Spring 5-14-2020

DNP FINAL REPORT: SEDATION PROTOCOL COMPLIANCE FOR IMPROVED OUTCOMES IN INTENSIVE CARE

Sonya M. Grigsby
University of Texas at Tyler

DNP Final Report: SEDATION PROTOCOL COMPLIANCE FOR IMPROVED OUTCOMES IN INTENSIVE CARE

by

Sonya M. Grigsby, MSN APRN, AGACNP-BC

A DNP Final Report submitted in partial fulfillment
of the requirements for the degree of
Doctor in Nursing Practice
School of Nursing

Ellen Fineout-Overholt, PhD, RN, FNAP, FAAN, DNP Project Team Chair

College of Nursing and Health Sciences

University of Texas at Tyler
May 2020

The University of Texas at Tyler
Tyler, Texas

This is to certify that the DNP Scholarly Project of

SONYA M. GRIGSBY

has been approved for the DNP Project requirement on
March 24, 2020

for the Doctor of Nursing Practice degree

Approvals:

DocuSigned by:
Dr. Ellen Fineout-Overholt PhD, RN, FNAP, FAAN
70911D5A98834CB...

DNP Project Team Chair: Ellen Fineout-Overholt, PhD, RN, FNAP, FAAN

DocuSigned by:
Dr. Terri Hoffman
EAC34B7F63AA465...

Industry Mentor: Dr. Terri Hoffman, MD

DocuSigned by:
DNP
276240E83BDB4E7...

Member: Sandra Petersen, DNP, APRN, FNP-C

DocuSigned by:
Cheryl D. Parker, PhD, RN-BC, CNE
8B0E6EECC4FE4E4...

Member: Cheryl D. Parker, PhD, RN-BC, CNE

DocuSigned by:
Barbara Haas
685A922F3BE54C7...

Executive Director: Barbara Haas

DocuSigned by:
Yong Tai Wang
BA57D18E0B84E4...

Dean: Yong Tai Wang

Dedication

"*Success is liking yourself, liking what you do, and liking how you do it*." Maya Angelou

I would like to dedicate this project to family for all the support and encouragement not just with my doctoral journey but throughout my life. To my mom, who struggles daily with memory loss…I don't know if at the end of my journey she will remember me, but I want the world to know what a special woman she is and her strength through life has made me who I am today. Dad, you instilled your values of hard work and perseverance to achieve my dreams. For that I owe you my success. To my sons, Ethan and Elisha, there are no words for how much I love you both. You have made me proud as a mom and are my biggest reasons for pursuing this goal. To all the ICU nurses and critically ill patients I have met throughout my career, I became a nurse, because every life is worth my time.

Acknowledgements

First and foremost, I would like to thank God Almighty for giving His never-ending grace and mercy. His provision of strength, knowledge, ability and opportunity to undertake this doctoral journey has given me the power to believe in my passion and pursue my dreams. Without His blessings, this achievement would not have been possible.

Secondly, I would like to express my gratitude to my faculty mentor Dr. Ellen Fineout-Overholt for the continuous support of not only my DNP Scholarly Project, but personally. Her motivation, enthusiasm, and immense knowledge has guided me throughout the writing of this project and understanding the value of evidence-based practice and Emotional Intelligence in nursing.

Besides my faculty mentor, I would like to thank the rest of my DNP Scholarly Project committee: Dr. Sandra Petersen, Dr. Barbara Haas.

I would like to show my warm thanks to my industry mentor, Dr. Terri Hoffman. Her support and encouragement have provided me personal and professional guidance to accomplish this project.

Finally, to my fellow cohort, Cyndi, Barbara, Keisha, Rebecca, and Christian. Thank you for the opportunity to grow as a person and a writer with all of you. I truly call you family.

Table of Contents

List of Tables & Boxes

List of Figures & Forms

Abstract

SEDATION PROTOCOL COMPLIANCE FOR IMPROVED OUTCOMES IN THE ICU

Sonya M. Grigsby, MSN, APRN, AGACNP-BC

DNP Chair: Ellen Fineout-Overholt, PhD., RN, FNAP, FAAN

The University of Texas at Tyler
May 2020

Background: Current evidence-based practice guidelines show that lighter sedation reduces mechanical ventilator days (MVD) and intensive care (ICU) length of stay (LOS). Guidelines (2018) for the management of pain, agitation, delirium, immobility, and sleep were released to direct appropriate high-quality care to achieve positive outcomes. However, studies demonstrated there were barriers to compliance of these guidelines.

Objective: To improve compliance with an existing evidence-based sedation protocol in an intensive care, and, thereby, improve patient outcomes (MVD and ICU LOS).

Methods: The three-month quality improvement (QI) project evaluated processes leading to compliance with the guideline. First, nurses were surveyed to determine knowledge and comfort with the guideline. Based on the guideline and data from nurses, education was provided on sedation medications, mechanical ventilation, the EBP sedation protocol, and focused on spontaneous awakening and breathing trials. Protocol comfort and compliance was evaluated.

Results: Primary compliance issues were lack of experience and education. Despite education, MVD increased by 23% and ICU LOS by 7%.

Implications for Practice: Staff education concerning sedation guidelines is key to achieving compliance and optimal MVD and ICU LOS.

Chapter 1: Development of the Clinical/Leadership Question and Problem Identification (EBP Process Steps 0, 1, & 2)

Background and Significance

In the United States (U.S.), the past three decades have been marked with increasing costs associated with critical care medicine (CCM); necessitating control without reducing the quality of services. According to the Society of Critical Care Medicine (SCCM, 2017), there are more than 5.7 million patients admitted to the intensive care unit (ICU) each year, with 14 percent of those patients requiring mechanical ventilation (MV). Most of these patients were elderly, average age 65, and had a chronic critical illness (CCI). Chronic critical illness is an extension of an acute critical illness characterized by metabolic, neuroendocrine, neuropsychiatric, and immunological changes leading to profound weakness, decreased muscle mass, increased vulnerability to infection, and brain dysfunction leading to a substantial consumption of health resources. Chronic critical illness accounts for 3 to 11% of patients receiving MV, with an overall cost exceeding $20 billion annually (Loss et al., 2015).

