WALDEN UNIVERSITY
A higher degree. A higher purpose.

Walden University
ScholarWorks

Walden Dissertations and Doctoral Studies

Walden Dissertations and Doctoral Studies Collection

2018

Adherence to the ICU Liberation ABCDEF Bundle Improves Patient Outcomes in the ICU

Jennifer Sweeney
Walden University

Follow this and additional works at: https://scholarworks.waldenu.edu/dissertations

Part of the Nursing Commons

Walden University

College of Health Sciences

This is to certify that the doctoral study by

Jennifer Sweeney

has been found to be complete and satisfactory in all respects,
and that any and all revisions required by
the review committee have been made.

Review Committee
Dr. Joanne Minnick, Committee Chairperson, Nursing Faculty
Dr. Amelia Nichols, Committee Member, Nursing Faculty
Dr. Mirella Brooks, University Reviewer, Nursing Faculty

Chief Academic Officer
Eric Riedel, Ph.D.

Walden University
2018

Abstract

Adherence to the ICU Liberation ABCDEF Bundle

Improves Patient Outcomes in the ICU

by

Jennifer Sweeney

MS, South University, 2009

BS, University of Nevada-Reno, 2003

Project Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Nursing Practice

Walden University

May 2018

Abstract

Delirium is a frequent complication of intensive care unit (ICU) admissions manifesting as acute confusion with inattention and disordered thinking. Patients in the ICU who develop acute delirium are more likely to experience long term disability and mortality. The purpose of this doctoral project was to evaluate an existing organizational quality improvement project to guide recommendations on improving care in the ICU. The practice-focused research question was: Does improving adherence to the ICU Liberation ABCDEF bundle for patients admitted to the ICU decrease incidence of delirium compared to outcomes prior to implementation? The Program Logic Model served as a framework for analysis of the organization's planning and implementation of this quality improvement project. Benchmark data from an organization's participation in the ICU Liberation Collaborative served as the primary source of evidence for analysis of outcomes. In addition, baseline data on current practice and outcomes in the organization's trauma ICU was analyzed and compared to the benchmark data. Analyses of data revealed strengths and opportunities for improvement in both the organization's project management and in current practices supporting adherence to the ABCDEF bundle guidelines. Incidence of delirium remained unchanged and far below national averages indicating need for further investigation into practices to verify this finding. Better prevention, identification, and management of delirium will lead to a positive impact on society, as patients who develop delirium rarely return to their baseline level of functioning.

Adherence to the ICU Liberation ABCDEF Bundle

Improves Patient Outcomes in the ICU

by

Jennifer Sweeney

MS, South University, 2009

BS, University of Nevada-Reno, 2003

Project Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Nursing Practice

Walden University

May 2018

Table of Contents

List of Tables

Section 1: Introduction

Delirium is a frequent complication of intensive care unit (ICU) admissions with occurrence rates as high as 80% (Kram, 2015). The condition is an acute state of confusion defined as an acute disorder of inattention and disordered cognition (Inouye et al., 1990, p. 941.) Patients in the ICU who develop acute delirium are more likely to experience long term disability and difficulty in performing activities of daily living for up to a year after discharge, and for every day a patient experiences delirium, their risk of mortality increases by 10% (Kram, 2015). A person's risk of developing delirium in the ICU is impacted by certain modifiable risk factors including uncontrolled pain, prolonged immobility, and administration of certain medications (Hannon, 2015). The purpose of this quality improvement project is to evaluate an existing organizational quality improvement project and outcomes to guide recommendations on improving care in the ICU. Improved care, utilizing evidence based guidelines, has the potential to positively impact society by decreasing of incidence of delirium and associated negative outcomes.

Problem Statement

The American Society of Critical Care Medicine published guidelines for the management of pain, agitation, and delirium in the ICU in 2013 (Barr et al., 2013). Based on these guidelines, the Society of Critical Care Medicine created the ABCDE Bundle to assess for, prevent, and manage pain, agitation, and delirium. ABCDE stands for Awakening and Breathing coordination of daily sedation and ventilator removal trials; Choice of sedative or analgesic exposure; Delirium monitoring and management; and

Early mobility and exercise. In recent years, the letter F was added for Family presence and empowerment (Hannon, 2015).

The medical ICU at a large community hospital in Florida recently participated in a two-year quality improvement project as part of the Society of Critical Care Medicine's ICU Liberation Collaborative. The national collaborative included 77 acute care hospitals aimed at decreasing pain, agitation, and delirium in the ICU by implementing the ICU Liberation ABCDEF care bundle. The organization received its first benchmarking report from the ICU Liberation Collaborative in May of 2017. Analysis of data, identification of strengths and opportunities for improvement, and recommendations for practice changes is ongoing. Additionally, lessons learned from participation in the collaborative need to be evaluated for possible adaption in other ICU units, specifically the trauma ICU.

Analysis of existing organizational quality improvement data to guide recommendations on care in the ICU will ultimately result in improved nursing care. Preventing, recognizing, and managing pain, agitation, and delirium in the ICU is significant to the field of nursing practice. Delirium, in particular, has a significant impact on both the patient and the health care system, with triple the costs of care and the risk in mortality for each episode of delirium (Pinto & Biancofiore, 2016). Nurses play a role in preventing and managing delirium with interventions including managing pain, promoting regular sleep-wake cycles, frequent reorientation, optimizing the patients' environment, and advocating for early mobility (Kram, 2015). The problem statement for the proposed project is improved adherence to the ABCDEF bundle will decrease incidence of delirium.

Purpose

Despite the availability of evidence based guidelines, the incidence of ICU delirium continues to be a major threat to patients admitted to the ICU (Kram, 2015). A review of the literature indicates a wide variety of research has been published on various components of the ABCDEF Bundle and related outcomes in the ICU. However, research is lacking on how well the complete bundle is adhered to and how adherence to the ABCDEF bundle impacts specific populations of patients, such as trauma patients (Miller, 2015; Joffe, McNulty, Boitor, Marsh, & Gélinas, 2016). This represents a significant gap for patients whose multisystem injuries and co-morbidities add a higher level of complexity to their care and outcomes.

The practice-focused research question for this doctoral project is: Does improving adherence to the ICU Liberation ABCDEF bundle for patients admitted to the ICU decrease incidence of delirium compared to outcomes prior to implementation? Analysis of the ICU's adherence to the ABCDEF bundle guided recommendations to improve care and potentially result in decreased incidence of delirium in the medical ICU. This analysis also serves as the basis for recommending the ABCDEF bundle be implemented in other specialty units, specifically the trauma ICU.

Nature of the Doctoral Project

Several sources of data were used to address the proposed research question. First, a retrospective review of the quality improvement project conducted in the organization's medical ICU was conducted to assess outcomes and identify opportunities for improvement. This review was used to identify where practice can be improved to more

closely align with the evidence based ABCDEF bundle guidelines. Next, a retrospective review of trauma ICU patient records was conducted utilizing the same analysis tools used in the medical ICU's project. The purpose of this review was to guide recommendations that the organization consider implementation of the ABCDEF bundle in the trauma ICU. The same approach to data collection was utilized in the medical ICU project to collect trauma ICU data, resulting in a baseline assessment of current practices in the trauma ICU. The results of the aggregate data from this record review were analyzed to determine if implementation of the ABCDEF Bundle could improve outcomes. A Microsoft Excel spreadsheet was utilized to organize and compare significant data points.

Significance

The doctoral project aimed to improve awareness of how the elements of the ICU Liberation ABCDEF bundle can be used together to impact the incidence of delirium in the ICU. Analysis of the existing quality improvement project data identified opportunities for improvement in current practice to increase daily adherence to the ABCDEF bundle guidelines for all patients. Beyond the local practice, continued replication of this quality improvement project across other patient populations, regions, and specialties will add to the paucity of research supporting these evidence-based practice guidelines.

Implementation of the ABCDEF bundle impacts a wide range of stakeholders. The core team for implementation includes the ICU nurses, nursing leadership, physicians, respiratory therapists, physical therapists, and patient care technicians.

Representatives from each of these specialties are called upon for scheduled interprofessional rounds on the unit to discuss the ABCDEF bundle progress for each patient. Recommendations to improve practices, and/or expand practices to the trauma ICU may require additional staffing incurring additional costs.

Replication across multiple other sites, regions, populations, and specialties has the potential to impact positive social change. A person's risk of developing delirium in the ICU is impacted by certain modifiable and non-modifiable factors. Non-modifiable risk factors include a history of dementia, the severity of the critical illness, a history of alcoholism, and a history of hypertension, among others (Hannon, 2015). Improved awareness of these risk factors and use of evidence based tools to assess for early signs and symptoms could potentially increase prevention and early recognition/management of delirium. Known modifiable risk factors for delirium can also be addressed earlier including factors such as uncontrolled pain, prolonged immobility, and administration of certain medications (Kram, 2015).

Decreasing the incidence and duration of delirium will lead to a positive impact on society. According to Hannon (2015), ICU patients who develop delirium rarely return to their baseline level of functioning. The effects have lasting impacts on their quality of life and activities of daily living such as difficulties returning to work, inability to balance a checkbook, struggling to finding a parked car or driving, and incapability to manage medications or medical devices (Hannon, 2015). Delirium can prevent people from returning to their baseline mentation and ability to continue being active and productive members of society.

Summary

Improved care, utilizing evidence based guidelines, has the potential to positively impact society by decreasing of incidence of delirium and associated negative outcomes. The analysis of existing organizational data on adherence to the ABCDEF bundle in the medical ICU also guides recommendations for adoption of the bundle in the trauma ICU. This doctoral project has the potential to impact a large group of stakeholders, all of which have been identified. Next, identification of concepts and theories, relevance to nursing practice, context of the doctoral project, and roles of the doctoral student are described.

Section 2: Background and Context

Introduction

Delirium has a significant impact on both the patient and the health care system. Nurses can play a role in preventing and managing delirium in the ICU population. The practice-focused research question for this doctoral project is: Does improving adherence to the ICU Liberation ABCDEF Bundle for patients admitted to the ICU decrease incidence of delirium compared to outcomes prior to implementation? The purpose of this doctoral project is to analyze existing organizational data to identify strengths and opportunities for improvement, and guide recommendations on improving adherence to the ICU Liberation ABCDEF bundle. In this section, the conceptual and theoretical frameworks will be identified, relevance to nursing practice will be discussed, and potential impacts on the local context will be presented.

Conceptual Models and Theory

The conceptual model guiding this project is the Program Logic Model. The Program Logic Model links the desired outcomes of an intervention to the resources and actions devised to address the issue (Hallinan, 2010). This model provides a systematic and structured approach to demonstrate the cause and effect relationships between all inputs and outputs of a program. Inputs are defined as the resources, including human, financial, and organizational resources impacting the issue, and outputs are the results of the program or service provided (Kellog, 2004).

Utilizing a change theory to guide implementation of changes can support a more successful outcome. Kotter's Change Model (2012) provides a conceptual framework and

structure to approach system changes including eight steps; 1) Create a sense of urgency, 2) Build a change team, 3) Form a strategic vision, 4) Enlist your army, 5) Remove barriers, 6) Generate short-term wins, 7) Sustain the change, and 8) Institute or enculturate the change (Kotter, 2012). The Kotter model (2012) was utilized in the original planning and implementation of the ICU Liberation bundle (K. Reynolds, personal communication, June 17, 2017). This model was considered when making practice change recommendations based on the analysis of data.

The theoretical model used to explore the phenomenon of delirium in the ICU is Levine's Conservation Model for Nursing Practice (Levine, 1967). Levine's (1967) focus is on conservation of energy, structural integrity, personal integrity, and social integrity. The theory stresses the importance of nurses working to maintain balance between immediate needs of the patient to keep them safe and the long term goals to get them back to their baseline wellness (Levine, 1967). Patients experiencing delirium are in an altered state of health. Identifying this altered state and intervening to restore the patient's previous level of cognition, aligns with Levine's (1967) theory by promoting adequate rest, nutrition and exercise (conservation of energy), preventing physical and psychological breakdown (conservation of structural integrity), recognizing and respecting oneself (conservation of personal integrity), and preservation of the patient's place among their family, community, and society (conservation of social integrity). All are aspects of a person that are threatened by the development of delirium.

