group 37.2%, p=.04 Control group 53.2% Severity or duration of delirium: No significant difference b/w groups Participants with cognitive decline at discharge: Higher with control group 38.7% vs 22.6%</p>	<p>statistically significant but clinically relevant Limitations: Participants not assessed daily for delirium, limited ability to show an effect on duration & severity of delirium episodes 1/3rd IGCT recommendations not adhered to (similar to previous studies), suggest proactive geriatric consultation as potential to have more clinical effect Study nurses not blinded to group allocation, although observe bias was minimized through structured questionnaire & scales</p>
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			<p>problem detected were prioritize in consensus other IGCT members asked to perform further evaluations post-op.</p> <p>Information gathered by team form a multidimensional image of the participant & targeted recommendations were made.</p> <p>Recommendations were shared & discussion with primary nurse, head nurse & traumatologist.</p> <p>IGCT nurse follow-up visit</p> <p><u>Instruments:</u></p> <p>Baseline data:</p> <p>age, sex, living situation, type of hip fracture, number of medications, comorbidity, functional status, mental status & confirmed diagnosis of dementia</p> <p>Comorbidity: Charlson Comorbidity Index</p> <p>Functional status: Katz Index of ADL</p> <p>Mental Status: Informant Questionnaire on Cognitive Decline in the Elderly</p> <p>10-item Geriatric Depression Scale (GDS)</p> <p>Outcome measure:</p> <p>Incidence & duration of delirium: CAM</p> <p>Severity of delirium: delirium index</p> <p>Cognitive status: MMSE</p> <p>Data collected by interview of by screening EHR, primary caregiver completed IQ-CODE</p> <p>Procedure:</p>	
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			<p>All baseline characteristics were assessed within first 24 hrs after admission & post-op</p> <p>Data on cognitive functioning (CAM, DI, MMSE) were collected pre-op & on post-op days 1, 3, 5, 8 & 15 unless discharged</p> <p>1 of 3 study nurses blinded to study outcomes but not to group allocation performed all assessments</p> <p>Instrument training:</p> <p>Senior author with clinical & research experience trained data nurses in using tools during a 3-hr session & follow-up session.</p> <p><u>Analysis:</u> SPSS version 17.0</p> <p>Descriptive analysis: mean & medians</p> <p>Chi-square to test difference in overall incidence of delirium</p> <p>Duration compared using Mann-Whitney U-test</p>		
<p>Hasemann, W., Tolson, D., Godwin, J., Spirig, R., Frei, I. A. & Kressig, R. W. (2015). A before and after study of a nurse-led comprehensive delirium management (DemDel) for older acute care inpatients with cognitive</p>	<p>To measure the effectiveness of the delirium management program (DemDel) in hospitalized elders with cognitive impairment</p>	<p>Setting:</p> <p>The study was conducted in four general medical units in an acute care university hospital in urban Switzerland.</p> <p>Intervention group n=138,</p> <p>Control group n=130</p> <p>The participants were direct admits age ≥70 medical patients with</p>	<p>Pre/post design</p> <p>Pretest phase:</p> <p>Data collected on 4 units in 2009</p> <p>Treatment as usual</p> <p>Post-treatment:</p> <p>Data collected in the same 4 units post-intervention.</p> <p>Interventions:</p> <p>DemDel consisting of 6 components:</p>	<p>-The delirium incidence was reduced to 3.6% in intervention group</p> <p>-Nurses non-adherence rate to the protocol was 34.1%</p> <p>-Delirium scores decreased in units were complaint with the protocol.</p> <p>-No significant difference duration of delirium episodes in pre</p>	<p>-The control and intervention groups were similar in demographics (age, comorbidity, cognitive impairment).</p> <p>- Significant improvement in the course of a delirium.</p> <p>-Due to the pre/post design, the risk for contamination b/w groups.</p>