Historically, deep sedation was thought to be optimal for MV patients for tolerance of the ventilation and pain, but improvements in ventilator technology allow for synchrony and optimization through lighter sedation levels (Moreira & Neto, 2016).

Mechanical Ventilation

Mechanical ventilation supports breathing in a patient that is unable to breath on their own using a machine (ventilator). Ventilators are used for oxygenation and ventilation of the lungs and body, ease the work of breathing from respiratory failure, and breathe for a patient that is not breathing due to a nervous system injury (American Thoracic Society, 2017). Indications for MV include hypoxic respiratory failure, acute respiratory distress syndrome (ARDS),

congestive heart failure (CHF), chronic obstructive pulmonary disease (COPD), neuromuscular disease, airway edema, surgery, or trauma. Patients are weaned off the ventilator once the underlying disease process has resolved.

Mechanical ventilation affects over 800,000 hospitalized patients each year within the U.S. (U.S. Department of Health & Human Services, 2017). While MV can save lives, many serious complications can result from prolonged MV including extended hospital and ICU stays, increased mortality, stress, anxiety, increased risk of delirium, increased risk of ventilator-associated events (VAE), such as pneumonia and pulmonary embolism that lead to increased healthcare costs (U.S. Department of Health & Human Services, 2017).

Sedation

Mechanically ventilated patients with critical illness experience interventions that lead to pain and distress necessitating the need for sedation and analgesia. Appropriate sedation management of critically ill MV patients is imperative for the ventilator synchrony, toleration of the endotracheal tube, immobility, toleration of procedures, oxygenation optimization, and to ensure safety. Adequate levels of sedation are challenging, and if done inappropriately expose patients to stress, anxiety, delirium, and increased risk of post-traumatic stress disorder (Kress et al., 2000; Schulingkamp, Woo, Nguyen, Sich, & Shadis, 2016). Oversedation can result in difficulty weaning from MV which may coincide with a higher risk of developing short and long-term complications including VAE and delirium (Fuchs et al., 2012).

Sedation and analgesia administration goals include minimal drug accumulation, titratability, tolerable adverse effects, and minimal drug-drug interactions. No sedation administration strategy fulfills all these goals, but evidence-based practice (EBP) guidelines facilitate efficient and safe interventions using the most common approaches to sedation.

Continuous sedation infusions with daily interruption has been shown to effectively decrease MVD for adult patients requiring longer than 24 hours on the ventilator (Nassar & Park, 2014; Burry et al., 2014; Mehta et al., 2012). Lighter sedation levels and medication choice strategies are associated with improved clinical outcomes and shorter duration of MV (Mehta et al., 2012; Moreira & Neto, 2016). New guidelines recommend lighter sedation with non-benzodiazepine agents that will allow a more controlled, lighter sedation thus enabling the patient to be more awake and active, allowing communication and active participation in care (AHRQ, 2017, Devlin et al., 2018).

Daily Interruption of Sedation. Research shows that continuous sedation infusions prolong MV and ICU LOS compared to intermittent sedation (Kress et al., 2000). While continuous sedation infusions provide a more consistent sedation level and comfort, intermittent dosing may increase nursing workload and hinder patient care. Daily interruption of sedation (DIS) involves continuous sedation infusions, but patients can "wake up" and allow assessment of readiness to wean from the ventilator. Research shows that DIS, coupled with sedation titration by nursing using validated assessment scales, shortens duration of MV and ICU LOS (Berry & Zecca, 2012; Carson et al., 2006; Devlin et al., 2018; Klompas et al., 2016; Mehta et al., 2012; Moreira & Neto, 2016; Ranzani et al., 2014; & Shehabi et al., 2013).

ICU Length of Stay. Two to eleven percent of critically ill patients require a prolonged ICU stay, which accounts for 25-45% of total ICU days (Williams et al., 2010). Technological developments have allowed for extended periods of stay for severely ill patients even if the outcome is death and substantial financial, moral, and psychological hardships for families. Prolonged MV is longer than 21 days on the ventilator with more than 100,000 new cases annually in the U.S. with a more rapid increase in incidence than MV alone (Cox, Carson,

Govert, Chelluri, & Sanders, 2007). Many of these patients require institutional care with readmission rates exceeding 40 percent and if the patient is unable to be rehabilitated within six months, may remain in the long-term facility until death.

Costs Associated with Mechanical Ventilation. Mechanical ventilation increases higher daily care costs more than any other treatment modality in ICU patients. For every day that a patient remains on MV, healthcare costs rise. Ventilator costs approximately $2,300 per day/patient, with an increase to $3,900 after day four (U.S. Department of Health & Human Services, 2017). The social and economic burden of prolonged MV affects approximately 300,000 people in the U.S. and is expected increase over the next decade creating an increase in healthcare costs by $50 billion (Navalesi et al., 2014). Reducing MVD by 20% is expected to lead to increased revenue, thereby facilitating staff to care for more patients. However, a lack of experience with evidence based (EB) sedation protocols may affect sedation delivery and safety and thereby, MVD.

The related costs of MVD includes sedation medications, which cost between $400 to $800 per day. These costs, in deeply sedated MV patients that develop delirium, reach upward to $3.6 billion annually (Venture Well, 2015). Affecting these costs through EB interventions aimed at reducing MVD and ICU days could save over $30 billion annually in the U.S. healthcare system.

Internal Evidence

Internal data (Appendix A) indicated that there was a compliance issue with the EB sedation protocol. Optimal sedation and analgesia for ICU patients depends on nursing staff assessment of sedation levels and appropriately keeping patients awake and interactive with daily spontaneous awakening trial (SAT) and spontaneous breathing trial (SBT). Compliance with

these protocols requires nursing staff and respiratory therapy (RT) collaboration. From January 1, 2016 through December 30, 2018 data the number of MVD slowly increased (Appendix A, Figure A1). In 2016, average number of MVD was 2.37 and there was a physician champion for the EB sedation protocol who offered nursing and respiratory education, facilitated multidisciplinary rounding, and took an active role in monitoring daily SAT/SBT compliance. The physician left the facility mid-2017, and the MVD began to rise. In 2017, the average ventilator day rose to 2.9, with an increase to 3.38 in 2018, and 4.89 in 2019. During the 2018 12-month period, dashboard data for individual unit MVD (Appendix A, Figure A2) and ICU LOS (Appendix A, Figure A3) demonstrated through an electronic documentation of multidisciplinary team charting the average number of days of ventilation per ICU stay for all persons receiving MV in real time. Only ICU stays that have ended were included. Agency data fell below the benchmark for all *EPIC* means worldwide that use *EPIC* and these specific metrics. Evaluation of these data shows need for improvement due to the increasing number of MVD.