Several terms are utilized in this project, the definitions of which are clarified below:

- *ABCDEF Bundle.* Evidence based care bundle developed by the Society of Critical Care Medicine, based on the recommendation published by American College of Critical Care Medicine (Barr et al. 2013).

- *Confusion Assessment Method for the Intensive Care Unit (CAM-ICU).* CAM-ICU is a simplified assessment tool developed by an expert panel to enable healthcare providers to correctly identify delirium in clinical settings, without any specialized training (Inouye et al., 1990). Previous studies have reported the CAM-ICU tool to be both valid and reliable finding approximately 90% sensitive, 100% specific, and approximately 95% accurate with high interrater reliability (Guenther et al., 2010; Inouye et al., 1990; Lemiengre et al., 2006)

- *Delirium.* Delirium is an acute state of confusion defined as an acute disorder of inattention and disordered cognition (Inouye et al., 1990, p. 941.)

- *ICU Liberation Collaborative.* A national collaborative directed by the Society of Critical Care Medicine including 77 acute care hospitals aimed at decreasing delirium and improving outcomes through implementation of the ICU Liberation ABCDEF care bundle (Society of Critical Care Medicine, n.d.).

- *SAT.* Spontaneous Awakening Trial. The stopping of narcotics (as long as pain is controlled) and sedatives every day and, if needed, restarting either narcotics or sedatives at half the previous dose and titrating as needed (Society of Critical Care Medicine, n.d.).

- *SBT*. Spontaneous Breathing Trial. The purposeful pause or reduction in mechanical ventilation to assesses the patient's ability to breathe while receiving minimal or no ventilator support (Society of Critical Care Medicine, n.d.).

- *A. and B.* These bundle elements are complimentary. The "A" and "B" stand for Awakening and Breathing coordination of daily sedation and ventilator removal trials. Adherence to these bundle elements is measured by documentation in the medical record that eligible patients were assessed for or attempted a Spontaneous Awake Trial and Spontaneous Breathing Trial in the previous 24 hours (Society of Critical Care Medicine, n.d.).

- *C*. The "C" stands for Choice of sedative or analgesic exposure. Adherence to this bundle element is measured by documentation in the medical record that were a minimum a minimum of 6 pain assessments and 6 sedation/agitation assessments in the previous 24 hours (Society of Critical Care Medicine, n.d.).

- *D*. The "D" stands for Delirium monitoring and management. The Confusion Assessment Method for the ICU (CAM-ICU) tool is the preferred tool in the identified organization. Adherence to this bundle element is measured by documentation in the medical record documentation that the patient received a minimum of 2 CAM-ICU assessments in the previous 24 hours (Society of Critical Care Medicine, n.d.).

- *E*. The "E" stands for Early mobility and exercise. Adherence to this bundle element is measured by documentation in the medical record documentation that the patient passed an early exercise/mobility safety screen and the patient received

exercise/mobility in the previous 24 hours (Society of Critical Care Medicine, n.d.).

- *F*. The "F" stands for Family presence and empowerment. Adherence to this bundle element is measured by documentation in the medical record documentation at least once in a 24 hour period that a family member/significant other participated in rounds or a family conference or assisted with the plan of care or the ACBDEF Bundle care or received education on the bundle elements (Society of Critical Care Medicine, n.d.).

Relevance to Nursing Practice

Delirium is preventable, yet more than 40,000 patients in the United States (US) experience delirium every day (Smith & Grami, 2017). This acute, hospital acquired condition represents one of the six leading causes of preventable injury in patients aged 65 years or older in this country (Smith & Grami, 2017). Delirium is more prevalent in patients who are 65 years of age or older due to confounding comorbidities and predisposing conditions (Inouye, 2006). The United States has a rapidly aging population which will continue to be negatively impacted by delirium and its sequelae. By the year 2030, 20 % of US residents will be over the age 65 compared to 13 % in 2010 (U.S. Department of Commerce, 2014). This number will continue to grow, with a projected 83 million US citizen over age 65 by the year 2050.

The prevalence of delirium in the ICU continues to rise with the potential to increase exponentially in coming years. Delirium remains under recognized, under documented, and under treated in as many as 84% of patients (Smith & Grami, 2017).

Bedside nurses are in a unique position to provide interventions and advocate for a plan of care that can help prevent delirium. However, bedside nurses fail to recognize delirium in more than 50% of the cases of delirium (Collins, Blanchard, Tookman & Sampson, 2010; Rice et al., 2011). This represents an opportunity for nurses to take the lead in improving patient outcomes. With improved education, evidence based assessment tools, and best practice guidelines, nurses can help decrease the incidence of delirium by as much as 30% (McDonnell & Timmons, 2012).

Current nursing practice focusses on prevention of delirium. According to Inouye (2006), prevention is the most effective strategy for decreasing incidence of delirium. Bedside nurses are best equipped for this role due to the nature of their interactions and therapeutic relationships with their patients. However, there is no single intervention that can prevent delirium, as the causes vary greatly. A multifaceted approach works best, focusing on comfort, orientation, and physical activity with interventions such as placing clocks and calendars in patients' rooms, talking frequently with patient to remind them where they are and why, ensuring they have access to their own glasses and hearing aids, and teaching family how to assist in keeping their loved-one oriented (Vidan et al., 2009). Nurses are also positioned well to partner with members of the interprofessional team to prevent delirium. Each component of the ABCDEF Bundle requires a collaborative approach to care.

The "A" and "B" stand for Awakening and Breathing coordination of daily sedation and ventilator removal trials. According to Kram (2015) "collaboration among the disciplines to pair awakening and spontaneous breathing trials has demonstrated that

patients who receive coordinated trials spend fewer ICU days breathing with ventilator assistance, have shortened ICU and hospital length of stays (LOS) and a reduced all-cause mortality within 1 year after discharge"(p. 252). Nurses often serve as the ring leader of patient care, coordinating disciplines to meet the needs of each patient. Wheeler (2015) argues that the state of the evidence is no longer focused on the importance of spontaneous awakening trials (SAT) and spontaneous breathing trials (SBT) but, on ensuring they get done daily to prevent delirium. As nurses are often so busy with other tasks, Wheeler (2015) suggests a model driven by the unit pharmacist to coordinate daily SATs and SBTs.

The "C" stands for Choice of sedative or analgesic exposure. Nurses must partner with physicians and pharmacists to assess their patients' medication lists and ensure appropriate medications are continued, while those that may contribute to or worsen symptoms of delirium be discontinued. The 2013 Society of Critical Care Medicine guidelines on Pain, Agitation, and Delirium provided recommendations based on a meta-analysis of over 18,000 published articles. The guidelines stress an analgesia-first concept, replacing sedatives and paralytics as front line medications, due to their impact on incidence of delirium (Shehabi et al., 2015). Interestingly, Benzodiazepines remain the most commonly used ICU sedative agents, yet research demonstrates a clear inverse relationship between administration of lorazepam and midazolam and incidence of delirium in critically ill patients (Ferrell & Girard, 2014). Propofol is currently the preferred choice (Kram, 2015; Ferrell & Girard, 2014; Wheeler, 2015; Shehabi et al., 2015).

The "D" stands for Delirium monitoring and management. The Confusion Assessment Method for the ICU (CAM-ICU) tool is one of the two assessment tools recommended by the PAD Guidelines. The tool assesses for four screening points that indicate delirium: 1) An acute change in mental status or fluctuating mental status over the past 24 hours, 2) Inattention, 3) A Richmond Agitation-Sedation Scale (RASS) score indicating an altered level of consciousness, and 4) Degree of disorganized thinking. Studies have reported the CAM-ICU tool to be both valid and reliable, including a study by Guenther et al. (2010) finding approximately 90% sensitive, 100% specific, and approximately 95% accurate with high interrater reliability. Nurses surveyed in this study report screening for delirium is too complicated and time-consuming (Guenther et al., 2010). Another study found nurses fail to recognize delirium in as many as 75% of cases (El Hussein & Hirst, 2016). Spronk, Riekerk, Hofhuis, and Rommes (2009) also reported that nurses report monitoring to be complicated and that the true incidence of delirium is most likely severely underestimated. Kram (2015) reported 40% of nurses fail to routinely screen for delirium, and of those who do, less than 35% use a validated tool.

The "E" stands for Early mobility and exercise. Getting a patient up and out of bed, even when intubated, used to be a normal daily practice in the ICU. For unknown reasons, medicine and nursing practice moved away from this practice over the past twenty years. This makes re-introduction into a practice where nurses never imagined walking an intubated patient quite daunting. Kram (2015) reports "The most protective, nonpharmacological, modifiable risk factor for the development of delirium is the receipt of early mobility" (p. 251). In a study by Hunter et al. (2017) reported barriers to nurses

initiating mobilization were confusion about nursing versus physical therapy responsibilities, lack of a protocol and exclusion criteria, poor understanding of the protocol, lack of ability to tailor the protocol to individual patient, fear of injury to self and patients, inadequate staffing, and equipment shortages. This again identifies an opportunity for nurses to partner with their interprofessional team for success.

The "F" stands for Family presence and empowerment. This piece of the bundle was not part of the original ABCDE bundle but was added after those involved in the ICU Liberation Collaborative stressed the impact family members can have on prevention of delirium (Hannon, 2015). Mitchell et al. (2017) report it is the family members' intimate knowledge of the patient that can help the nurses better understand who this person is, what their baseline cognition is, and how best to orient them. Family also provides a reassuring, familiar comfort that can help prevent delirium. Research also suggests involving family members in the care results in greater perceived respect, support and collaboration from nursing personnel (Mitchell et al., 2017). An intervention as simple as providing the family an informational pamphlet on what delirium is and how to prevent it can be very helpful.

This doctoral project seeks to support improved adherence to the ABCDEF bundle to ultimately decrease incidence of delirium. Despite the availability of evidence based guidelines and assessment tools, the incidence of ICU delirium continues to be a threat to patients in the ICU. In addition, research is lacking on how adherence to the ABCDEF bundle impacts specific populations of patients, such as trauma patients. The review of the literature presented indicates a wide variety of research has been published

on various components of the ABCDEF Bundle and related outcomes in the ICU.

However, there is a gap in evidence related to the application of the ABCDEF bundle

specifically to the trauma population, whose multisystem injuries and co-morbidities may

add a higher level of complexity to their care and outcomes.

Local Background and Context

The medical ICU is housed within a suite of specialized intensive care units,

located in a large, 800 bed, community hospital in Florida. The suite of intensive care

units provides a total of 64 beds with an average daily census of 56 patients. The suite is

staffed by 185 Registered Nurses, the majority of whom are cross-trained to provide care

in the medical ICU, cardiovascular ICU, neuro ICU, surgical ICU, and trauma ICU. The

organization is a stand-alone hospital, run by a publically elected board of directors, and

publically funded by the taxpayers.

The organization has a long track record of demonstrating excellence in care and

quality. Currently seeking a fourth designation as a Magnet institution, the organization is

one of only 1% of American hospitals that have reached this level of designation for

nursing excellence. In 2017, the organization was awarded an "A" grade by the Leapfrog

Group, a national not-for-profit organization founded in 2012 to rate how well hospitals

are protecting patients from preventable medical and medication errors, injuries and

infections. In 2017, the organization also received the highest 5–Star rating for overall

hospital quality from the Centers for Medicare & Medicaid Services (CMS).

Demonstrating compliance with CMS standards is a priority for any healthcare

organization receiving funding from Medicare and Medicaid. The passing of the Patient

Protection and Affordable Care Act in 2010 impacted organizations in the way quality improvement initiatives are prioritized. Section 3008 of Affordable Care Act established the Hospital-Acquired Condition Reduction Program to provide an incentive for hospitals to reduce iatrogenic conditions. Pain, agitation, and delirium are not formally identified as hospital-acquired conditions, but are contributors to other conditions included on the current list such as Pressure Ulcer Rate, In-Hospital Fall with Hip Fracture, Perioperative Pulmonary Embolism or Deep Vein Thrombosis Rate, and Postoperative Sepsis Rate (CMS, 2017).