<p>impairment. <i>International Journal of Nursing Studies</i>, 53, 27-28.</p>		<p>signs of cognitive impairment.</p> <p>The exclusion criteria:</p> <ul style="list-style-type: none"> -aphasic -non-native speakers -blind or deaf -advanced terminal illness or coma -known delirium due to alcohol withdrawal or benzodiazepine use -neurological disease -oncology service -consent provided by patient or family <p>Study approved by the local ethics board</p>	<p>1.education for nurses (1 day) & physician (2X30mins); monthly 30min case conferences</p> <p>2. On admission nurses screened all pts age ≥ 70 for cognitive impairment using clock drawing test & mental status questionnaire.</p> <p>3. based on nurses assessment, physicians prescribed medications (avoid Benzo, use atypical neuroleptics)</p> <p>4. implementation of evidence-based interdisciplinary measures for prevention and treatment including pain management, improve oxygenation, reduce stress, avoid infection, mobilize</p> <p>5. delirium screening using delirium observation screening scale every shift for 5 days, if positive then in-depth assessment</p> <p>6. If delirium positive, nurse-led delirium interdisciplinary interventions implementation.</p> <p>Measures:</p> <ul style="list-style-type: none"> -Swiss Mini-Mental Status -CAM -Delirium rating scale revised 98 -clock drawing test -digit span task test -comprehension test -delirium observation screening. 	<p>& post-intervention group 3.0 days vs 4.1 days</p> <p>-A significant decrease in lorazepam use and an increase in atypical neuroleptics (Quetiapine > haloperidol)</p>	<p>-The significant reduction of the use of benzodiazepine, which is the precipitating factor, also responsible for the increased severity of delirium</p> <p>-The measures and assessments used were feasible on units. Most assessments were new.</p> <p>-The adherence rate was 75% on 3 out of 4 units. The non-adherence rate of 57% was on a unit with lack of leadership support</p> <p>Limitations:</p> <ul style="list-style-type: none"> -Most affected patients could not be included due to consenting issues -Timeframe (5days) for screening was short as not all delirium was detected. screening should continue throughout hospitalization - Due to irregular appearance of delirium episodes, difficult to statistically analyze data.
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<p>Layne, T., Haas, S. A., Davidson J. E. & Klopp A. (2015). Postoperative delirium prevention in the older adult: An evidence-based process improvement project. <i>Medical Surgical Nursing</i>, 24, 256-63.</p>	<p>To implement CAM and an evidence-based delirium prevention protocol (based on 2010 National Clinical Guideline Center) in a surgical unit.</p>	<p>Setting: A 40-bed med/surg unit at a 140 bed tertiary care hospital, part of a larger integrated health care system in southern California</p> <p>Inclusion criteria: Post-op over age 65</p> <p>IRB deferred, no consent needed</p>	<p>Method: Quality improvement project</p> <p>An evidence-based delirium screening and prevention protocol was established based on available evidence</p> <p>The CAM was completed on admission, every shift and with any onset of new behavioral and cognitive changes.</p> <p>Interventions: focused on 3 areas: 1. Cognitive function and reorientation, 2. Identification of risk factors, and 3. Assessment of and response to the underlying causes of delirium.</p> <p>The patient/family educational brochure was developed to educate and obtain their help.</p> <p>Nurses received a 1-hour and Certified Nursing Assistants (CNA) 30 minutes mandatory education.</p> <p>Beers criteria was used by the pharmacist to review medications.</p> <p>A nurse and CNA champions assisted with the dissemination of guidelines & influence the multidisciplinary team</p> <p>Observations and chart audits were completed to check compliance.</p>	<p>The CAM completion compliance was 81% by nurses; delirium rate was 13% as compared to the 77% in older adult post-surgery.</p>	<p>-clinical nurses being at bedside can identify delirium early and in surgery patients</p> <p>-nurses found protocol to be useful & easy to use</p> <p>-educational intervention increase knowledge in identification & prevention of complications</p> <p>Limitations: -no baseline data (so difficult to compare) -no designated delirium charting in electronic medical record (so difficult to comply).</p>
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			The outcomes measured included the nurses' knowledge regarding delirium, increased identification of delirium and protocol usage and rate of delirium as compared to the rates found in the literature.		
Mudge, A., Maussen, C., Duncan, J., & Denaro, C. (2012). Improving quality of delirium care in a general medical service with established interdisciplinary care: A controlled trial. <i>Internal Medicine Journal</i> , 43, 270-277. doi:10.1111/j.1445-5994.2012.02840.x	To implement delirium guidelines (based on Australian Clinical Practice Guidelines for the Management of Delirium in Older People) in general medical patients to reduce incidence and duration of delirium	<p>Medical unit at a large metropolitan teaching hospital in Australia</p> <p>Inclusion criteria: Age 65 and older admitted to Intervention team □ medical unit 2</p> <p>Control teams □ medical unit 4 & 5, with anticipated LOS 3 days or more (care as usual)</p> <p>Exclusion criteria: Palliative, unconscious, critically ill, dementia, psychiatric, or intellectual disability, or dysphagia, adequate English knowledge</p> <p>Control <i>n</i>=74</p> <p>Intervention <i>n</i>=62</p>	<p>Controlled trial</p> <p>Quality improvement project</p> <p><u>Control</u></p> <p>Unit chosen because of its close physical proximity & similar staffing and policies</p> <p>Usual care not described.</p> <p><u>Intervention</u></p> <p>Project team (IP steering committee led by consultant physicians from the intervention unit) met regularly Planned & obtained input from nursing staff & volunteers over 1-year implementation period.</p> <p><u>Interventions included:</u></p> <p>A series of five 30-min weekly education sessions conducted by project team for nursing staff & IP team</p> <p>Monthly case-based nursing forums facilitated by one of the intervention unit physicians held during intervention period</p> <p>Screening for risk factors: Delirium screening within 48hrs of admission by project staff (5 days/week)</p> <p>Delirium detection: using CAM & communicate to IP team</p>	<p>Baseline delirium 27% in general medical unit (per 2006 study)</p> <p>Participants characteristics were similar in both groups</p> <p>63% delirious participants & 37% at-risk stayed in delirium bay</p> <p>No at-risk patients developed delirium during hospital stay</p> <p>LOS longer 11 vs 8 days in intervention group</p> <p>Mortality, falls, functional decline 7 new residential care placement were similar b/w groups</p> <p>No reduction in 1:1 nursing care intervention</p> <p>Intervention group received psychogeriatric consultation (32% vs 11%, <i>p</i>=0.04) & less</p>	<p>Small sample size, risk for type 2 error</p> <p>Short-term outcomes collected by project staff not blinded to study purpose</p> <p>Use of a 4-bed delirium bay caused an increase in patient transfers</p> <p>Unsure if delirium bay contributed to outcomes</p> <p>No discussion about how the team achieved positive outcomes or about team processes</p> <p>Difficult to sustain outcomes in clinical practice</p> <p>Require additional dedicated staffing for program</p>