External Evidence

Even though the internal evidence suggests DIS reduces MVD and ICU LOS, varying strategies of sedation management still plague the ICU. Gaps between evidence into practice have revealed multiple barriers to implementation, but with increased educational effort, a reduction in deep sedation can be reduced by 10 percent (Shinotsuka, 2013). Rumpke & Zimmerman (2010) found that using a standardized approach directed by nursing and respiratory decreased MVD. Clinical practice guidelines (CPG) recommend a sedation bundle approach which was consistent with the Khahlil & Sharkawy (2018) study comparing complete and incomplete ventilator bundle compliance and effects on MVD. Barriers to successful

implementation of an evidence-based sedation protocol include (Amaral, Kure, & Jeffs, 2012; DeGuzman & Wayner, 2014; Rumpke & Zimmerman, 2010; Sneyers, et al., 2014):

- Lack of personnel or equipment support
- Concern about risk of patient-initiated device removal
- Fear of patient discomfort
- Increased nurse workload
- Lack of communication
- Difference in beliefs
- Lack of collaboration and multidisciplinary team
- Difference in practice
- Organizational characteristics and structure
- Lack of nursing education and experience

Developing the Clinical Question

The facility has had an increasing number of MVD over the past three years (Appendix B, Table B1). Clinical inquiry began with sedation strategies used in the units for determination of readiness to wean from the ventilator. A sedation protocol was in place but not consistently followed. Thus, began the inquiry as to the validity of the current sedation strategies and best practice for improved patient outcomes. Therefore, the question arises, in mechanically ventilated patients in the ICU (P), how does intermittent sedation (I) compared to continuous sedation (C) affect duration of MV (O1) and ICU LOS (O2) over a 90-day period (T)?

Chapter 2: Evidence, Synthesis & Model of EBP (EBP Process Steps 1,2,3, & 4)

Systematic Search

The elements of the PICOT question formulated and facilitated the best evidence search of multiple databases for relevant studies to answer the question. The search spanned from inception to February 2018. The databases included Cumulative Index to Nursing and Allied Health Literature (CINAHL), PubMed, Cochrane Library (Appendix B, Figure B1). The systematic search consisted of keywords (i.e., *intermittent sedation, continuous sedation, barriers and facilitators to sedation protocols, mechanical ventilation, adult mechanically ventilated patient, decreased ventilator days, sedation,* and *"wean" "vent"*), subject headings using truncation, Boolean Operators, and exploding subject headings.

Limiters consisted of adult, English, peer-reviewed, evidence-based practice, and full-text articles. Further studies were identified by hand searching the reference lists of all included articles. Inclusion criteria were articles that had adult patient samples, mechanical ventilation intervention, and all sedation strategies interventions. CINAHL resulted in 26 articles, Cochrane with 1,278 articles, and PubMed yielded 10 articles for a total yield of 1,314 for the final cohort of studies. Ten articles were retained for review with a general appraisal overview and rapid critical appraisal checklist leading to the body of evidence.

Critical Appraisal

Rapid Critical Appraisal

Critical appraisal involves a systematic examination of external evidence for reliability and value in clinical practice. The clinical question involved intermittent sedation as compared to continuous sedation for improved ICU outcomes. The 10 remaining studies were evaluated

based on the quality of the research using general appraisal overview and rapid critical appraisal checklists appropriate for the study design. Upon review of the 10 studies, they were found to be valid and reliable studies that were retained for evaluation. Validity and applicability to patient population was appraised to integrate best practice into clinical experience.

Currently, the SCCM has established CPG for the management of agitation, pain, and delirium of adult ICU patients with recommendations for lighter targeted sedation levels using validated assessment tools and daily sedation interruptions (Devlin et al., 2018). The newest guidelines consisted of a revision to the previous 2013 guideline use of sedative and analgesic recommendations. Seven out of ten studies support that less sedation in critically ill MV patient improves patient outcomes and providing selected sedation and analgesics with DIS and may be an improved strategy to significantly reduce MVD (Anifantaki et al., 2009; Barr et al., 2013; Berry & Zecca, 2012; Carson et al., 2006; Jackson, et al., 2010; Nasaar & Park, 2014; Strom & Toft, 2010). This is a guideline recommendation.

Sedation management strategies included in the evidence consisted of intermittent bolus, continuous sedation, analgesic management, and the use of sedation protocols with DIS. Ideal sedation and analgesia involve patients being awake, comfortable, cooperative, and able to participate in care. In a systematic review, Berry and Zecca (2002) evaluated sedation interruption and found that DIS was an effective and safe strategy in critically ill ICU patients. Comparison of various sedation strategies including DIS, intermittent and continuous sedation administration, and protocolized sedation determine effectiveness and mitigation of drug action limitations and may decrease MVD. Anifantaki et al. (2009) found that a nursing-implemented protocol for DIS was neither beneficial nor harmful when compared to ICU physician team directed sedation.

Jackson, Proudfoot, Cann, and Walsh (2010) performed a systematic review of multiple databases to compare the impact of changes in different sedation protocols on economic and patient safety outcomes. These studies varied in design, population, interventions, and settings, however, they resulted in a substantial association with sedation optimization for the overall reduction in the number of MVD and ICU LOS. A limitation was due to baseline sedation practices such as staffing levels and training. This study supports systematic management of sedation using a protocol-directed approach recommended by current practice guidelines (Barr et al., 2010).