The focus of the Society of Critical Care Medicine's guidelines is the reduction of pain, agitation, and delirium (Barr et al., 2013). The Joint Commission first established standards for pain assessment and treatment in 2001. The Joint Commission's current standards require that organizations have policies in place to address pain management and ensure the staff is provided with education to practice in compliance with those policies (Baker, 2016). Agitation and delirium are addressed in an array of other standards. For example, CMS considers the use of antipsychotics as chemical restraints when used for the treatment of unspecified behavior such as agitation or delirium (CMS, 2017). So, although delirium is not currently recognized as a hospital-acquired condition within the Affordable Care Act's Hospital-Acquired Condition Reduction Program, incidence of delirium is an acute, hospital acquired condition and a major contributor to other conditions on the list.

Role of the DNP Student

The doctoral student who conducted this project is the Trauma Program Manager for the organization identified. The ICU is led by a nursing director and nursing manager who collaborate daily with the Trauma Program Manager in the care of trauma ICU patients. Duties of the Trauma Program Manager include oversight of the trauma surgeons and trauma advanced practice providers, maintenance of all policies and procedures impacting the care of the trauma patient, ensuring all professionals interacting with patients admitted to the trauma service are properly trained and credentialed in compliance with all state and national regulatory requirements, maintenance of the trauma registry, and oversight of care coordination, process improvement, and quality of the trauma patient care.

Interest in this project developed out of collaboration with the ICU nursing leaders and their discussions on the initial implementation of the ABCDEF Bundle. Participation in the ICU Liberation Collaborative's original study was limited to the medical ICU patients only. Therefore, data on adherence to the ABCDEF bundle, along with associated outcomes, is currently unknown for patients in the organization's other specialty ICU's, including the trauma ICU.

Delirium may occur across all areas of the acute care hospital. Therefore, analysis of existing data generated by participation in the ICU Liberation Collaborative may result in recommendations to improve adherence to the ABCDEF bundle in for all ICU patients. As the Trauma Program Manager for the organization, the doctoral student does harbor personal motivation to propose this evidence based approach in the trauma ICU, as

improvement in patient outcomes is a key responsibility for the Trauma Program Manager role. However, improvement in patient care and patient outcomes is a universal goal for all members of the healthcare team. The doctoral project further supports the mission, vision, and values of the organization.

The role of the doctoral student in this proposed project was to conduct a thorough review of the organization's ICU Liberation Collaborative quality improvement project and benchmark report data. The collaborative's benchmark report provides data on the staff members' adherence to the ABCDEF bundle for patients included in the initial study (n=210), and associated outcomes including incidence of delirium, ICU length of stay, and hospital length of stay. The benchmark report also compares the organization's outcomes to all hospitals included in the collaborative for the same study period (n= 15,087). The student compared current practice with the best practice guidelines for adhering to the ABCDEF bundle and proposed opportunities for improvement to organizational stakeholders. The student also assessed current adherence to elements of the ABCDEF Bundle in the trauma ICU, utilizing a review of aggregate data produced by a previous retrospective review of de-identified patient records. The purpose of the retrospective review was to assess current practice in the trauma ICU to determine if implementation of the ABCDEF Bundle could impact outcomes as demonstrated in the medical ICU.

Summary

The concepts and theories, relevance to nursing practice, context of the doctoral project, and roles of the doctoral student have been identified and described. Despite the existence of evidence based guidelines to decrease incidence of delirium, there is an identified gap in practice that continues to contribute to a high incidence of delirium in the ICU. Next, the practice-focused question, sources of evidence, and approach to analysis and synthesis of evidence will be more thoroughly described.

Section 3: Collection and Analysis of Evidence

Introduction

Despite the existence of evidence based guidelines to manage and prevent delirium in the ICU, this condition continues to be prevalent in the United States and the identified organization for this project. As evidenced by the organization's ICU Liberation Collaborative benchmark report, several opportunities for improvement in adhering to the ABCDEF Bundle still exist in current practice. In this section, the practice-focused question, sources of evidence, and approach to analysis and synthesis are presented.

Practice-focused Question

The organization's participation in the ICU Liberation Collaborative involved baseline assessment of practices in the ICU, an educational program on implementing the ABCDEF bundle, followed by post-intervention assessment of adherence to that bundle in practice. The ABCDEF bundle elements are evidence based guidelines, however, as with any guideline, successful translation into practice requires planning and structured change management. The purpose of the doctoral project is to analyze the existing data to identify strengths and opportunities for improvement, and guide recommendations on improving adherence to the ICU Liberation ABCDEF bundle the ICU. The analysis serves to address the practice-focused question: Does improving adherence to the ICU Liberation ABCDEF Bundle for patients admitted to the ICU decrease incidence of delirium compared to outcomes prior to implementation? Outcomes are measured by

documentation of adherence to the ABCDEF bundle, and the incidence of delirium pre and post implementation of the bundle.

<div align="center">**Sources of Evidence**</div>

The organization's ICU Liberation Collaborative benchmark report served as the primary source of evidence. This report includes data on how well the organization's medical ICU documented adherence to the elements of the ABCDEF bundle before and after the project implementation. Data is also included in the report demonstrating how the organization's adherence rates compared to the other hospitals included in the collaborative. The benchmark report is a reflection of the outcomes produced by the organization's participation in the quality improvement project outlined by the ICU Liberation Collaborative. Therefore, an analysis was also conducted of the program planning and implementation. This analysis provided insights on how outcomes were or were not achieved and served as a basis for recommendations on future quality project implementation.

Next, a review of current literature was conducted. An electronic search for literature was conducted utilizing CINHAL, Medline, and PubMed. Literature older than 10 years was excluded unless considered a landmark study written by a leading expert. Articles published in a language other than English were excluded. The search included only those articles focused on delirium or implementation of the ABCDEF bundle or components of the bundle in the ICU setting. Search terms included delirium, acute brain failure, acute confusion, ICU Liberation, ABCDEF bundle, CAM-ICU, and early mobility. This review of literature supported recommendations for improving care based

on analysis of the existing quality improvement project and outcomes. Best practice

recommendations were presented to hospital leadership as directed by the analysis of the

data.

Finally, a review of aggregate data from a previously conducted retrospective

review of patients admitted to the trauma ICU was conducted. The purpose of the review

was to assess current practices in the trauma ICU to determine the level of adherence to

ABCDEF bundle elements in that unit. As the trauma ICU was specifically excluded

from the original project, evidence is lacking on how much of the bundle is currently

being utilized and how the bundle elements are impacting this population's outcomes.

The retrospective review required access to the aggregate data, with the permission of the

host organization. All information reviewed was de-identified and no protected health

information was disclosed.

The collection and analysis of this evidence resulted in a comprehensive

assessment of current practice in the medical ICU and the trauma ICU. Assessment of

practice provides the organization with an understanding of what the strengths are and

where the opportunities are to better align with the ABCDEF bundle and best practice

guidelines. The final product helps to answer the proposed practice –focused question:

Does improving adherence to the ICU Liberation ABCDEF Bundle for patients admitted

to the ICU decrease incidence of delirium compared to outcomes prior to

implementation?

Archival and Operational Data

Participation in the ICU Liberation Collaborative study required adherence to the study protocol set forth by the Society of Critical Care Medicine. The protocol utilized a convenience sample approach. Pre-implementation data was collected by reviewing the records of the first ten patients admitted to the medical ICU each month for a period of three months prior to the start of the project (n=30). This served as the baseline assessment of adherence to the ABCDEF bundle as well as baseline incidence of delirium, and other indicators such as ICU length of stay, and days of mechanical ventilation. Then, for a period of 14 months after implementation, the records for the first ten patients admitted to the ICU were reviewed to assess for improvement (n=210).

Data was submitted to a central depository maintained by the Society of Critical Care Medicine's ICU Liberation Collaborative team. This team analyzed the data provided for all 77 hospitals participating in the collaborative and provided each organization with a benchmark report. The individual reports include information on how each organization compared to other organizations, as well as individual performance outcomes in adherence to the bundle elements. The intent of the benchmark report is to provide participating organizations with information on how their ICUs are currently practicing, the associated outcomes, which in turn provide information to the organization to help guide improvement in practice and outcomes.

The organization's nurse leader for the ICU Liberation project was tasked with reviewing the medical records of study patients to collect data on study-specified data elements. Data elements included age, diagnosis, comorbidities, length of ICU stay,

length of hospital stay, days on mechanical ventilation, hospital acquired complications,

and documentation demonstrating adherence to the ABCDEF bundle. Documentation of

adherence to the bundle was directed by study protocol and is described in Table 1.

Table 1

ICU Liberation Documentation to Demonstrate Adherence to Bundle Elements

Bundle Element	Documentation Expectation
A: Assess, Prevent, and Manage Pain	There was documentation that the patient received a minimum of 6 pain assessment in 24 hours using a PAD Guideline recommended tool
B: Both SBT and SAT	In patients receiving continuously infused and/or scheduled/intermittent sedatives/opioids, the patient passed a SAT Safety Screen and received a SAT in the 24 hour period
	In patients receiving invasive mechanical ventilation, the patient passed a SBT Safety Screen and received a SBT in the 24 hour period
	In patients who received both a SAT and SBT, that SAT was performed before the SBT in the prior 24 hour period.
C: Choice of Analgesia and Sedation	There was documentation that the patient received a minimum of 6 sedation/agitation assessments in the prior 24 hour period using a PAD Guideline recommended tool.
D: Delirium: Assess, Prevent, and Manage	There was documentation that the patient received a minimum of 2 delirium assessments in the prior 24 hour period using a PAD Guideline recommended tool.
E: Early Mobility and Exercise	There was documentation that the patient passed an early exercise/mobility safety screen and the patient received exercise/mobility in the prior 24 hours.
F: Family Engagement	There was documentation at least once in a 24 hour period that a family member/significant other participated in rounds or a family conference or assisted with the plan of care or the ACBDEF Bundle care or received education on the bundle elements.

The organization's ICU Liberation benchmark report has been shared with organizational leaders and was readily accessible to the student for this doctoral project. Consent to analyze this existing data and replicate assessment of trauma patient aggregate data was provided by the organization's nurse leader for the ICU Liberation Collaborative project team. Access to trauma patient data for the purposes of process improvement is within the current job description and responsibility of the trauma program manager. The student did secure permission from the director of trauma services to utilize existing data for the purposes of this project. Internal Review Board (IRB) approval from both Walden University and the host organization was obtained prior to accessing patient records for purposes of this doctoral study.

Evidence Generated for the Doctoral Project

Evidence generated for this doctoral project were threefold; 1) Analysis of the quality improvement project planning, implementation, and evaluation to identify strengths and opportunities for improvement, 2) Analysis of the existing ICU Liberation Collaborative benchmark report to the identify opportunities to improve practice in the medical ICU to better align with the ABCDEF bundle, and 3) Analysis of existing trauma ICU data to evaluate practice in the trauma ICU against the same standards used in the benchmark report to determine if patient outcomes in the trauma ICU may be positively impacted by implementation of the ABCDEF Bundle.

Procedures. For the analysis of the organization's quality improvement project planning, implementation, and evaluation, the student examined organizational

documents and interviewed project leaders. The program analysis was conducted

utilizing the Logic Model as a framework for evaluation. The logic provides a framework

for examining and defining program elements in five phases (Kettner, Moroney, &

Martin, 2017):

- Situation: The statement and definition of the problem to guide the planning of

  the project.

- Inputs: Inputs are the resources and materials needed for the project.

- Outputs: Assessment of the services or activities implemented to achieve

  objectives

- Outcomes: Assessment of the results of the project implementation

- Impact: Assessment of the changes occurring in the organization and/or

  community as a result of the project

For the analysis of existing data provided by the organization's ICU Liberation

Collaborative benchmark report, a Microsoft Excel spreadsheet was used to organize the

identified opportunity to improve, the associated evidence based best practice guideline,

and the recommendation provided to the organization. For the analysis of practice in the

trauma ICU, a review of trauma patient data was conducted utilizing the same protocol

utilized in the ICU Liberation Collaborative study of practices in the organization's

medical ICU. A Microsoft Excel Spreadsheet was used to organize the specific data

points that demonstrate adherence to the ABCDEF guidelines. See Table 1 for the

documentation points in the patient record assessed. In addition to those items in Table 1, the following information was collected and is included in the aggregate data reviewed:

- Age

- Sex

- Injury Severity Score

- Mechanism of Injury

- Days on Mechanical Ventilation if applicable

- Length of stay in ICU

The original ICU Liberation study included many more data points. However, for the purposes of this doctoral project, only those data points identified above were evaluated. Omitted data points from the original study included: demographic information, admitting diagnoses, information on advanced directives, and end of life care. These data points were deemed unnecessary for the purpose of this quality improvement project.