			<p>Unit-based strategies: expedite transfer of at-risk patients</p> <p>4-bed delirium bay where nursing assistants/Volunteers use diversion & relaxation activities</p> <p>Team strategies: consultant guided junior MD to perform routine assessment, med review, risk factor modifications</p> <p>Nurses implement multicomponent preventative strategies</p> <p>Patient/caregiver education using brochure</p> <p><u>Analysis</u></p> <p>Categorical variable compared using contingency tables & chi-square testing (or Fisher's exact test if cell counts <5)</p> <p>Continuous variables compared using <i>t</i>-test or Mann-Whitney U-test</p>	<p>use of neuroleptic drugs (26% vs 41%, $p=0.46$)</p> <p>No use of restraints in either group</p>	
<p>Steunenberg, B., Mast, R.C., Strijbos, M.J., Inouye, S.K., & Schuurmans, M.J. (2016). How trained volunteers can improve the quality of hospital care for older patients. A qualitative evaluation within the Hospital Elder Life Program (HELP). <i>Geriatric</i></p>	<p>To assess the added value of trained HELP volunteers to the quality of hospital care</p> <p>To describe the characteristics and motivation of the HELP volunteers</p>	<p>8 hospital units in 3 hospitals in the Netherlands</p> <p>Volunteers survey: $N=135$</p> <p>An online open-ended questionnaire</p> <p>About demographics, personal motivation, rating of the overall</p>	<p>Mixed-methods design</p> <p>Oct 2012 to June 2014</p> <p>Volunteer recruitment:</p> <p>Recruited by volunteer coordinator through newspaper & online advertisements & then each candidate was interviewed by the coordinator.</p> <p>Volunteer training:</p> <p>All volunteers received a 2-day training</p>	<p>Volunteers:</p> <p>94/135 invited completed the survey</p> <p>F>M</p> <p>43% retired</p> <p>Rated added value 7.7 on a 0-10 scale.</p> <p>Themes:</p>	<p>- the study was the first to examine the characteristics and motivation of HELP volunteers</p> <p>-the study demonstrated the volunteer-assisted model of care for older adults was appreciated by patients, family members and staff.</p> <p>- the volunteers add value to the HELP model</p>