Daily interruption of continuous sedation is a common sedation practice but there were very few studies found comparing the intermittent bolus dosing of sedation and DIS (Nassar & Park, 2014). Nassar and Park (2014) conducted a randomized controlled trial comparing intermittent dosing and DIS. Lighter sedation levels allow the patient to express pain and participate in their care and physical therapy. The comparison of these strategies evaluated the number of ventilator-free days in a 28-day period as well as safety concerns in ICUs and the inadequate nurse staffing. Associated agitation treatment consisted of intermittent doses of fentanyl. Both strategies were similar in results and increased the number of ventilator-free days. The daily interruption of continuous sedation group resulted in higher total dosages of fentanyl and midazolam in addition to worse psychological outcomes over intermittent bolus dosing. The Nassar and Park study (2014) indicated the feasibility and safety of lighter sedation strategies even in understaffed units. The results showed no difference in the comparison of the intermittent dosing and continuous infusion of sedation but did demonstrate that lighter sedation improves overall ICU patient outcomes. Barriers to successful implementation of DIS include

patient safety concerns, respiratory compromise, decreased patient comfort, and lack of acceptance by bedside nursing staff (Berry & Zecca, 2002; Berry & Zecca, 2012).

Standard treatment of MV patients is with continuous sedation, but as the Nassar and Park study (2014) showed, DIS is effective in decreasing MVD. The PICOT question focused on intermittent dosing of sedation in relation to the reduction of MVD. In a randomized control trial by Strom, Martinussen, and Toft (2010), researchers performed a comparison of a no sedation strategy focused on pain control and a DIS strategy. The study of 140 medical/surgical MV patients showed that the no sedation strategy allowed more patients to be awake and participate in care, that resulted in more ventilator-free days and shorter ICU stays.

Sedation protocol implementation has emerged to promote weaning and short MVD, but an RCT conducted by Anifantaki et al. 2009 resulted in contradictory findings that DIS did not have any influence on the length of MV or ICU stay. Current sedative regimens mainly use benzodiazepines and fentanyl, but the drug choices in this study were propofol and remifentanil thus supporting the notion of pain management and less drug accumulation such as is common with benzodiazepines. Drug researchers compare benzodiazepines with nonbenzodiazepines and the effects of sedation, delirium, MVD, and costly ICU stays where routine practice involves day-to-day changes in sedation and exposure to multiple sedatives resulting in knowledge gaps.

Evaluation

The 10 studies on sedation management strategies in mechanically ventilated patients answered the clinical question and were entered into an evaluation table. Study details were entered into an evaluation table to provide the scope of the body of evidence. This table provided an overall picture of the body of evidence (Appendix C, Table C1). Key findings from the keeper studies showed lighter sedation with DIS decreased MVD and ICU LOS. Once the

current sedation protocol was determined to be evidence-based, critical appraisal was needed concerning barriers to implementation of an EB sedation protocol (Appendix C, Table C2). Eleven studies were evaluated for feasibility of sedation protocol and common barriers for compliance.

Synthesis

Synthesis involves combining results from the keeper studies in an organized manner to provide a visual representation of the sedation strategies and effect on MVD and ICU LOS. The first synthesis table evaluated levels of evidence for the 10 sedation studies (Appendix D, Table D1). Support for evidence-based decisions is higher with corroborating high and lower levels of evidence. The ten keeper studies revealed five level one evidence and four level two evidence. Findings from these studies agreed, leading to a strong recommendation from the evidence.

Other synthesis tables were created to provide a clear and simple picture of data from the studies concerning sedation strategies and their effect on MVD and ICU LOS. The synthesis tables showed comparison and synthesis of the evidence at a quick glance. Based on the studies, continuous sedation with DIS reliably decreased MVD and ICU LOS (Appendix D, Table D2). Studies also indicated that no sedation and as needed sedation could increase in MVD and ICU LOS (Appendix D, Table D4). In addition, studies showed that different sedative medications have varying impact on these patient outcomes (Appendix D, Table D4). While the PICOT question compared intermittent sedation to continuous infusion sedation, researchers have shown that sedative choice is associated with both ICU and hospital LOS and MVD (Barr et al., 2013).

Recommendation

Based on the evidence, the best practice recommendation is three-fold: 1) all patients should have lighter sedation levels to reduce the risk of VAE, including ventilator-assisted pneumonia (VAP), pressure ulcer, deep vein thrombosis (DVT), and shorter MV, and ICU LOS; 2)all MV patients should have propofol and dexmedetomidine as first choice medications before the use of benzodiazepines, due to an increased risk of delirium and over sedation leading to longer MVD and ICU LOS; 3) daily interruption of sedation should be standard to facilitate awakening and monitoring of neurological status using assessment of sedation measures, such as the Richmond Agitation-Sedation Scale (RASS) and Sedation-Agitation Scale (SAS) is recommended (Barr et al., 2013; Khan et al., 2012).

This recommendation should be delivered with an interprofessional (IP) rounding team, including a physician, nurse, RT, pharmacy, dietary, and physical therapy (PT). The recommendation check to ensure it is sustained is ongoing competency development in use of the Awakening and Breathing Coordination, Delirium Monitoring and Management, and Early Mobility (ABCDEF) Bundle.

In this project, this recommendation was already policy; however, the policy was not consistently followed. To ensure best practice was sustainably delivered, a quality improvement (QI) initiative was launched to ensure that the current EB sedation protocol processes were implemented. Outcome measures were addressed as well as other factors and disciplines involved in the sedation and weaning of MV patients (See Appendix E, Box E1).

Johns Hopkins EBP Model

Clarification of implementation success can be augmented using theoretical frameworks to provide better clarification. The Johns Hopkins EBP model requires program logic and

intervention protocol development, acceptance and complete protocol performance to ensure successful implementation. The elements of the model are inquiry, practice question, evidence, translation (PET), best practice, and practice implementation (Appendix F, Figure F1). Inquiry began with the identification a clinical question after examination of a practice concern. The second phase consists of the PET process where internal and external evidence is appraised, synthesized, and results in recommendations for change. Translation determines the feasibility and appropriateness of the proposed changed in the current practice setting. The best practice process entails using existing high-quality research for identification of best practice for quality practice improvements.