Data collected was used to calculate overall performance of the providers in the trauma ICU, utilizing the same format as the ICU Liberation benchmark report. Results were then compared to existing results of the performance in the medical ICU and performance of all ICUs included in the ICU Liberation Collaborative study. The ICU Liberation Collaborative study included 77 hospitals and 15087 patients. The organization contributed information on 210 patients to the study. For this doctoral project, the minimum number of records required was determined by an a priori power analysis. Aggregate data on a total of 60 trauma patients was included. The ICU Liberation Collaborative study protocol called for the first ten patients admitted to

the ICU to be included in the study for the study period of 14 months. The doctoral

project followed this protocol by selecting the first ten patients admitted to the trauma

ICU for the previous 6 months to generate the data on the care documented for 60 trauma

ICU patients.

Protections. Analysis of the organization's existing ICU Liberation benchmark

report, as well as analysis of existing trauma patient records was not started until

approval was secured by the Walden University Internal Review Board (IRB) and the

host organization's IRB. Participation in the ICU Liberation Collaborative was already

approved by the organization's IRB upon enrolling on the original study in 2014. For the

analysis of trauma patient data, the trauma program manager already has permission and

is responsible for review of trauma patient data to fulfill process improvement

requirements imposed by the Florida Department of Health and the American College of

Surgeons Committee on Trauma. Permission was secured from the organization to extend

this permission for the purpose of process improvement for the organization, but also for

the doctoral project. Data collected in the spreadsheet described above, for the purposes

of evaluating practice in the trauma ICU, did not include any identifying or protected

health information of the patients. The spreadsheet will be maintained on an encrypted

flash drive that will be destroyed 5 years after the conclusion of the project.

Analysis and Synthesis

Microsoft Excel served as the system for recording, tracking, organizing, and

analyzing the evidence for this doctoral project. Data from the existing organizational

quality improvement project was analyzed to assess the original project planning and implementation, interventions, outcomes, assessment and analysis, and the quality improvement initiatives devised in response to the findings (Walden University, 2017). The information was summarized and presented to the organization with recommendations based on the ABCDEF bundle guidelines to either maintain best practice or improve practice as applicable.

The second part of the project replicated the protocol of the original ICU Liberation Collaborative study to generate data for the purposes of assessing if implementation of the ABCDEF bundle in the trauma ICU would be a beneficial recommendation to the organization. Because the trauma ICU was left out of the original study, a baseline measurement is needed to determine which, if any, bundle elements are already being applied, and if the resources required for implementing the full bundle would be beneficial to the organization and the patients.

Following the original study protocol, the data collected was a yes, no, or not applicable for each bundle element. Missing documentation was recorded as a no. The aggregate data was then calculated in a percentage of compliance with the bundle element. For example, for assessment of pain in the previous 24 hours, if a pain score was documented six times, the compliance rate was six out of six or 100%. If only three pain assessments were documented, the compliance rate was three out of six or 50%. This methodology is aligned with the scoring methodology used in the original ICU Liberation

Collaborative study. The results of this analysis were summarized and presented to the organization with recommendations based on the ABCDEF bundle guidelines.

Summary

The identification and discussion of the practice-focused question is presented, along with specific sources of evidence used, procedures, protections, and finally the analysis and synthesis of information generated by the doctoral project. Results will be discussed in Section 4. Information discussed includes findings and implications, resultant recommendations, and the strengths and limitations of the project.

Section 4: Findings and Recommendations

Introduction

Despite evidence based guidelines to manage and prevent delirium in the ICU, this condition continues to be prevalent in the United States and the project organization. The problem- based question addressed in this quality improvement assessment was: Does improving adherence to the ICU Liberation ABCDEF Bundle for patients admitted to the ICU decrease incidence of delirium compared to outcomes prior to implementation? To answer this question an analysis of existing organizational data from an ongoing quality improvement project was conducted. Analysis revealed some strengths and opportunities for improvement in adhering to the ABCDEF Bundle in current practice. In this section, a summary of the findings and implications, recommendations, and strengths and limitations of the project are presented.

Findings and Implications

The findings and implications are divided into three sections: 1) analysis of the organization's quality improvement project, 2) analysis of the ICU Liberation Benchmark report for the organization, and 3) analysis of baseline practices in the trauma ICU.

Assessment of Organizational Quality Improvement Project

The Logic Model was used to conduct an analysis of the organization's planning, implementation, and evaluation of the quality improvement project. The Logic Model provides a framework to evaluate the situation, inputs, outputs, outcomes, and impact of a quality improvement project (Kettner, Moroney, & Martin, 2017).

Situation. The Logic Model begins with a statement and definition of the problem. This guides the planning of the project and serves as the baseline to measure outcomes (McCawley, n.d.). An interview was conducted with the organization's ICU Liberation program leader to assess the situational factors that prompted her interest in implementing this quality improvement project. Implementing change in an organization should be based on alignment with the vision and strategic plan for the organization, impact on staff, impact on quality of care, and ultimately impact on the patient (Fleiszer et al., 2016). The program leader reported that through professional networking, she had identified an opportunity to enroll the organization in a nationwide study to improve outcomes in the ICU (K. Reynolds, personal communication, May 16, 2017). She had mostly anecdotal evidence to categorize the current state of pain, agitation, or delirium in the organization. Enrolling in the ICU Liberation Collaborative provided the opportunity to utilize a structured process to assess baseline outcomes and practice, followed by a pre-packaged evidence based program to make changes and assess outcomes.

This approach was unique. Without solid data on current organization-specific incidence of pain, agitation, and delirium, the program leader had to communicate her concerns and gain organizational support based on the assumption that if all hospitals have these issues than this one must, too. The leader did cite previous failed organizational attempts at impacting incidence of delirium as a motivator for this project.

Inputs. Inputs are the resources needed to successfully implement a program, including financial, human resources, knowledge, equipment, time etc. (McLaughlin & Jordan, 1999). Once support was secured from organizational leaders, the project leader

conducted a thorough assessment of resources. A Strengths, Weaknesses Opportunities,

Threats (SWOT) Analysis was conducted. A SWOT analysis is a useful tool in project or

program planning used to identify factors within the internal environment and the

external environment that may impact the plan (Tavares Barbosa et al., 2017). Grant

funding was secured through the organization's healthcare foundation. A timeline was

developed to organize the roll out of the education, documentation, and data collection.

Assessment of program planning documentation and interview of the project

leader demonstrates a well-organized plan for implementation. One opportunity to

improve was identified in the planning of program ownership and sustainability. When

planning a program or change initiative, there are three crucial roles that should be

assigned from the start; 1) the project sponsor, 2) the project manager, and 3) the project

owner (Project Management, 2013). The sponsor is the person or group supporting the

project. The manager is the person responsible for the work of planning and

implementation. The owner is the individual who will be responsible for the ongoing

sustainment and outcomes. In general, the owner is the one who will continue funding

and benefiting from the new practice (Project Management, 2013). In speaking with the

project leader, she verbalized frustration with not identifying the project owner in the

initial plan (K. Reynolds, personal communication, May 16, 2017). She now continues to

struggle with identifying a leader within the ICU who is willing to own the responsibility

of sustaining the changes made.

Outputs. Outputs are the activities that link the identified problem to the intended

impact of a program (McLaughlin & Jordan, 1999). The outputs of this quality

improvement project were pre-selected and directed by participation in the ICU

Liberation Collaborative. The primary output was the ICU Liberation Benchmark report

provided to each organization enrolled in the collaborative. Receipt of the report,

however, did give the organization data to be used for further exploration of current

practice and identification of opportunities for improvement. These outputs could be

further studied and shared with other hospitals via poster presentations, publications, and

educational workshops. So far these outputs have not been realized.

In addition, the project team did identify some organizational-specific outputs.

Changes to the electronic documentation within the organization's electronic health

record were anticipated. Changes to hospital policy were also anticipated to support the

changes in practice. Finally, creating and maintaining regular interprofessional care

rounds in the ICU was an identified as a goal.

Outcomes. Program outcomes can be short-term and long-term (Project

Management, 2013). Outcomes should be specific, measurable, action-oriented, realistic,

and timed (Kellogg Foundation, 2004). Short term goals identified for this project

included improved adherence to bundle elements, improved teamwork and

interprofessional collaboration, more efficient resource use with less energy, and

sustained compliance with assessments and interventions. Adherence, compliance and

efficiency are outcomes that can be measured from the data; however improved

collaboration is more subjective and difficult to measure. The outcomes did not include a

specific time frame in the plan. Long term goals included a demonstrated decrease in the

incidence of pain, agitation, and delirium with associated improvements in secondary

outcomes such as ICU length of stay, days of mechanical ventilation, and decreased hospital length of stay. The delineation of expected outcomes for this project would have benefited from better defined measurable goals and specific time points for assessments.

Impact. Impacts are the organizational and/or system level changes that are anticipated as a result of the quality improvement project (Project Management, 2013). The mission of the ICU Liberation Collaborative was to institute prevention strategies in the ICU to avoid complications and improve clinical outcomes. These improved clinical outcomes represent the impact of the quality improvement program. Measurement of the true impact of the program should also be specific, realistic, and timed (Kellogg Foundation, 2004). The planning and implementation of this quality program may have benefited from a more specific impact evaluation plan.

Overall, assessment of the planning, implementation, and evaluation of the organization's quality improvement program demonstrated some strengths and some opportunities for improvement. Strengths included a thorough assessment and securing of resources to support the implementation. The implementation plan benefitted from being pre-designed by the ICU Collaborative for consistency across all enrolled sites. However, the plan for evaluation of outcomes and impact could have been more specific and measurable. Sustainment of the program and continued focus on improvement efforts is weak and in danger of failure. This could be improved in future projects by ensuring ownership and sustainment is planned and assigned prior to implementation of the program (Project Management, 2013).

Assessment of ICU Liberation Benchmark Report

An analysis of the organization's benchmark report was conducted for the purpose of identifying strengths and opportunities for improvement. The report provides data on percentage of adherence to recommended bundle elements, as demonstrated by nursing documentation of activities in the medical record. Pre-implementation, the organization reviewed 30 patient records for a total of 79 days in the ICU (patient-days). The population studied in all hospitals in the collaborative was 1,982 patient records for a total of 5,865 patient-days. Post implementation the organization cohort included 210 patient records for 486 patient-days and the all hospitals cohort included 15,087 patient records for a total of 79,521 patient-days. The results of the analysis are presented:

A. To demonstrate adherence to the element of Assessing, preventing, and managing pain, there must be documentation that the patient received a minimum of six pain assessments in 24 hours. Prior to implementation of the ABCDEF bundle education, the organization cohort demonstrated documentation meeting this criteria on 43% (n= 79) of all patient-days. The average for the all hospitals cohort was 66% (n=5,865). After implementation of the education, the organizational cohort average dropped to 38% (n=486) of patient-days, whereas the average for the all hospitals cohort improved to 79% (n=40,361).

A decrease in compliance with the recommended frequency of pain assessment in the organization cohort is difficult to explain. This decrease could be a reflection of a smaller population in the pre-implementation group. There are also some activities that result in the patient not being present in the ICU at the time the pain assessment is due,

such as radiologic testing or scheduled procedures. The study protocol did not direct data abstracters to look into other departments' documentation to find missing values.