<p><i>Nursing</i>, 37 (6), 458-463.</p>		<p>added value of HELP to regular care</p> <p>NP survey: N=7</p> <p>-at the end of the project, NP received a questionnaire by email regarding the perception of the added value of volunteer role in the quality of care</p> <p>Eligibility:</p> <p>Patients aged 70 years and older, at risk for delirium, admitted to cardiology, internal medicine, geriatrics, orthopedics, & surgery units</p> <p>Exclusion criteria: life-threatening situation, palliative care, LOS <24hrs, legally incapable of participating, unable to communicate verbally</p>	<p>then coached by experienced volunteer, volunteer coordinator & by unit staff</p> <p>Qualitative focused group interview:</p> <p>-all meetings led by one interviewer/researcher</p> <p>Volunteers: Focused group meetings</p> <p>6 months after the study start date.</p> <p>All active volunteers received invitations</p> <p>Staff: included geriatricians, nurses, unit leaders, PT, OT were invited</p> <p>Examples of questions provided.</p> <p>Patient/family: within one month of hospital discharge, at-home interviews were held with patients.</p> <p>Separate interviews with family members</p> <p>Interviews were conducted by trained psychology students</p>	<p>1.being independent trusted party</p> <p>2.recognizing the value of the job</p> <p>3.additional hand to nursing staff</p> <p>>1 reason to volunteer</p> <p>Staff:</p> <p>Focused-group held with 11 IDT members</p> <p>6/7 NPs completed the surveys</p> <p>Themes:</p> <p>1.additional hand to the unit team</p> <p>2.faster recovery of older patients</p> <p>3.loneliness intervention</p> <p>Patient & family: 32pts & 27 family members interviewed</p> <p>-most patients could not remember about volunteer visits</p> <p>Themes:</p> <p>1.additional hand to the unit team</p> <p>2.loneliness intervention</p>	<p>-70% of volunteers had prior experience with delirium in personal or professional lives</p> <p>-the role of HELP volunteer fits within the model</p> <p>-volunteers enable extra attention and support to patients and families that helps reduce the workload of unit staff</p> <p>Volunteers provide distraction during a long hospital stay that helps with loneliness</p> <p>Limitations:</p> <p>-70% volunteer participation in the survey</p> <p>& 29.6% participated in focus-group meetings</p> <p>-staff scheduling issues limited the sample size and no randomization due to personal invitations to join focus group meetings</p> <p>-future research: possible positive effects of volunteers on feelings of loneliness, on the cognitive functioning of older patients & quality of care.</p>
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<p>Yoo, J., Seol, H., Kim, S. J., Yang, J. M., Ryu, W. S., Min, T. D., Choi, J. B., Kwon, M., & Kim, S. (2014). Effects of hospitalist-directed interdisciplinary medicine floor service on hospital outcomes for seniors with acuter medical illness. <i>Geriatrics & Gerontology International, 14</i>, 71-77. doi:10.1111/ggi.12056</p>	<p>To examine the effectiveness of hospitalist-directed interdisciplinary (ITD) medicine team in medicine hospital & clinical outcomes for geriatric patients with acute medical illness</p>	<p>A 485-bed academic medical center with no geriatric unit nor geriatric consultation service teams</p> <p>ACGME accredited internal medicine program</p> <p>Patient enrollment March & June 2008</p> <p>Inclusion criteria:</p> <p>65 & older, non-teaching medicine floor services, community-dwelling person before admission to hospital</p> <p>Exclusion criteria:</p> <p>Hospice enrollee, declined participation, transfer to teaching medicine floor, Katz Index of Independence 0</p> <p>Physician criteria:</p> <p>Attending physicians with internal medicine board certification</p>	<p>Controlled trial</p> <p>All participating physicians in ITD & usual care team completed 6 hours of AMA either onsite or online CME before study enrollment</p> <p>Control team provided usual care (not described) as opposed to ITD intervention group physicians who provided additional “geriatric care”</p> <p><u>“Geriatric care”:</u></p> <p>1.ITD care teams’ geriatric assessment & management</p> <p>-daily from admission to discharge</p> <p>-delirium assessment using CAM</p> <p>-a goal of care (documenting advance directives)</p> <p>-minimize harmful meds based on Beer’s criteria</p> <p>-minimize restraints</p> <p>-checklist to all physicians</p> <p>-compliance set at 80% or more</p> <p>-patients dropped out of study if poor compliance</p> <p>2.IDT team meeting</p> <p>-consisted of physicians, nurses, pharmacists, social workers, nutritionists, PT, OT & ST</p> <p>-physician-led the meetings</p> <p>-average 45 mins</p> <p>3X/wk</p> <p>-at medicine floor conference room</p>	<p>Patient & physicians characteristics were not statistically different between care teams</p> <p>Functional decline on discharge was much lower in ITD team vs usual care team (25% vs 36%)</p> <p>Delirium was significantly lower in ITD team vs usual care team (26% vs 34%)</p> <p>Transition to institution was significantly lower as compared to usual care team (18% vs 26%)</p>	<p>Significant reductions in functional decline, delirium & transition to an institution by ITD team care.</p> <p>The first study investigating hospital outcomes of hospitalist-directed ITD medicine floor service</p> <p>The hospital-directed ITD team play a “buffering” role in reducing hospital-associated functional decline & institutionalization</p> <p>The hospital-directed ITD team model is one of the solutions to improving quality care as well as reducing healthcare resources</p> <p>Limitations</p> <p>Data collection and study design, lack of generalizability</p> <p>Selection bias, even though blinding present</p>
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			<p>-Selected patients were discussed</p> <p>Allocation & analysis:</p> <p>The study coordinator who did not participate in patient care allocated physicians & patients by matching patient characteristics & physician experience.</p> <p>Both physician & patients were unaware of the assignment</p> <p>Physicians were not allowed to select team location</p> <p><i>n</i>=383 ITD team</p> <p><i>n</i>=379 in usual care</p> <p>Main outcomes:</p> <p>-functional decline, delirium, & discharge destination upon hospital discharge</p> <p>-physical functions were assessed by the same nursing staff team of admission team.</p> <p>-CAM used by physicians, researcher reviewed daily progress notes for occurrence of delirium</p> <p>Patient characteristics:</p> <p>Age, sex, ethnicity, marital status, severity of illness, physical function on admission, cognition, home or day services, & admission diagnoses</p> <p>APR-DRG severity of illness classification to estimate severity of illness</p> <p>Physical functions were assessed using Katz's Index of independence of ADL</p>		
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			<p>Data collected from clinical, administrative database, department of medical operations, 3-M Health information system</p> <p>Statistical analysis:</p> <p>X2-tests, t-tests</p> <p>Statistical significance at P<0.05</p> <p>Odds ratios 95% confidence intervals (CI)</p> <p>SAS version 9.2</p>		
<p>Yoo, J. W., Nakagawa, S., & Kim, S. (2013), Delirium and transition to a nursing home of hospitalized older adults: A controlled trial of assessing the interdisciplinary team-based “geriatric” care and care coordination by non-geriatrics specialist physicians. <i>Geriatrics & Gerontology International</i>, 13, 342-350. doi:10.1111/j.1447-0594.2012.00905.x</p>	<p>To assess the effectiveness of an interdisciplinary team-based inpatient “geriatric” care & care coordination by non-geriatric physicians</p>	<p><u>Setting:</u> non-profit academic 350-bed hospital in a metropolitan area</p> <p><u>Sample:</u></p> <p>-275 patients per group</p> <p>-study coordinator assigned groups; pt. demographics matched b/w groups, pt. & physicians blinded of pt. gp assignments</p> <p>-Inclusion criteria: admission to floors or tele units, age 65 or older, community-dweller before hospital admission, Medicare beneficiary.</p> <p>-Exclusion criteria: hospice enrollee before admission, admission to ICU, admission to</p>	<p>Controlled trial</p> <p>All physicians received geriatric education 4-weeks, noon conference or online CME</p> <p><u>Intervention:</u></p> <p>-Team: internal medicine board-certified attending & internal medicine resident.</p> <p>-“Geriatric” care: ADL (Katz’s index & cognitive (MMSE or Mini-Cog) assessments, med reconciliation, & sleep protocol, restraints necessity; documented by IDT daily.</p> <p>-Daily IDT meetings:</p> <p>Team: physicians, nurses, pharmacists, social workers, nutritionists & rehab (PT/OT/ST); led by senior physician</p> <p>-Attending physicians rounded with resident at patient bedside</p> <p><u>Outcome measures:</u></p>	<p>- Both groups characteristics did not differ statistically</p> <p>- delirium occurrence was 19% and 17% in the intervention and control group, which was insignificant (p=0.35)</p> <p>-significantly fewer transitions to nursing home (16% vs 22%, p=0.005) in intervention than control group.</p>	<p>- the difference in the occurrence of delirium b/w gps /d/t: control gp physicians had education prior enrollment, & under diagnosis due to hypoactive delirium and overlook cognitive assessment</p> <p>Limitations:</p> <p>-Lack of generalizability d/t urban setting</p> <p>-no cause and effect interpretation: cross-sectional data, unknown longitudinal outcomes</p> <p>-observer variations</p> <p>-physician compliance with study protocol & contamination</p>