Lewin's Change Theory

Lewin's Change model represents a fundamental approach for implementing organizational change through the understanding of human behavior and patterns of resistance to change (Sutherland, 2013). Kurt Lewin, also known as the father of social psychology, developed this theory that requires undoing of prior learning and replacement through unfreezing, changing, and refreezing. Unfreezing involved letting go of old behaviors and overcoming resistance. The next stage involves feelings, behavior, and thought with movement toward change. The final stage of refreezing establishes the change as the norm creating a "new habit" (Appendix F, Figure F2).

Chapter 3: Project Design & Methodology (EBP Process Steps 3-4)

Project Design & Methodology

The EBP process steps 0-3 were conducted and it was found that the current policy was evidence-based, but not being implemented. Furthermore, internal evidence verified increasing MVD and ICU LOS. Therefore, understanding the processes involved in the lack of implementation of the EB sedation protocol was required. A prospective quality improvement (QI) project was conducted in the 24-bed ICU within a nonteaching hospital East Texas for 3-months (September 1, 2019 to November 30, 2019). The QI project was designed to monitor and analyze processes around current sedation practices, including SAT/SBT processes, to improve ventilator weaning and patient flow (LOS) within the organization using the Plan-Do-Study-Act Method (PDSA). The increasing number of MVD signaled a need for change. The PDSA uses MVD gathered quickly within the electronic medical record (EMR) to develop a plan to test the impact of education. Education was provided, implementation of the education was ongoing, observation and learning from the education was used to determine what modifications were needed to improve compliance to the guideline. Run charts were used to evaluate the sedation protocol process by producing a visual graphic representation of MVD and ICU LOS, allowing for identification of trends and variations within the outcome data over time (Institute of Healthcare Improvement, 2018). To further benchmark, graphic run charts of MVD and ICU LOS were compared to the *EPIC* mean for these outcomes across all users of the *EPIC* electronic health record over the past two years. Further synthesis of the literature revealed barriers to compliance and sustainability of an EB sedation protocol, including lack of experience with and education about the protocol. Upon further analysis of current processes and practices within the ICU, there was noted that there was no education about the existing EB sedation protocol.

Therefore, the goal of the QI project became to introduce and implement ongoing education to improved compliance and sustainability of the existing EB sedation protocol. In the month prior to QI implementation (pre-education), nurses completed a survey to identify perceived nursing barriers to compliance with the current EB sedation practice. Nurses completed a post-education, follow-up survey to provide nursing perceptions and compliance with the sedation protocol at that time.

Ethics Review

Collaborative Institutional Training Initiative (CITI) training and the Institutional Review Board (IRB) process were completed in December 2018 to comply with the facility required IRB process (Appendix G, Ethics Review Form G1). Notification that the project did not need IRB approval was received in February 2019. Approvals obtained included industry mentor contract, University of Texas at Tyler (UTT) Doctor of Nursing Practice (DNP) Program, and facility IRB (Appendix G, Ethics Review Forms G1, G2, G3, G4).

Fully Operationalized Plan

The organization is a 402-bed acute care Magnet facility in East Texas utilizing advanced technology and EB treatments. The facility has four adult ICU's and a neonatal ICU. The units for this QI project were the medical (MICU) and surgical ICUs (SICU). The MICU/SICU had 20 beds during the project. Each unit is led by an ICU clinical director who works collaboratively with a registered nurse (RN) team leader and the chief nursing officer (CNO).

Approximately 73 RNs worked in the MICU/SICU during the project and were supported by a full-time respiratory therapist on each unit. The critical care intensivist director led the team of five full-time critical care physicians, four full-time advanced practice providers, and temporary fill-in physicians.

The key stakeholders for this project were the patients and their families, the intensivist team, ICU clinical directors, RNs, RT director, and RT. Key stakeholders worked collaboratively to facilitate compliance to the sedation protocol, performing DIS to evaluate for readiness to wean patients from the ventilator to decrease MVD and ICU LOS.

Implementation Timeline & Gantt Chart

Project management included the QI implementation project timeline and Gantt chart to provide a graphically illustrated schedule to plan, coordinate, and track tasks within the project (Appendix E, Table E1). Prior to the implementation, Phase 1 identified current perceptions and understanding of the sedation protocol through a nursing survey, education preparation, and distribution of education materials began. Phase-1 also included identification of key stakeholders and secured buy-in. Phase-2 included ongoing education to new ICU nurse residents, current ICU nursing staff, RT, and ICU physicians. Pocket cards were distributed to all bedside staff, both day and night. Posters with current quality metrics and benchmark data were posted into the units and updated throughout the 90-day period. Throughout the implementation, the PDSA method evaluated consequences of the education on MVD and ICU LOS. At the end of the 90-day period, data collection from the EMR was evaluated and verified for integrity and compared with baseline data. Phase-3 finished with a follow-up survey to evaluate ease of protocol use, nurse perception of the sedation protocol, and evaluation of multidisciplinary compliance. Dissemination is an essential component of the quality improvement process and completed Phase-4 of the project. Rapid incorporation of the best evidence into clinical practice ensures improved patient outcomes. Planned dissemination includes a poster presentation to facility, and staff, with subsequent presentation at nursing

conferences. Phase-5 focused on sustainability for improved outcomes. Expected competencies for sustainability included:

- Annual competency added to HealthStream
- Education added to annual Skills Fair: ongoing poster presentations of progress
- More access for ICU clinical directors to Dashboard for MV/ICU LOS tracking
- Collaborative effort by all disciplines involved in providing patients care
- Staged educational interventions at regular intervals for nursing/RT/physician
- Weaning assessments done daily
- Consistency with IDRs: daily IDRs with all multidisciplinary team members in attendance, even on the weekend

To achieve these competencies, monthly educational opportunities were presented by an interdisciplinary team to the MICU/SICU nursing staff. The first month, the intensivist director presented a PowerPoint presentation on the current sedation protocol with clarification on DIS to facilitate SAT/SBTs. The second month, the ICU pharmacist followed with sedation medication education and titration. The following month, the intensivist advanced practice registered nurse (APRN) presented basic ventilator education on various modes of ventilation and settings to the nurses. The final month, a respiratory therapy instructor from the local junior college presented hands-on ventilator training. Bedside staff were given the opportunity to ask questions and troubleshoot various ventilator alarms.