Information was collected in the original study on the pain score at the time of assessment, and what actions were taken to address pain, however, this data was not reported in any measurable fashion in the ICU Liberation Benchmark report. Pain is difficult to assess in nonverbal or non-responsive patients. For patients unable to provide a verbal pain score, behavioral assessment tools such as the Behavioral Pain Scale (BPS) and Critical-Care Pain Observation Tool (CPOT) are recommended (Barr et al., 2012). Both assessment tools have been previously tested and determined valid and reliable; however there is concern that these assessment tools may not be adequate for special populations. Rijkenberg et al. (2017) found both the CPOT and the BPS to be valid for most patients, but inadequate for patients who are agitated or sedated. Arbour et al. (2014) found similar inadequacies with these nonverbal pain assessment tools in patients with traumatic brain injury altered level of consciousness, sedation, and mechanical ventilation. The data presented in the ICU Liberation Benchmark report does not distinguish how pain was assessed (verbal versus behavioral), just that a score was documented. Therefore, it is difficult to determine if pain assessment and management declined after implementation of the bundle or if the data reflects inconsistencies in measurement and missing information in the patient records.

B. To demonstrate adherence to the element of conducting Both spontaneous breathing trials and spontaneous awake trials, there must be documentation that both a

recommended safety screen followed by a trial was performed at least once per every 24 hours. This element is dependent on the patient's plan of care regarding sedation and mechanical ventilation. In some cases, the recording of a spontaneous awake trial and/or a spontaneous breathing trial was not applicable. Therefore, each component was analyzed separately.

For spontaneous awake trial safety screenings, the organization cohort demonstrated documentation meeting this criterion 32% of patient-days (n=13) pre-implementation and 25% (n=48) of patient-days post-implementation. The average for the all hospitals cohort was 16% (n=456) pre and 35% (n= 6,674) post. For the actual spontaneous awake trial, the organization cohort demonstrated documentation meeting this criteria 34% of patient days (n=14) pre and 49% (n=107) of patient-days post-implementation. The average for the all hospitals cohort was 23% (n=656) pre and 36% (n= 7,041) post. The data does not indicate how many patients met criteria for inclusion for each element, so it is difficult to judge if this indicates true changes in practice or simply a result of having more or less patients in the data pool impacting the average.

The same discrepancy can be attributed to results for the spontaneous breathing trial criteria. For the spontaneous breathing trial safety screenings, the organization cohort demonstrated documentation meeting criteria 38% of patient days (n=17) pre and 22% (n=48) of patient-days post-implementation. The average for the all hospitals cohort was 16% (n=1,249) pre and 35% (n=3,079) post. For the actual spontaneous breathing trial, the organization cohort demonstrated documentation meeting criteria on 36% of

patient days (n=16) pre and 35% (n=76) of patient-days post-implementation. The

average for the all hospitals cohort was 30% (n=953) pre and 37% (n=8,214) post.

Spontaneous awake trials should be included in daily protocol-directed sedation

plans (Balas et al., 20102). The positive relationship between nurse-driven sedation

protocols and duration of mechanical ventilation has been demonstrated as early as 1999

(Brook et al, 1999). Kress, Pohlman, and Hall (2001) found daily interruption in sedation

per nurse-driven protocols results in significantly shorter length of stay in the ICU and

associated complications including infections and delirium. Likewise, spontaneous

breathing trials, driven by respiratory therapy, significantly decrease time to extubation,

total days of mechanical ventilation, and incidence of complications, including delirium

(Balas et al., 2012).

Finally, data was analyzed to evaluate the frequency of the spontaneous awake

trial being performed prior to the spontaneous breathing trial. Pairing the nurse driven

spontaneous awake trial with the respiratory therapy-driven spontaneous breathing trial

enhances secondary outcomes compared to when the trials are conducted independently

(Balas et al. 2012). The organization cohort demonstrated documentation of coordinated

trials in 60% (n=6) of patient days pre-implementation and 92% (n=47) post. The average

for the all hospitals cohort was 71% (n=257) pre and 76% (n=3,087) post.

Although this appears to be improvement in both cohorts, one must consider the

number of eligible patients, and those who either did not attempt a spontaneous breathing

trial, or did so without a recommended spontaneous awake trial documented prior to it.

This may reflect a documentation issue rather than a practice issue. In practice, a patient

is generally awake and responsive prior to attempting unaided spontaneous breathing. The exception to this would be in cases of brain injured patients on mechanical ventilation. Spontaneous breathing trials are sometimes conducted on patients with reduced or absent levels of consciousness to assess severity of neurological dysfunction (Joffe, Anton, & Duff, 2010).

C. To demonstrate adherence to the element of appropriate Choice of analgesia and sedation medication, there must be documentation that the patient received a minimum of six sedation/agitation assessments in the each 24 hour period. The organization uses the Richmond Agitation Sedation Score (RASS) to assess level of sedation. The RASS is one of the recommended assessment tools for use in the ICU Liberation Collaborative. The RASS is a 10 point scale scoring system ranging from -5 to +4. A score of 0 indicates the patient is alert and calm. A score of +4 indicates the patient is agitated and combative. A score of -5 indicates the patient is heavily sedated (Holly, Cantwell, & Jadotte, 2012). This assessment is not applicable to all patients, just those medicated for sedation and/or analgesia. Data was collected on each eligible patient for each day the patient was in the ICU on an applicable medication.

Prior to implementation of the ABCDEF bundle education, the organization cohort demonstrated documentation meeting this criteria 65% of patient days (n=51). The average for the all hospitals cohort was 44% (n=2,578). After implementation of the education the organization average dropped to 61% (n=304), whereas the average for all hospitals improved to 79% (n= 26,072). Again, the benchmark report did not include information on how many patients were included in each cohort, so it is difficult to

ascertain if this was really a practice issue, a documentation issue, or a reflection of more or less patients per patient-days in each cohort.

Choice of sedation and analgesia medications is equally important to outcomes. Several studies have demonstrated a significantly negative relationship between delirium in the ICU and use of benzodiazepines (Balas et al., 2012). The Society of Critical Care Medicine recommends lighter levels of sedation and promotes the idea of analog-sedation (Barr et al., 2013). Analgo-sedation is the primary use of analgesic medications with sedatives administered sparingly, and only as needed for managing anxiety and agitation (Berntzen, Bjork, & Woien, 2017). The ICU Liberation Benchmark report does provide data on sedative and analgesic medication use. For the all hospitals cohort, use of benzodiazepines for sedation decreased from 24% of patient days pre-implementation to 20% post-implementation. For the organization, use of benzodiazepines increased from 16% pre-implementation to 19% post-implementation indicating an ongoing opportunity to improve.

D. To demonstrate adherence to the element of assessing, preventing, and managing Delirium, there must be documentation that the patient received a minimum of two delirium assessments in each 24 hour period. The organization utilizes the Confusion Assessment Method tool for Intensive Care Unit (CAM-ICU). Utilizing the CAM-ICU, the nurse assesses the patient's level of consciousness per the RASS score, and then assesses the patient's alertness, inattention, and disorganized thinking.

Prior to implementation of the ABCDEF bundle education, the organization cohort demonstrated documentation meeting this criteria 90% of patient days (n=71). The

average for the all hospitals cohort was 41% (n=2411). After implementation the organization cohort average improved to 96% (n=465), and the average for the all hospitals cohort improved to 59% (n= 24989). A pre-implementation adherence rate of 90% is impressive. This may be attributed to a prior organization quality improvement project focused on delirium that resulted in the RASS and CAM-ICU assessment fields being added into the electronic documentation flowsheet (K. Reynolds, personal communication, November 28, 2017). However, the study only included documentation that the assessment was performed. No information was reported on the accuracy of the assessment or interventions implemented as the result of the assessment.

     E. To demonstrate adherence to the element of promoting <u>E</u>arly mobility and exercise, there must be documentation that the patient passed an early exercise/mobility safety screen and the patient received exercise/mobility each 24 hours. This element is difficult to analyze. To meet criteria, there must be documentation of both completion of a safety screen and mobility. Documentation that a safety screen was performed in the organization cohort came solely from the physical therapist's notes. There is no indication how this data was collected in the all hospitals cohort. When documentation of mobility was found, data was only collected for the categories of Active Range of Motion, Dangle, Stand, Active Transfer, March in Place, Walk in Room, and Walk in Hall.

     The data shows that prior to implementation of the bundle, the organization cohort documented adherence to this bundle element 11% of patient days (n=9) and the all hospitals cohort documented adherence 6% of patient days (n=376) for completing a

safety screen. For actually mobilizing the patient the organization cohort documented adherence to this bundle element 15% of patient days (n=12) and all hospitals cohort documented 23% of patient days (n=1355). Post implementation data reveals safety screening documentation improved to 23% for the organization, but documentation of actual exercise or mobility performed decreased slightly to 14% from 15%. For the all hospitals cohort, improvements were seen in both documentation of safety screening (17% from 6%) and mobility (30% from 23%). Missing from this data is details on how many patients did not receive early mobility screening and intervention because their medical condition prohibited it.

    F. To demonstrated adherence to the element of promoting <u>F</u>amily engagement, there must be documentation at least once each 24 period, a family member participated in rounds, a family conference, assisted with the plan of care, or received education on the ACBDEF bundle elements. Family engagement is perhaps the most difficult data element to analyze with the data provided. There is no differentiation on which activity listed in the criteria was documented, so adherence rates do not reflect how family engagement was actually achieved.

    In evaluating the benchmark report, it is also important to note how many days a family member was present compared to the total patient days. For the organization, documentation of family presence was noted for 29 out of 70 patient-days. Of those 29 patient days, documentation of family engagement was noted 28 days or 98% of patient-days. Post-implementation this number fell slightly to 90% of patient days, but family was documented to be at the bedside for only 169 of 486 total patient days. Data from the

all hospitals cohort demonstrated improvement from 48% of patient days to 66% of

patient days. Important to note is that total days of family at bedside improved from just

under 50% of patient-days to almost 60% of patient days in the all hospitals cohort. For

the organization, documentation of family presence never reached 40% of patient days.

This represents an opportunity for the organization to evaluate policies and practices

around family presence in the ICU.

All Elements. The ICU Liberation Benchmark report provided data on the overall

adherence to the ABCDEF bundle for both the organization and all hospitals cohorts. The

all hospitals cohort data indicates all elements of the bundle were documented on each

patient day for only 1% of all patient-days in the study prior to implementation.

Compliance rose to 7% post-implementation. For the organization, compliance with all

elements of the bundle was 0% pre-implementation and 4% post-implementation.

Barnes-Daly, Phillips, and Ely (2017) studied the impact of overall bundle

compliance with associated outcomes. They utilized a random effects regression to

measure association between full versus partial compliance with all ABCDEF bundle

elements. The study found for every 10% increase in total bundle compliance, patients

had 7% higher odds of hospital survival (odds ratio, 1.07; 95% CI, 1.04–1.11; $p < 0.001$).

Interestingly the study also found for every 10% increase in partial bundle compliance,

patients had a 15% higher hospital survival (odds ratio, 1.15; 95% CI, 1.09–1.22; $p <$

0.001) (Barnes-Daly, Phillips, &Ely, 2017). Both the organization and the all hospitals

cohorts demonstrated some minor improvement in compliance with all elements of the

bundle. However, improving compliance with just some of the elements may have a significant impact on secondary outcomes.

Secondary outcomes reported in the study included average patient-days on mechanical ventilation, average ICU length of stay, and incidence of delirium. Pre-implementation and post-implementation results for both the organization and all hospitals in the collaborative are reports in Table 2.

Table 2.

Secondary Outcomes: Organization vs. All Hospitals

	Organization	All Hospitals
Avg. Days Mechanical Ventilation - Pre	4.25 days	2.7 days
Avg. Days Mechanical Ventilation - Post	1.5 days	2.3 days
Avg. ICU Length of Stay Days- Pre	2.5 days	3.5 days
Avg. ICU Length of Stay Days- Post	2.5 days	3 days
Avg. Incidence of Delirium- Pre	10 %	20%
Avg. Incidence of Delirium- Post	10%	28%

Notable is the decrease in average days on mechanical ventilation for the organization from pre-implementation to post-implementation (4.25 days to 1.5 days). Many factors play into the ability to discontinue mechanical ventilation. It is difficult to demonstrate direct correlation between elements of the bundle and the resulting decrease in mechanical ventilation days.

Also of note is the incidence of delirium in both cohorts. With research reporting incidence of delirium ranging from 40% to 80% (Kram, 2015), incidence of delirium as reported by the ICU Liberation benchmark report is surprising. As referenced in the discussion of results for adherence to delirium screening, performance of the assessment for delirium may not directly correlate to incidence. The error rate must be assessed to

determine if the incidence in this study was really below nationally reported averages, or if the incidence was much higher, but under-identified by the nurses performing the assessment. This data is not available to assess in the ICU Liberation Benchmark report for either cohort.