		<p>hospitalist (non-teaching) services.</p> <p>-If a patient had >1 admission, all included.</p> <p>-Sample enrollment: 20 wks: July to Nov 2007)</p> <p>-demographics: age, sex, ethnicity; residence, cognitive impairment, & diagnosis before adm.</p> <p>-data collected from pt. medical record</p> <p>-APR-DRG severity of illness classification used to estimate severity of illness.</p>	<p>-Delirium: CAM-assessed & documented daily by physicians in intervention & usual care groups</p> <p>-Transition to SNF vs community</p> <p>-Data collected by researcher</p> <p><u>Statistical analysis:</u></p> <p>-χ^2-tests to compare categorical data</p> <p>-Wilcoxon rank-sum tests to compare ordinal data</p> <p>-$p < 0.05$</p> <p>-multivariate logistical regressions of delirium I transition to SNF</p> <p>-SAS statistical 9.2</p>		<p>-selection bias: physician characteristics not included in analysis</p> <p>-limited nursing role in team</p> <p>- ITD team meetings changed from charge nurses led to physicians, shows physicians in hierarchal leadership, possibly causing dissatisfaction for nursing.</p>
<p>Zaubler, T. Murphy, L. Rizzuto, R. Santos, C. Skotzko, J. Giordano, R. Bustami, R. & Inouye, S. (2013) Quality improvement and cost savings with multicomponent delirium interventions: replication of the Hospital Elder Life Program in a community hospital. <i>Psychosomatics</i>, 54, 219-26.</p>	<p>To implement an adapted HELP delirium protocol in a community hospital and assess the effectiveness and cost impact</p>	<p>-A 600-bed teaching hospital in Morristown, New Jersey</p> <p>-A 38-bed general medical floor</p> <p>-Initiated by dept of psychiatry</p> <p>-Two grants over 3 years (2 full-time Elder Life Specialists (ELS) & purchase the HELP training materials)</p> <p>-Exclusion criteria:</p> <ul style="list-style-type: none"> o Non-verbal 	<p>Method:</p> <p>-Quality improvement project</p> <p>-pre/post-intervention</p> <p>Design:</p> <p>-4 months of data recorded on the same unit prior intervention</p> <p>Intervention:</p> <p>-over 9 months</p> <p>-CAM administered by ELS X2daily</p> <p>-Delirium as a binary outcome (present or absent)</p> <p>-18 volunteers recruited & trained</p>	<p>-595 pts >70 years (215 in pre-intervention & 380 in intervention groups)</p> <p>-average age of 82.8 yrs.</p> <p>-62% female</p> <p>-95% white</p> <p>-no significant difference between pre & intervention groups (age, gender, race, admitting diagnosis, or cognitive impairment)</p>	<p>-Broadened inclusion criteria to include all patients 70 & over</p> <p>-HELP interventions were not limited to pts without delirium at the time of first assessment like in other studies</p> <p>-no dedicated funds to support geriatrician, GNP or psychiatric, they rounded on pts</p> <p>-One SLE (for 42 pts/month) would have been sufficient.</p> <p>- LOS stay reduced by 1 day for non-delirious pts,</p>