Logic Model

A logic model organized the elements of EBP to clearly articulate and illustrate the outcomes (decreased MVD and ICU LOS), barriers, educational activities, and collaboration of the multidisciplinary team to provide the resources, stakeholder buy-in, inputs, outputs, and support

needed for nursing compliance to the EB guideline. (Appendix F, Table F1). The Logic Model encouraged iterative development of the QI project, facilitating consideration of relationships between the QI interventions and organization effectiveness and outcomes. The project assumptions were that the bedside staff would participate in educational activities and facilitate improved communication of the IP team concerning SAT/SBTs for determination of readiness to wean from MV. Constraints compounded the fear of lightening sedation and the lack of support during low staffing deterred nursing compliance with the SAT/SBTs. Limitations included the onboarding of 11 new nurses during the implementation period and lack of an ICU educator for support of the new staff. The long-term goals of this project involve sustainability of the EB sedation guideline therefore ongoing education and support is needed to ensure complete understanding of sedation medication titration, timing of SAT/SBT, and nursing level of comfort with guideline use.

Operationalized John's Hopkins Nursing EBP Model

Inquiry was actualized in the internal data that validated an increase in MVD within the specific units, which, according to the model, led to the clinical question. A systematic search revealed that the current sedation protocol matched best practice; however, was not consistently followed. At this point, the translation of evidence required integration of QI into project delivery plan. Methods, QI and EBP, were used to discover barriers to compliance and sustainability from the literature as well as within the organization. Research supported the importance of education to practice improvements for sedation protocol compliance, along with monitoring for compliance and improvement in process markers. Part of the culture shift was to ensure that nursing staff were empowered to search and critically appraise the evidence for use in daily practice. Sustainability demands continued leadership and resource support for bedside

staff and the implementation of EBP as well as reducing organizational barriers to ensure translation of EBP is used within care settings. The use of JHNEBP Model guided staff through a systematic approach to evaluate current evidence to impact sedation within the ICU (Appendix F, Figure F1).

Operationalization of Lewin's Change Theory

The goal of using a change model is to ensure that the latest research findings and best practices are quickly and appropriately incorporated into practice. The stage for using Lewin's model was that after review of our current sedation protocol, we already had an EBP sedation protocol, but not consistently following it. The Johns Hopkins Nursing EBP model was initially chosen and helped get the project through to determining that the existing sedation protocol was EB; however, for full implementation of the QI project, we needed a change model.

Given the internal data of increasing MVD and ICU LOS verified the need for change, the Unfreezing stage of Lewin's Change Model offered bedside staff time to more completely understand the clinical issue and thereby, facilitated preparedness and readiness for change. That is, bedside staff were presented with the internal data and led to understanding that change was necessary. When presented with the internal data, bedside staff were motivated to make improvements and compliance to the EBP sedation protocol. The Change stage of Lewin's Model involved ongoing education concerning sedation medications, basic MV terminology and modes of ventilation, and SAT/SBT with the sedation protocol (Appendix F, Figure F2). With the recent addition of ten new graduate RN's, the loss of the ICU educator and ICU director created barriers that included lack of resources and support during the time of transition. The APRN working in the ICU stepped into the role of educator and supported bedside staff. The final stage of the Model of Refreezing consisted of ongoing evaluation of compliance with the

EB sedation protocol, continuing monthly education, and APRN and intensivist support with a commitment to change. All the evaluative data were shared with the staff and other members of the healthcare team, closing the loop.

Final Budget

Successful implementation of the QI project required planning, resources, and support, including financial. Directs costs included expenses towards personnel, materials, equipment, and consumables and can be categorized as recurring and non-recurring expenses on the basis of their occurrence during the 90-day period. Total costs involved in this QI project were $6,980.04 (Appendix H, Table H1). The majority of the costs, were attributed to personnel time for education presentations. Nurses, including APRNs, are catalysts for improving healthcare and patient outcomes. Engaging the multidisciplinary team in educational training of their own helps sustain an experienced nursing workforce through deliberated and planned investment initiatives. Based on the evidence, the goal of this project was 20% reduction in the number of MVD per episode of MV, which would result in a $2095.60 cost savings per episode and $356,252.00 cost savings to the organization per month. The outcomes of the project realized a 23% increase in MVD, which was not anticipated and likely due to patient acuity as well as a large number of new hires during the project. Should the increased MVD continue, it could increase the cost of MV by approximately $4 million per year. Therefore, patient acuity will be added to the monitoring metrics for this QI initiative.

Data Collection Plan

A retrospective review of MV patients admitted to the medical/surgical ICU at Magnet hospital within East Texas was conducted from September 2018 through November 2018 to

determine baseline data. Completion data was defined as data collected post-intervention consisting of September 2019 through November 2019. All adult MV patients were included with primary outcomes of MV days and ICU LOS. No patient identification was needed for this QI project as data extraction from the EMR "dashboard" consisted of real-time MV documentation by the multidisciplinary team.

Data Analysis Plan

All data were evaluated for absolute differences between year one and year two on project outcomes. All adult MV patients, over the age of 18 were included with primary outcomes of MVD and ICU LOS. No patient identification was needed for this QI project as data extraction from the EMR "dashboard" consisted of real-time MV documentation by the multidisciplinary team. Data analysis for the QI project was retrospective from one year prior to education (September-November 2018) to during implementation of education (September-November 2019). Run charts were used to evaluate the sedation protocol process by producing a visual graphic representation of MVD and ICU LOS, allowing for identification of trends and variations within the outcome data over time (Institute of Healthcare Improvement, 2018). To further benchmark, graphic run charts of MVD and ICU LOS were compared to the *EPIC* mean for these outcomes across all users of the *EPIC* electronic health record for year one and year two.

Nursing surveys were completed pre-and post-intervention to determine actual nursing barriers and perceptions regarding the EB guideline. The survey was conducted through Survey Monkey to ensure anonymity of nursing staff to facilitate honest and open responses.