Assessment of Baseline Trauma ICU Practices

An analysis of aggregate data on nursing documentation in the trauma ICU was conducted to identify baseline practice. The purpose was to identify strengths, opportunities for improvement, and generate recommendations for expanding the implementation of the ABCDEF Bundle into this specialized unit. The trauma ICU data was calculated as a percentage of adherence to recommended bundle elements, as demonstrated by nursing documentation of activities in the medical record. This matches the data presented in the ICU Liberation Benchmark report, allowing for direct comparison. The pre-implementation organization cohort data from the ICU Liberation Benchmark report was used as comparison. This group included 30 patient records for a total of 79 patient-days in the ICU. The population studied in the trauma ICU group included 60 patient records for a total of 202 patient-days. The results are presented in Table 3.

Table 3.

Baseline Data: Organization vs. Trauma ICU

	Organization (n=79)	Trauma ICU (n=202)
6 pain assessments in 24 hours	43%	75%
SAT Safety screening per each 24 hours	32%	60%
SAT per each 24 hours	34%	52%
SBT Safety screen per each 24 hours	38%	47%
SBT per each 24 hours	36%	30%
SAT before the SBT per each 24 hours	60%	60%
6 sedation/agitation assessments per 24 hours	65%	73%
2 delirium assessments per 24 hours	90%	83%
Exercise/mobility per 24 hours	15%	34%
Family member participation per 24 hours	97%	44%
All elements documented	0%	1%
Avg. Incidence of Delirium	10 %	7%
Avg. Days Mechanical Ventilation	4.25 days	1.7 days
Avg. ICU Length of Stay Days	2.5 days	3.4 days

Comparison of baseline data from the organization's ICU Liberation pre-implementation data to baseline documentation in the trauma ICU reveals some significant findings. When comparing data, it is important to note that nurses working in the Trauma ICU also float to the medical and surgical ICU. At the time of the original ICU Liberation ABCDEF bundle project implementation, all ICU nurses received the same education, regardless of the unit they more frequently worked in. Therefore, one might assume that nursing practice and documentation would not vary much from unit to unit. However, the data suggests some significant differences in practice. For example, six pain assessments per every 24 hours was documented in 75% of patient days in the trauma ICU cohort, but only in 43% of patient-days in the organization cohort.

Differences in practice could be attributed to many factors. The nature and complexity of trauma patient care is unique with multiple co-morbidities impacting physiologic reserve, compensatory mechanisms, and risk of morbidity and mortality

(Joffe, McNulty, Boitor, Marsh, & Gélinas, 2016).There is little evidence in the current literature speaking to the unique characteristics of this specialized population and the efficacy of each bundle element in preventing complications.

Assessing and managing pain in trauma patients can be challenging. Pain is a frequent complication in trauma with greater than 50% of patients experiencing moderate to severe pain during the first three days of ICU admission (Arbour et al., 2014). Many have conditions impacting their ability to report pain such as those with traumatic brain injury (TBI), altered level of consciousness, sedation, and mechanical ventilation. Untreated or undertreated pain can contribute to worsening clinical condition, particularly in the TBI population (Arbour et al., 2014).

Valid and reliable assessment tools are available to assess for pain in nonverbal or nonresponsive patients including the Pain Behavioral Assessment Tool and the Critical Care Pain Observation Tool. These assessment tools rely on observation of pain behaviors such as facial grimacing or guarding. However, Ge ́linas and Arbour (2009) found TBI patients often exhibit "atypical" pain behaviors, such as sudden eye opening, eye weeping, and raising their eyebrows, which are not assessed for utilizing these standardized assessment tools.

Early mobility is also challenging in the trauma population. Mobilization is defined as "physical activity sufficient to elicit acute physiological effects that enhance ventilation, central and peripheral perfusion, muscle metabolism, alertness and are counter measures for venous stasis and deep vein thrombosis (Cameron et al., 2015, p. 664). Certain traumatic injuries warrant complete immobilization before definitive

stabilization, such as spinal cord injuries or in non-operative management of liver or

spleen lacerations (Stassen et al., 2012). When reviewing trauma ICU baseline data,

multiple cases were observed where early mobilization assessment was deferred due to

patient condition. However, when looking at aggregate data compared to the baseline

data for the organization, the trauma ICU cohort documented adherence to the bundle

element in 34% of patient days compared to 15% in the organization cohort.

One area of opportunity for the trauma ICU, based on comparison of baseline

data, is family presence. The bundle element recommends promoting family engagement,

as evidenced by family member participation in rounds, a family conference, or evidence

that education was provided to the family on the ACBDEF bundle elements. The

organization cohort demonstrated adherence to this bundle element in 97% of patient-

days. The trauma ICU cohort demonstrated adherence in only 44% of patient-days. This

represents an opportunity to improve. However, it is unknown if this data reflects poor or

inconsistent documentation practices or policies and protocols that do not support family

presence. Further investigation is required.

When assessing secondary outcomes, some differences are noted. The trauma

ICU cohort demonstrated an average of 1.7 days on mechanical ventilation and an

average of 3.4 days length of stay in the ICU. This suggests that those trauma patients

who do require mechanical ventilation tend to be extubated quicker than in the

organization cohort, whose baseline average days on mechanical ventilation was 4.25

days. However, earlier discontinuation of mechanical ventilation did not result in

decreased length of stay in the trauma ICU. In the organization cohort, the average ICU

length of stay was 2.5 days whereas average length of stay in the trauma ICU cohort was 3.4 days. For all patients in the trauma ICU cohort, the data suggests length of stay is, on average, shorter than in the organization cohort. Length of stay and mechanical ventilation can be impacted by a variety of factors; however opportunity to improve these outcomes may exist in the trauma ICU by implementation of these bundle elements.

As was noted in the original ICU Liberation Benchmark report, the incidence of reported episodes of delirium is quite low in all three cohorts compared to numbers reported in current literature (Kram, 2015; Hannon, 2015; Barr et al. 2013; Pinto & Biancofiore, 2016). The organization cohort reported a baseline incidence of delirium in 10% of cases; the all hospitals cohort reported delirium in 20% of cases, and the trauma ICU cohort in 7% of cases. Again, consideration for the nurses' reliability in recognizing delirium utilizing the CAM-ICU tool may need to be addressed. Delirium remains underdiagnosed in the ICU (Nishimura, 2016).

Under-recognition of delirium may have devastating impacts on the individuals, communities, and institutions. In a survey of ICU nurses' perceptions of assessing for delirium, only 20% knew a formal delirium test, and only 7% sometimes used one (Eastwood, Peck, Bellomo, Baldwin, & Reade, 2012). In the organization cohort, the CAM-ICU was utilized to assess for delirium at least twice per 24 hours in 90% of cases before the quality improvement project was implemented, and in 96% of cases post-implementation, yet delirium was only identified in 10 to 20% of cases. Further investigation is warranted to determine if the tool is being utilized consistently and correctly. The hyperactive form of delirium is easier to detect than the hypoactive form,

which is much more common but also more difficult to detect without improved

education and use of reliable screening tools (Eastwood, Peck, Bellomo, Baldwin, &

Reade, 2012). Improving the prevention, management, and treatment of delirium can

have an important impact on society due to the financial, physical and emotional impacts

delirium has on patients, their families, and the community.

<div align="center">**Recommendations**</div>

Recommendations are presented for the organization in improving upon quality

improvement project planning and outcomes. To address the quality improvement

program, it is recommended that the original project leader convene a meeting of

stakeholders to identify a project owner. Continued improvements in documentation and

practice are struggling due to lack of a designated owner to continue enculturation of the

ABCDEF bundle into daily practice. The project appears to be stuck in the sixth stage of

Kotter's model for change: generating short-term wins (Kotter, 2012). The post

implementation data from the ICU Liberation Benchmark report demonstrates that within

months of project implementation, certain practices such as early mobility and

spontaneous breathing trials were already trending down instead of up. A project owner is

needed to continue leading the effort to attain Kotter's final two stages: sustaining the

change, and enculturating the change (Kotter, 2012).

To address improved outcomes in the ICU, it is recommended that the project

leader meet with the project owner and stakeholders to plan and implement smaller

quality improvement projects to address specific deficits. For example, adherence to the

early mobility guidelines was poor at baseline with only 15% of cases documenting

adherence. This worsened post-implementation with only 14% of cases documenting

adherence. Further investigation is needed to determine the causes of this trend. There are

several potential issues including proper documentation, protocols to support early

mobilization, potential barriers caused by lack of manpower, or perhaps attitudes and

perceptions of staff that may need to be addressed. This is true of the issue related to

recognition of delirium. Is the organization that good at preventing delirium compared to

the rest of the country, or is there just poor recognition when it exists? Without a more

focused assessment of the current situation, it is difficult to recommend an appropriate

solution. Utilization of the Plan, Do, Study, Act (PDSA) methodology is recommended.

The Institute for Healthcare Improvement (IHI) recommends the PDSA tool for

accelerating improvements within an organization by identifying a change needed then

planning it, trying it, observing the results, and acting on what is learned (IHI, 2018)

     Even though incidence of delirium is reported to be low per the ICU Liberation

Benchmark report, there is still opportunity to improve. The best approach is prevention

(Adams et al., 2014). Key interventions include addressing medical complications,

mobilizing patients early and often, maintaining a normal wake-sleep cycle, and avoiding

high risk drugs such as benzodiazepines, (Adams et al., 2014). Benzodiazepines are

thought to cause acute brain dysfunction by activating gamma-amino butyric acid type A

receptors, altering normal neurotransmitter function and inducing delirium (Fujita, 2009).

Sedation is necessary for many ICU patients, but sedation is not equivocal to sleep.

     Maintaining normal sleep/wake cycles plays an important role in delirium. The

sleep/wake cycle is regulated by alternating neural pathways called the ascending

reticular activating system (ARAS) and the ventrolateral preoptic nucleus (VLPO) (Figueroa-Ramos et al., 2009). Avoiding medications that disrupt this cycle is helpful. Keeping lights dim, noise levels down, and even providing earplugs helps support sleep (Hill, 2017). Sleep is necessary for healing, but sedating patients to keep them asleep during the day is more harmful than healthful (Edmunds, 2017). Promoting wakefulness, reorientation, and normal stimulation during wake is helpful in preventing delirium. This may include interventions such as getting patients up into a chair and or walking around if applicable, reading, keeping the room brightly lit with sunlight from a window and lighting in the room. For those unable to get out of bed due to medical conditions, in bed exercises such as utilizing a specially developed cycle device to pedal in bed should be considered (Edmunds, 2017).

Delusional thinking and hallucinations are commonly seen with delirium. Ongoing studies at Johns Hopkins University are demonstrating these hallucinations may result in Post-Traumatic Stress Disorder (PTSD). One patient described no recollection of his time in the ICU under sedation, but continues having vivid nightmares that he was in jail fighting with the guards (Edmunds, 2017). Patients who develop post-delirium PTSD can continue suffering mental and emotional distress, sleep disturbances, and feelings of danger. Several studies have recommended using diaries as a tool to help orient patients who are experiencing hallucinations and help them recover (Edmunds, 2017). Johns Hopkins Medical Center is currently utilizing diaries in the ICU to impact delirium. The ICU nurses write down the events of the day in each patient's diary. The patients and family are welcomed to write in the diary, too. The study is finding that when patients

can't remember what happened during their time in the ICU, or suffered hallucinations, the diary helps them read about what was really happening during those times. The diaries help patients to start coming to terms with their illness and reorienting them to the reality of what happened (Edmunds, 2017). Application of this strategy in the organization's ICU is recommended.

A secondary focus of this doctoral project was to evaluate baseline practice in the organization's trauma ICU to determine if implementation of the ABCDEF bundle could improve outcomes. Analysis determined several opportunities for improvement. Daily spontaneous breathing trials appear to be conducted infrequently, based on what data is recorded in the documentation; however this may not accurately reflect true practice. Further investigation is needed to determine how adherence to this guideline can be improved. Ensuring the trials are documented when conducted is important. Ensuring processes are in place to support coordination between the nurses, pharmacists, and respiratory therapists are also crucial to improvement. Patients who receive coordinated spontaneous awakening and breathing trials have on average fewer days on mechanical ventilation and decreased ICU length of stay (Kram, 2015).