		<ul style="list-style-type: none"> o Terminal illness/comfort care o Refusal to participate <p>- Inclusion criteria: 70years & older with at least 1 risk factors for delirium other than age</p>	<p>-pt. received interventions from ELS or volunteer X5days/week adapted from HELP model (daily visits, therapeutic activities, & assistance with feeding, hydration, sleep, & vision/hearing impairment).</p> <p>-exercise/mobility omitted because of staffing limitations</p> <p>-geriatrician, geriatric nurse practitioner and/or psychiatrist rounded with ELS intermittently each week</p> <p>-Delirium causing medications were identified and discontinued when possible</p> <p>Measures:</p> <ul style="list-style-type: none"> -delirium episodes & duration -total patient-days with delirium -LOS -healthcare cost 	<p>-delirium: 40% reduction</p> <p>-total pt. days with delirium: decrease from 8% to 6%</p> <p>-duration of delirium decreased from a median of 2.5 days to 2 days</p> <p>-LOS decreased from 6 days to 4 days</p> <p>-annual savings \$841,000 over 9 months</p>	<p>suggesting the program benefits in minimizing physical/cognitive decline</p> <p>-cost comparison with the difference in patients with and without delirium with an admission diagnosis of pneumonia (\$2700 difference), may not be true for other diagnoses</p> <p>-Psychiatrist consultation which facilitated the development of treatment algorithms for delirium</p> <p>-success of project: ELS on board</p> <p>-improved coordination of care & dc planning with inclusion of ELS in clinical rounds</p> <p>Limitations:</p> <ul style="list-style-type: none"> -Several adaptations to HELP were made to facilitate its implementation -assessments & interventions were done 5days/week during working hours -no control group, delirium rates were assessed prospectively for 4 months
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					<p>-due to interventions 5days/week, impossible to discriminate b/w delirium prevalent (pre-admission) and incident (after admission).</p> <p>-Hawthorne effect: pt. may have received increase attention</p> <p>-Increased time spent by physicians consulting pts</p> <p>-LOS is affected by different variables, though no changes during this study</p> <p>Limitations not mentioned in the article:</p> <p>-exercise/ mobility protocol, a very important intervention was not implemented due to staff limitations and also was not explained.</p> <p>-no pharmacist utilized for medication management</p> <p>-discharge planning/pt. family education not highlighted.</p>
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Appendix B