Chapter 4: Project Implementation, Outcomes, Impact, & Results (EBP Process Steps 4 & 5)

Process Indicators with Lessons Learned, Barriers and Solutions

The QI project and implementation experienced multiple barriers that have a potential impact on compliance and jeopardize sustainability of the sedation protocol. The process outcome measures included: EB guideline education, bedside RN education, and data collection. Completion outcomes of MVD and ICU LOS were obtained monthly from the EMR and with final data collected at the end of the implementation period.

The MICU/SICU experienced increased nursing turnover for the past three years that coincided with a lack of experience and education within the units (Appendix I, Figure I1). During the implementation, the units lost 15 nurses, with 11 new nurses hired during that time. The simultaneous loss of the ICU director and educator also presented challenges with the number of new nurses within the units and constant need for education. The intensivist team and APRNs took ownership within the units and participated in the nursing education. Critical care nurses play a crucial role in ventilator weaning through the performance of SAT/SBTs demanding an understanding of sedation titration per the EB guideline. The pre-survey revealed actual barriers to nursing compliance to the EB sedation protocol and included lack of experience and education (Appendix I, Table I1). Nursing demographics were obtained with assistance from the Human Resources and Education departments to help identify internal nursing barriers to sedation protocol compliance (Appendix I, Table I2).

The question arose as to whether there had been an increase in the number of ventilator initiations that could account for the increase in MVD. Therefore, the EMR was used to gather

data on total MV episodes and total MV days (Appendix I, Figure I2). The RT director hand extracted the data from respiratory therapy charting within the EMR on initiation of MV and the total MVD. The data was calculated upon discontinuation of MV documented in the EMR. Patient data and diagnosis were unavailable in the EMR and therefore inclusion and exclusion criteria concerning diagnosis affected the results. The intensivist team is asking IT to investigate separating MV data by diagnosis.

Project Results

The primary outcomes for this improvement project were MVDs and ICU LOS. Monthly monitoring of the EMR data including MVD and ICU LOS was recorded. During the preintervention period, 50.68% (37/73) of the beside ICU nurses responded to the survey. While 11% of the nurse perceived lack of collaboration, workload, and timing of the SAT/SBTs were barriers, 16% of the staff reported there was a lack of collaboration within the multidisciplinary team (Appendix I, Table I1). During the implementation, monthly education was provided to all bedside RNs in the MICU/SICU that included sedation protocol use, sedation medications, ventilator management, and hands on ventilator training.

The one-month postintervention period involved a follow-up nursing survey for re-evaluation of ongoing barriers, education evaluation, and nursing comfort with use of the sedation protocol. The 30% response (22/73) from the bedside ICU nurses concluded that the education was helpful and 77% of respondents were confident with sedation protocol use.

Data Analysis

Data collected by the DNP candidate was ongoing at the time of clinical inquiry. The IT department facilitated access to the dashboard with benchmark data in each of the units as well as the *EPIC* mean. Data collection for the QI project included MVD and ICU LOS for the

MICU/SICU units. Nursing demographics were also obtained from the HR department to evaluate experience within the units of implementation.

Despite ongoing education, there was a 23% (4.3/5.2) increase in the number of MVD. Baseline data established during the preintervention period showed the sum of the average MVD was 25.7 as compared to 31.2 during implementation. A limitation to this QI project is that the EMR does not separate diagnosis therefore the resulting MVD data could include patients with exclusion criteria. Also retrieved was the number of ventilator initiations and total number of MVD (Appendix I, Figure I1).

Total ventilator initiations and days for the comparison period included 149.8 (1,768 days) (preintervention) and 149.3 (1,980) (intervention). Comparison of ICU LOS was also evaluated and noted to have a 7% increase during the two comparison periods (Appendix I, Figure I3). The preintervention period resulted in an average of 2.6 days compared to the intervention period consisting of 2.8 days (Appendix I, Figure I3).

Outcomes Measures

Outcomes direct individual patient care management and provide opportunity for comparison and determination of effectiveness of EBP. Ongoing education and monitoring of the sedation protocol using DIS required evaluation of nursing knowledge and comfort with sedation titration for the sustainability of the EBP protocol. Before the initiation of the QI project, a nursing survey was completed for evaluation of current perceptions and barriers to compliance with protocol use. The survey was completed online via survey monkey with anonymous results and an aim to have 100% response rates. The objective of the surveys was to have greater than 90% of the nursing staff educated on the use and understanding of DIS, the performance of SAT/SBT, and treatment of pain approach.

The loss of the ICU educator and ICU director created barriers to ongoing education. The ICU intensivist group including physicians and APRNs took ownership within the units and presented educational activities including observation, learning interactions during point-of-care interventions, power-point presentations on DIS/SAT/SBT, and pocket card distribution for pain/RASS assessment scales. After the 90-day QI project, a follow-up nursing and RT survey was completed to evaluate improvement in perceptions and confidence in the protocol used.

Multidisciplinary rounding (MDR) is currently in place using validated rounding tools. The multidisciplinary team included the intensivist, pharmacy, RT, bedside RN, physical therapy (PT), occupational therapy (OT), dietary, case manager, and charge RN. The team facilitated feedback and evaluated the possible need for an individualized sedation plan for each patient.

Outcomes Analysis

According to the surveys, nurses requested more education, but participation was lacking. The lack of experience and education of the nurses significantly impacted compliance and comfort with use of the sedation protocol that ultimately impacts MVD and ICU LOS. While multiple educational opportunities were presented during the monthly staff and UBC meetings, attendance was poor. The education department has approved continuing education (CE) credits for completion of the education to provide incentives for attendance. Furthermore, the facility has planned to include an annual ICU-specific competency blitz that would mirror the biannual hospital wide skills fair that will focus on unit-specific skills, including sedation protocol weaning and ventilator training.

The loss of the ICU director and educator presented challenges for the units and are vital for successful performance within the units. Intensive care units consume substantial parts of a facilities budget and demand extensive human resources thus mandating good management for

adequate and appropriate use of resources. Nursing educators ensure the next generation of nurses are prepared to meet the growing demands of the healthcare system. Experienced ICU educators facilitate the delivery of information to other nurses who understand the challenges with critical illness. A nurse educator is crucial for reducing errors and identifying opportunities for process improvement.