There is much room for improvement regarding early mobility based on the baseline assessment of current trauma ICU practice. Recommendations to improve must again start with ensuring accurate documentation to determine if this is an accurate reflection of current practice. There currently is no early mobility safety screening tool for nurses in the organization to utilize to start progressing mobility without waiting for a physical therapy evaluation. The Agency for Healthcare Research and Quality (AHRQ)

has a safety screening available for hospital implementation as part of their project to promote early mobility (AHRQ, 2017). Including this assessment into the daily electronic assessment flow sheet could potentially improve practice and outcomes in the trauma ICU. Mobilization is sometimes medically contra-indicated. In such cases, the reason for deferring mobility should be documented in the electronic record. Assessment and progression of mobility should be started as soon as possible based on the patient's condition.

Delirium recognition is another opportunity for improvement. Baseline data of the trauma ICU demonstrated Delirium was recognized in 7% of cases studied. Delirium may not be as frequent in the trauma population as it is in medical populations, or perhaps it may be much more frequent but misdiagnosed (Frenette et al., 2016). Further investigation is warranted. For the trauma ICU, improvement should start with ensuring the nurses are conducting the assessments utilizing the CAM-ICU tool appropriately. Utilizing the CAM-ICU in patients who are sedated or have suffered traumatic brain injury poses a challenge. However, Soja et al. (2008) demonstrated high interrater reliability in patients with traumatic brain injury and found it to be helpful in supplementing the Glasgow Coma Scale for monitoring changes in neurological status. A study by Frenette et al (2016) demonstrated similar findings but cautioned the CAM-ICU may have lower specificity in patients with moderate to severe traumatic brain injury.

Nurses working in the organization's trauma ICU received the same education as all nurses in the ICU when the ABCDEF bundle was initially rolled out. Because the trauma ICU nurses occasionally float out to other areas of the ICU, their exposure to the

ABCDEF bundle was greater than when the baseline data for the organization cohort was first collected. This may account for data that suggests elements of the ABCDEF bundle are already being addressed, informally, in the trauma ICU. Therefor a recommendation to plan and implement a full scale introduction of the ABCDEF bundle in the trauma ICU may not be warranted. Instead, the baseline data should serve as a tool to identify which bundle elements are not currently receiving adequate attention, and build quality improvement PDSA cycles around those individual elements. Conducting a more focused implementation may also alleviate issues encountered in the original implementation due to issues with project ownership and competing priorities.

Strength and Limitations of the Project

This doctoral project was guided by the Walden University Manual for Quality Improvement Evaluation Projects. The purpose of the evaluation of an existing organizational quality improvement project is to improve a practice and gain insight into the effectiveness of an organization's practice change. In conducting this evaluation, several strengths and limitations were observed.

Strengths

The organization's quality improvement project was guided by the national ICU Liberation Collaborative. By participating in this collaborative, the organization was provided with tools including education and implementation materials for staff, frequent conference calls and webinars to support progress, and a data base to contribute to that was used by the Collaborative to analyze and report results. This nationwide quality improvement program is rooted in the Society of Critical Care Medicine's Guidelines on

prevention of pain, agitation, and delirium published in 2013. The guidelines were evidence-based, with no inclusion of recommendations based on personal clinical experiences or those for which no evidence existed (Skrobik, Skrobik, & Chanques, 2013). This provided a solid evidence based framework for the organization and ease of assessment for this doctoral project.

An additional strength stems from the volume of records collected and analyzed, as part of the collaborative, supporting the strength of validity of the findings and recommendations. The post-implementation data for the all hospitals cohort included 15,087 patient records for a total of 79,521 patient-days. The organization cohort's post-implementation population included 210 patient records for 486 patient-days. The large population included in the data analysis adds strength to the findings of this doctoral project. Recommendations can be made to improve practice based on a large population contributing to the evidence and outcomes revealed in the ICU Liberation benchmark report.

Limitations

Several limitations were observed. First, implementation of the guidelines was conducted and outcomes measured with a retrospective-prospective study design. This design lacked randomization and a control group, which could add validity to study results. Also, data was collected utilizing a convenience sample of the first ten patients admitted to the ICU per month. Use of a convenience sample limits study findings. A randomized selection of patient records to include in the study could strengthen generalizability in future studies.

Determination of outcomes was also limited by the choice in data points documented and collected from the patients' medical records. For example, the pain assessment focused on if the assessment was completed the specific number of times prescribed in the 24 hour period. Assessment did not include the accuracy of the pain assessment, the actions taken to address pain, or the use of non-pharmacological interventions to address pain. Some of this information was collected by the organizations participating in the collaborative, but not reported out in meaningful ways to impact practice change.

Another limitation stems from the nature of the guidelines. The ABCDEF bundle was created based on the Pain, Agitation, & Delirium guidelines (Barr et al., 2013). The guidelines were published with the specific intent on allowing for flexibility in their application based on unique characteristics of individual organizational resources, patient needs, and provider influences. Therefore recommending practice changes to the organization, based on the assessment of the quality improvement project, is difficult because the specifics of how bundle elements were implemented in other organizations is not provided.

Future projects may benefit from a more detailed description of which data elements are to be documented and collected. For example, in the organization cohort, data on meeting the early mobility and family involvement guidelines was limited by lack of specific data fields in the electronic medical record to document these interventions. When collecting baseline trauma ICU data, it was difficult to determine when family members were included in discussions and what topics were discussed. In addition, more

research is needed to demonstrate correlational strength among bundle elements and outcomes. Does each individual element impact incidence of delirium or must all elements be adhered to in order to create measurable change?

Summary

A summary of the findings, implications, strengths and limitations of this study have been presented. In addition, recommendations are provided based on the strengths and opportunities identified in both the assessment of the organization's quality improvement project, and the data resulting from the project. In addition, recommendations have been provided based on assessment of baseline practice in the organization's trauma ICU. It is evident that certain bundle elements are already in place, but room for improvement is identified.

Section 5: Dissemination Plan

Introduction

Based on the observations made in the assessment and findings of this doctoral project, recommendations have been identified to help the organization improve practice and expand the ABCDEF care bundle to other areas. In this section, a plan for disseminating the findings and recommendations is presented. Also presented is an analysis of this doctoral student as a practitioner, scholar, and project manager.

Dissemination Plan

The specific objectives of this doctoral project were to evaluate the effectiveness of an organization's practice change/QI initiative and disseminate the results and recommendations to improve practice within the organization. The main findings were that the organization did achieve improvement in some ABCDEF bundle elements with associated outcomes, but continued improvement will require a designated project owner who can continue focusing quality improvement efforts by re-addressing those bundle elements that are not meeting the guidelines. This same approach is recommended for expanding the ABCDEF bundle into the trauma ICU. A project owner will need to be identified and individual bundle components addressed over time.

The dissemination of these findings will be presented in several formats. First, the doctoral student will share this manuscript in its entirety with the organization's Nurse Leader for the ICU Liberation Collaborative. Next, the doctoral student will set up several meetings with stakeholders to present the findings and recommendations. Stakeholders include the current members of the ICU Liberation Collaborative

committee, the nursing leaders of the organization's ICU and trauma ICU, the physician

leaders of the ICU and trauma ICU, and finally interprofessional team members that play

a role in ensuring bundle elements are met. Also, the doctoral student will create an

informational poster for display in the units and potentially for presentation at local, state,

and national conferences. Finally, the doctoral student will seek opportunities to provide

oral presentations and publications on the national level.

Analysis of Self

This doctoral project provided me with the motivation and opportunities to

expand my knowledge and skill set as a leader, project manager, and DNP prepared

nurse. I was also able to gain confidence in my role as an expert in critical care nursing,

an important step in my role actualization after spending the majority of my previous

nursing career in emergency care. As a scholar, I was challenged with the rigors of this

process; identifying a problem, conducting an extensive literature review, seeking IRB

approval from two organizations, defending my proposal, conducting an un-biased and

research based assessment, and writing up the entire process in a scholarly manner.

These challenges and lessons learned will support both my present practice as a

nursing leader, and my long-term professional goals including higher levels of executive

nursing leadership, consulting, and perhaps the academic side of the nursing profession.

Healthcare today and in the future depends on high quality, efficient, effective, and

evidence based practice. The expanding and aging population will continue to demand

leaders who can critically appraise the evidence, the actions taken, and the outcomes of

quality improvement projects to ensure each subsequent project is planned and executed with ever-increasing skill and precision.

Summary

This assessment of an existing organizational quality improvement project provides insight into the planning and organization needed to institute change at the organizational level, based on best practice guidelines. The translation of evidence to practice is an important concept for the DNP prepared nurse. There is an abundance of evidence supporting the implementation of the ABCDEF bundle to impact the incidence of delirium and other untoward conditions in the ICU. Implementation requires strong organizational support, a skilled project leader, and an identified project owner to sustain enculturate the change. With competing priorities and chaotic environments, implementation of care bundles in smaller increments may result in more successful and sustainable outcomes over time.

References

Arbour, C., Choinie`re, M., Topolovec-Vranic, J., Loiselle, C. G., Puntillo, K., & Ge´linas, C. (2014). Detecting pain in traumatic brain-injured patients with different levels of consciousness during common procedures in the ICU: Typical or atypical behaviors? *Clinical Journal of Pain, 30*(11), 960-969.

Adams, C. L., Scruth, E. A., Andrade, C., Maynard, S., Snow, K., Olson, T. L., & ... Cheng, E. (2014). Implementing clinical practice guidelines for screening and detection of delirium in a 21-hospital system in northern California : Real challenges in performance improvement. *Clinical Nurse Specialist, 29*(1), 29-37.

AHRQ. (2017). Medical Screening Algorithm: Medical screening algorithm to evaluate patient appropriateness for rehabilitation. Retrieved from https://www.ahrq.gov/professionals/quality-patient-safety/hais/tools/mvp/technical-bundles-earlymobility.html

Baker, D. W. (2016). *Joint Commission Statement on Pain Management.* Retrieved from https://www.jointcommission.org/joint_commission_statement_on_pain_management/

Balas, M. C., Vasilevskis, E. E., Burke, W. J., Boehm, L., Pun, B. T., Olsen, K. M., & ... Ely, E. W. (2012). Critical care nurses' role in implementing the 'ABCDE Bundle' into practice. *Critical Care Nurse, 32*(2), 35-8. doi: 10.4037/ccn2012229.

Barnes-Daly, M. A., Phillips, G., & Ely, E. W. (2017). Improving hospital survival and

    reducing brain dysfunction at seven California community hospitals:

    Implementing PAD guidelines via the ABCDEF Bundle in 6,064 patients. *Critical*

    Care Medicine, 45(2), 171–178.

Barr, J., Fraser, G. L., Puntillo, K., Ely, E. W., Gélinas, C., Dasta, J. F., … & Jaeschke,

    R. (2013). Clinical practice guidelines for the management of pain, agitation, and

    delirium in adult patients in the intensive care unit. *Critical Care Medicine, 14*(4),

    263-306.

Berntzen, H., Bjork, I. T., & Woien, H. (2017). 'Pain relieved, but still struggling' -

    Critically ill patients experiences of pain and other discomforts during

    analgosedation. *Journal of Clinical Nursing*, *27*(1), 223-224.

    doi:10.1111/jocn.13920.

Brook, A. D., Ahrens, T. S., Schaiff, R., Prentice, D., Sherman, G., Shannon, W., &

    Kollef, M. H. (1999). Effect of nursing-implemented sedation protocol on the

    duration if mechanical ventilation. *Critical Care Medicine, 27*(12), 2609-2615.

Cameron, S., Ball, I., Cepinskas, G., Choong, K., Doherty, T., …. & Fraser, D. D.

    (2015). Early mobilization in the critical care unit: a review of adult and pediatric

    literature, *Journal of Critical Care, 30*, 664-672.