Figure 15: Delirium Risk Factor Identification (DRFI) Tool (EHR Optimization Proposed)

[DATE/TIME] 05/1 0600-05/02 0559									
	[time]	[time]	[time]	[time]	[time]	[time]	[time]	[time]	[time]
CAM	+/-								
Age>70									
Primary diagnosis									
Dementia/ stroke/Parkinson's disease									
Anesthesia/post/op									
Sepsis Screening	+/-								
Restraints									
Foley catheter									
Vitals Graph									
Vitals									
Temp									
HR									
BP									
RR									
SpO2									

O2 Device									
Lab Results									
WBC Count									
Hemoglobin									
Hematocrit									
Lactate									
CO ₂									
Base deficit									
Ammonia									
Chem 7									
Calcium									
Procalcitonin									
Urine Cx									
Blood Cx									
All Cx									
Intake									
PO									
IV									
Output									
Urine									
Emesis									
Stool									

Medication									
Benadryl									
Ativan									
Opioid derivatives									
Fentanyl									
OxyContin									
Meperidine									
Morphine derivatives									
Codeine derivatives									
Benzodiazepines									
Hydroxyzine									
Haldol									
Seroquel									

Appendix C

Figure 16: Delirium Documentation (EHR Optimization in Nursing Flowsheet – Proposed)

CAM							
Feature IA: Is there evidence of an acute change in mental status from the				No	No		
Feature IB: Did the (abnormal) behavior fluctuate during the day, that is, tend				No	No		
Feature II: Did the patient have difficulty focusing attention, for example,				No	No		
Feature III: Was the patient's thinking disorganized or incoherent, such as				No	No		
Feature IV: Overall, how would you rate this patient's level of consciousness?				Alert (normal)	Alert (normal)		
Feature IV: Was Vigilant, Lethargic, Stupor, or Coma answered above?				No	No		
If all items in Feature I (a or b) and II are answered YES and at least one				NEGATIVE	NEGATIVE		



Delirium risk factor(s)	Yes No
Delirium interventions	<i>[drop down menu]</i> Positive: new-onset, will contact MD Positive: existing, continue management plan Negative: risk factor(s) present, targeted prevention strategies

Appendix D

Table 7: Variable Description

	Variable	Brief description	Function in analysis	Data source	Reliability & validity of measure	Range of possible values, coding	Level of measurement	Time frame for collection
1	Age	Age in years, Beginning at 65 years and above	Sample descriptor and possible independent variable	EHR	Calculated based on patient date of birth recorded in EHR from patient identification card/self-reported	65-108	Ratio (“scale” for SPSS)	At pre-intervention; and intervention phase
2	Group	Group (pre-intervention or intervention)	Independent variable	Project documentation	Group assignment based on phase of study	0=control group (no intervention) 1=intervention group	Nominal	At pre-intervention; and intervention phase
3	Gender	Gender	Sample descriptor & possible independent variable	EHR	Based on patient self-reported gender identification recorded in EHR	1=male 2=female 0=chooses neither male nor female	Nominal	At pre-intervention; and intervention phase
4	Ethnicity Race	Ethnic/Racial background	Sample descriptor & possible independent variable	EHR	Based on patient self-reported ethnic identification recorded in EHR	1=White 2=African American 3=Hispanic 4=Asian 5=other	Nominal	At pre-intervention; and intervention phase
5	Diagnosis	Admitting diagnosis	Sample descriptor & possible independent variable	EHR	Based on Admitting diagnosis recorded in EHR by physician	1=Pneumonia 2=UTI 3=Cellulitis 4=Septicemia 5=Dehydration 6=GI bleeding	Nominal	At pre-intervention; And intervention phase