Collins, N., Blanchard, M. R., Tookman, A., & Sampson, E. L. (2010). Detection of

    delirium in the acute hospital. *Age Ageing, 39*(1), 131-135.

CMS. (2017). *Hospital-Acquired Condition Reduction Program Fiscal Year 2018 Fact Sheet*. Retrieved from https://www.cms.gov/Medicare/Medicare-Fee-for-Service-Payment/AcuteInpatientPPS/Downloads/FY2018-HAC-Reduction-Program-Fact-Sheet.pdf

Devlin, J. W., Fraser, G. L., Joffe, A. M., Riker, R. R., & Skrobik, Y. (2013). The accurate recognition of delirium in the ICU: the emperor's new clothes? *Intensive Care Medicine, 39*(12), 2196-2199.

Eastwood, G. M., Peck, L., Bellomo, R., Baldwin, I., & Reade, M. C. (2012). A questionnaire survey of critical care nurses' attitudes to delirium assessment before and after introduction of the CAM-ICU. *Australian Critical Care, 25*,162-169. doi:10.1016/j.aucc.2012.01.005

Edmunds, L. (2017). Delirium. Retrieved from https://www.hopkinsmedicine.org/news/publications/hopkins_medicine_magazine/features/delirium

El Hussein, M., & Hirst, S. (2016). Chasing the mirage: A grounded theory of the clinical reasoning processes that Registered Nurses use to recognize delirium. *Journal of Advanced Nursing, 72*(2), 373-81. doi: 10.1111/jan.12837

Ferrell, B. A., & Girard, T. D. (2014). Sedative choice: A critical decision. *American Journal of Respiratory and Critical Care Medicine, 189*(11), 1295-1297.

Figueroa-Ramos, M. I., Arroyo-Novoa, C. M., Lee, K. A., Padilla, G., & Puntillo, K. A. (2009). Sleep and delirium in ICU patients: a review of mechanisms and manifestations. *Intensive Care Medicine, 35*(5), 781-795.

Frenette, A., Bebawi, E., Deslauriers, L., Tessier, A., Perreault, M., Delisle, M., & ... Williamson, D. R. (2016). Validation and comparison of CAM-ICU and ICDSC in mild and moderate traumatic brain injury patients. *Intensive Care Medicine, 42*(1), 122-123.

Fujita, T. (2009). Letter: Better sleep in the ICU for preventing postoperative delirium. *Journal of the American College of Surgeons, 209,*792-793.

Ge´linas, C. & Arbour, C. (2009). Behavioral and physiologic indicators during a nociceptive procedure in conscious and unconscious mechanically ventilated adults: Similar or different? *Journal of Critical Care, 24*(62), 7-17.

Gélinas, C., Boitor, M., Tsoller, D. M., Choinière, M., Streiner, D. & Puntillo, K. (2017). *Validation of a Revised Pain Assessment Tool for Brain-Injured ICU patients.* Proceedings from 2017 Society of Critical Care Medicine Annual Conference, HI: Honolulu.

Guenther, U., Popp, J., Koecher, L., Muders, T., Wrigge, H., Ely, E. W., & Putensen, C. (2010). Validity and reliability of the CAM-ICU Flowsheet to diagnose delirium in surgical ICU patients. *Journal of Critical Care Nursing, 25*(1):144-51. doi: 10.1016/j.jcrc.2009.08.005

Hallinan, C. M. (2010). Program logic: A framework for health program design and

    evaluation-the Pap nurse in general practice program. *Australian Journal of*

    Primary Health, 16, 319-325.

Hannon, S. (2015). ICU Delirium: Impacts & Interventions. *Alaska Nurse, 66*(5), 6-7.

Harris, C. L., & Shahid, S. (2014). Physical therapy-driven quality improvement to

    promote early mobility in the intensive care unit. *Baylor University Medical*

    Center Proceedings, 27(3), 203-207.

Hill, L. (2017). Earplugs could be an effective sleep hygiene strategy to reduce delirium

    in the ICU. *Evidence-Based Nursing, 21*(4):147-148.

Holly C., Cantwell E. R., Jadotte Y. (2012) Acute delirium: differentiation and care.

    Critical Care Nursing Clinics of North America, *24*(1), 131-134.

Hunter, O. O., George, E. L., Dianxu, R., Morgan, D., Rosenzweig, M., & Tuite, P. K.

    (2017). Overcoming nursing barriers to intensive care unit early mobilization: A

    quality improvement project. *Intensive & Critical Care Nursing, 40*, 44-50.

Inouye, S. K., van Dyck, C. H., Alessi, C. A., Balkin, S., Siegal, A. P., & Horwitz, R. I.

    (1990). Clarifying confusion: The Confusion Assessment Method. *Annals of*

    Internal Medicine, 113(12), 941-948.

Inouye, S. K. (2006). Delirium in older persons. *The New England Journal of Medicine,*

    354(11), 1157-1165.

Institute for Healthcare Improvement. (2018). Science of Improvement: How to Improve. Retrieved from http://www.ihi.org/resources/Pages/HowtoImprove/ScienceofImprovementHowto Improve.aspx

Joffe, A. M., Anton, N. R., & Duff, J. P. (2010). The apnea test: Rationale, confounders, and criticism. *Journal of Child Neurology, 25*(11), 1435-1443.

Joffe, A. M., McNulty, B., Boitor, M., Marsh, R., & Gélinas, C. (2016).Validation of the Critical-Care Pain Observation Tool in brain-injured critically ill adults. *Journal of Critical Care, 36*, 76–80.

Kettner, P. M., Moroney, R. M., & Martin, L. L. (2017). *Designing and managing programs: An effectiveness-based approach* (5th ed.). Thousand Oaks, CA: Sage.

Kellogg, W. K. (2004). *Using logic models to bring together planning, evaluation, and action: Logic model development guide.* Battle Creek, Michigan: W.K. Kellogg Foundation. Retrieved from http://www.wkkf.org

Kram, S. (2015). Implementation of the ABCDE Bundle to Improve Patient Outcomes in the Intensive Care Unit in a Rural Community Hospital. *Dimensions of Critical Care Nursing, 34*(5), 250-258.

Kotter JP. (2012). *Leading Change.* Boston, MA: Harvard Business Review Press.

Lemiengre, J., Nelis, T., Joosten, E., Braes, T., Foreman, M., Gastmans, C. & Milisen, K. (2006). Detection of delirium by bedside nurses using the Confusion Assessment Method. *Journal of the American Geriatrics Society, 54*, 685-689. doi:10.1111/j.1532.5415.2006.00667.x

Levine, M. E. (1967). The four conservation principles of nursing. *Nursing Forum. 6*, 45-60.

McCawley, P. F. (n.d.). *The Logic Model for Program Planning and Evaluation. University of Idaho Extension.* Retrieved from https://www.cals.uidaho.edu/edcomm/pdf/CIS/CIS1097.pdf

McDonnell, S. & Timmons, F. (2012). A qualitative exploration of the subjective burden experienced by nurses when caring for patients with delirium. *Journal of Clinical Nursing, 21*, 2488-2498.

McLaughlin, J. A. & Jordan, G. B. (1999). Logic models: A tool for telling your program's performance story. *Evaluation and Planning 22*, 65-72.

Miller, M. A. (2015). ABCDE, but in that order? A cross-sectional survey of Michigan intensive care unit sedation, delirium, and early mobility practices. *Annals of the American Thoracic Society, 12*(7), 1066-1071.

Mitchell, M. L., Kean, S., Rattray, J. E., Hull, A. M., Davis, C., Murfield, J. E., & Aitken, L. M. (2017). A family intervention to reduce delirium in hospitalized ICU patients: A feasibility randomized controlled trial. *Intensive and Critical Care Nursing, 40*, 77–84

Nishimura, K., Yokoyama, K., Suzuki, E., Uchiide, Y., Ishigooka, J., Yamauchi, N., & ... Yamazaki, K. (2016). Sensitivity and specificity of the Confusion Assessment Method for the Intensive Care Unit (CAM-ICU) and the Intensive Care Delirium Screening Checklist (ICDSC) for detecting post-cardiac surgery delirium: A single-center study in Japan. *Heart & Lung, 45*(1), 15-20.

Pinto, F. & Biancofiore, G. (2016). The ABCDE Bundle: A survey of nurses knowledge and attitudes in the intensive care units of a national teaching hospital in Italy. *Dimensions of Critical Care Nursing, 35*(6), 309-314.

Project Management, Inc. (2013). *Agile Project Management : Essentials From the Project Management Journal*. [Place of publication not identified]: Jossey-Bass.

Rijkenberg, S., Stilma, W., Bosman, R. J., van der Meer N. J., & van der Voort, P. H., (2017). Pain measurement in mechanically ventilated patients after cardiac surgery: Comparison of the Behavioral Pain Scale (BPS) and the Critical-Care Pain Observation Tool (CPOT). *Journal of Cardiothoracic and Vascular Anesthesia, 31*(4), 1227-1234.

Rice, K. L., Bennett, M., Gomez, M., Theall, K. P., Knight, M., & Foreman, M.D.

(2011). Nurses' recognition of delirium in the hospitalized older adult. Clinical

Nurse Specialist: *The Journal for Advanced Nursing Practice, 25*(6), 299-311.

Shehabi, Y., Bellomo, R., Mehta, S., Riker, R., & and Takala, J. (2013). Intensive care

sedation: The past, present and the future. *Journal of Critical Care, 17*, 322 -327.

Skrobik, Y., Skrobik, Y., & Chanques, G. (2013). The pain, agitation, and delirium

practice guidelines for adult critically ill patients: a post-publication perspective.

Annals Of Intensive Care, 3(1), 3-9.

Smith, C. D., & Grami, P. (2017). Feasibility and effectiveness of a delirium prevention

bundle in critically ill patients. *American Journal of Critical Care, 26*(1), 19-27.

Society of Critical Care Medicine. (n. d.). *Guidelines.* Retrieved from

http://www.iculiberation.org/Guidelines/Pages/default.aspx

Soja, S. L., Pandharipande, P. P., Fleming, S. B., Cotton, B. A., Miller, L. R., Weaver, S.

G., & ... Ely, E. W. (2008). Implementation, reliability testing, and compliance

monitoring of the Confusion Assessment Method for the Intensive Care Unit in

trauma patients. *Intensive Care Medicine, 34*(7), 1263-1268.

Spronk, P., Riekerk, B., Hofhuis, J., & Rommes, J. (2009). Occurrence of delirium is

severely underestimated in the ICU during daily care. *Intensive Care Medicine,*

35(7), 1276-1280.

Stassen, N. A., Bhullar, I., Cheng, J. D., Crandall, M. L., Friese, R. S., … & Kerwin, A. J. (2012).Selective nonoperative management of blunt splenic injury: An Eastern Association for the Surgery of Trauma practice management guideline. *Journal of Trauma and Acute Care Surgery, 73*(5), 294-300.

Tavares Barbosa, N. C., Cordeiro, B. C., Abrahão, A. L., Xavier, M. L., Silva de Carvalho, R., Carvalho da Silva, R. O., & Ferreira Vieira, M. (2017). Health Education: The use of the SWOT matrix for project analysis. *Journal of Nursing, 11*(11), 4298-4304.

U.S. Department of Commerce, United States Census Bureau (2014). *An aging nation: The older population in the United States*. Retrieved from http://www.census.gov

Vidan, M. T., Sanchez, E., Alonso, M., Montero, B., Ortiz, J., & Serra, J. A. (2009). An intervention integrated into daily clinical practice reduces the incidence of 51 delirium during hospitalization in elderly patients. *Journal of the American Geriatrics Society, 57*(11), 2029-2036.

Walden University (2015). *Doctoral Project Premise: Doctor of Nursing Practice.* Retrieved from http://academicguides.waldenu.edu/ld.php?content_id=30438605

Walden University (2017). *Evaluation of Existing QI Manual.* Retrieved from https://class.waldenu.edu/bbcswebdav/pid-3821919-dt-announcement-rid-104049049_1/courses/USW1.36440.201770/Evaluation%20of%20Existing%20QI%20Initiative%20Manualfinal.pdf

Wheeler, A. P. (2015). Pharmacist Leadership in ICU Quality Improvement. *Annals of Pharmacotherapy, 49*(8), 883 – 891.