						7=Respiratory failure 8=other		
6	Dementia	Underlying/History of dementia	Sample descriptor & possible independent variable	EHR	Based on patient history recorded in EHR by physician	0= No 1= Yes		
7	Cognitive impairment	Cognitive status on admission	Sample descriptor & possible independent variable	EHR	Based on cognitive status recorded in EHR by nurse on admission	0=alert & oriented 1=confused	Nominal	At the pre-intervention; and intervention phase
8	Delirium on admission	Baseline delirium assessment on admission using Confusion Assessment Method (CAM) tool	Independent variable	EHR	Based on CAM assessment recorded in EHR by nurse on admission	0= negative 1= positive	Nominal	At the pre-intervention; and intervention phase
9	LOS	Baseline/during intervention phase; Length of stay in hospital	Independent variable/Outcome	EHR	Total number of days patient stayed in hospital, average days calculated from EMR	0-10	Ratio ("scale" for SPSS)	At the pre-intervention; and intervention phase
10	Delirium	Baseline/during intervention phase; CAM positive for at least one day per patient and minimum one episode/day	Independent variable/Outcome	EHR	Based on CAM assessment recorded by nurse every shift		Ratio ("scale" for SPSS)	At the pre-intervention; and intervention phase

1 1	Delirium documentation	Pre-intervention group: Any delirium documentation in nursing clinical note; intervention group: Delirium documentation using .deliriumnote template present in nursing 'End of shift summary' note	Independent variable	EHR	Nurse documentation in EHR	0=No 1=Yes NA=not applicable	Nominal	At the pre-intervention; and intervention phase
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Appendix E

Table 8: Delirium Training: Teaching Plan

Objectives	Content Outline	Method of Instruction	Time Allotted	Resources	Method Evaluation
Following a 60-minute teaching session, nurses will be able to:					
1. Identify three causes, risk factors and sign and symptoms of delirium (cognitive)	A. Definition of delirium B. Risk factors of delirium C. Causes for developing delirium D. Signs and symptoms of delirium	1:1 instruction	15 minutes	PowerPoint presentation	Teach-back Case study
2. Apply 2 strategies (for each risk factor) for preventing delirium in hospitalized older adults (psychomotor)	A. Prevention strategies based on six risk factors and HELP models: 1. Cognitive impairment 2. Sleep deprivation 3. Immobilization 4. Visual impairment 5. Hearing impairment 6. Dehydration	Demonstration-return demonstration 1:1 instruction	15 minutes	PowerPoint presentation	Observation of return demonstration Teach-back Case study
3. Demonstrate the use of the 'Delirium Risk Factor Identification' tool for delirium risk factor identification (psychomotor)	B. 'Delirium Risk Factor Identification' tool in EHR	Demonstration-return demonstration 1:1 instruction	10 minutes	PowerPoint presentation	Observation of return demonstration Teach-back

				EHR TPly environment	Case study
4. Perform documentation using delirium not template (.deliriumnote) (psychomotor)	C. Delirium note template in EHR	Demonstration-return demonstration 1:1 instruction	10 minutes	PowerPoint presentation EHR TPly environment	Observation of return demonstration Teach-back Case study
5. Express any concerns related to the care of the older adults with delirium (affective)	A. Explore feelings B. Additional resources for delirium prevention/management and support	Discussion	10 minutes	PowerPoint presentation	Question and answer

Appendix F

Table 9: Project Timeline

Deliverables	Aug 2019	Sept	Oct	Nov	Dec	Jan 2020	Feb	March	April	May	June
IRB application											
EHR build											
Pre-Intervention data collection											
Staff education											
Implementation: GO LIVE							→				
Intervention phase data collection											
Data analysis											
Monitor & sustain intervention											

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