The question arose as to whether there had been an increase in the number of ventilator initiations that could account for the increase in MVD. Therefore, the EMR was used to gather data on total MV episodes and total MVD (Appendix I, Figure I1). Respiratory therapy charted within the EMR initiation of MV and the total MVD was calculated upon discontinuation of MV documented in the EMR. The data was hand extracted from the EMR by the RT director but was not separated per unit. The EMR presents challenges for use of the clinical data with regards to data availability and comparability. While the EMR provides real time feedback on MVD and ICU LOS, data concerning diagnosis, acuity, and patient information were not recognized in the EMR.

Physician and practice variability, patient acuity, and fluctuation of medical, surgical and trauma patients may present challenges with consistency of sedation protocol use. During the period of implementation, the ICU intensivist group utilized locum physicians to fill in temporarily when staffing was low. The variability in ventilator management strategies could account for inconsistency with use of the EB sedation protocol. Patient acuity is not separated within the EMR leading to patients meeting SAT/SBT exclusion criteria still being calculated into MVD.

Financial Impact

Many factors influence financial impact of a project. Hospital engagement, improved collaboration and communication, the use of continuing education designed to target lighter sedation increases compliance resulting in sustainability of the evidence-based sedation management to reduce the number of MVD and ICU LOS. Despite implementation of evidence-based education, the results of this project were an increase in MVD of 23 %, which resulted in an increase in MV cost of $2095.60 per episode and over $356,252.00 per month. The impact of increased MVD, if continued, could lead to an increase in mechanical ventilator costs of $4 million per year. However, with a focus on patient acuity and sustaining a stable workforce, MVD will not be contributing to a projected $50 billion increase in healthcare costs over the next decade.

Chapter 5: Project Sustainability Discussion, Conclusions, & Recommendations (EBP Process Step 5 & 6)

Implications of Project Results

Evidence-based practices can be used effectively in the ICU to improve sedation protocol compliance but should undergo continuous quality assurance and optimizations to maximize compliance. The main implication of this QI project is that bedside ICU staff be aware of risks associated with prolonged MV and feel comfortable titrating sedation to allow patients to be awake and involved in care, facilitating weaning from the ventilator as soon as possible.

The EMR is a valuable data collection system that provides real time feedback on quality measure but may fully not be utilized. The value of an informatics team can optimize the EMR and help ensure the stored data is available for analysis to reduce outcome variations and increase quality and patient satisfaction thereby reducing healthcare costs.

Nursing turnover impacts experience and education within the units. New nurses are overwhelmed with the amount of learning needed in the ICU. Nurses responded to questions posted on the unit Facebook page but participation in the online survey was poor. The lack of participation was surprising as nurses asked for education. Learning to interact with the new generation of nurses requires expanding avenues for education and the addition of incentives. While continuing education is obtained for professional knowledge, professional success, gaining professional credit, and improvement in decision making, incentivizing education may improve staff motivation and responsibility.

Project Sustainability Plans

Ongoing QI monitoring and analysis are key to sustainability of this project. Continuing the education about the EB sedation protocol has become part of the ICU orientation. To provide incentive for attendance, the education department has approved continuing education (CE) credits for completion of the education. Furthermore, the facility has planned to include an annual ICU-specific competency blitz that would mirror the biannual hospital wide skills fair that will focus on unit-specific skills, including sedation protocol weaning and ventilator training. Financial impact will be continually monitored as will patient demographics to better understand the outcomes collected.

Implications of Results

Evidence-based practice results in improved patient outcomes and reduced healthcare costs. The current sedation protocol aligns with the evidence for reducing MVD and ICU LOS. Nursing education and experience affected compliance to the EB guideline and an ongoing increase in MVD and ICU LOS remained. Continued education is needed to combat the high turnover within the units with no ICU educator. A focus on increasing compliance to the guideline will ensure consistency and sustainability with use. Mechanical ventilator days and ICU LOS data collection are part of ongoing monitoring for improvement, and PDSA cycles are used to enable evaluation of educational presentations and support effective communication between the IP team for performance of SAT/SBTs. Knowledge of balance between optimal sedation, delirium prevention, and sleep quality is vital in improving MV patient outcomes. Mechanical ventilator weaning demands a collaborative team and competency within each discipline ensures that all staff understands their roles, understanding of complications, and

adherence to current practice guidelines and protocols to promote continuous quality improvement, reduced MVD and ICU LOS.

Key Lessons Learned

Evidence-based practices can be effectively used in the ICU to improve sedation protocol compliance but should undergo continuous quality assurance and optimizations to maximize compliance. Learning the steps of the EB process laid the foundation for transforming healthcare through the development of the clinical question. Learning to navigate the research database has opened the door for cultivation of inquiry on methods and traditions and developed the desire to be more involved with creating them. The organization must embrace a culture of EBP so that bedside staff will embrace and actively participate in activities. The greatest challenge for this QI project was finding ways to engage nurses and motivate them to accept responsibility for their own learning.

Project Recommendations

Perceived nursing barriers to sedation protocol compliance included lack of education and experience. It is the recommendation of this project to continue presenting educational opportunities for improved protocol compliance. Improving knowledge concerning sedation titration will help staff feel more comfortable managing an awake ventilated patient to facilitate SAT/SBTs to liberate patients faster from MV.

Chapter 6: DNP Practice-Scholar Role Actualization

Role Impact

Healthcare is not an individual task but requires a cohesive and collaborative team to provide safe, effective, quality care. The role of the DNP also has the responsibility to impact nursing through dissemination. The QI project has been selected as a poster presentation at the 2020 Sigma Theta Tau International Conference in Abu Dhabi and at the 2020 ANCC Magnet Conference. The poster presentation offers the opportunity to disseminate findings quickly bridging the gap between research completion and presentation.

The transformational leadership model enabled understanding of nursing and organizational need for change (Appendix F, Figure F3). The model created a vision of change fostered through inspiration and commitment of multidisciplinary team members working collaboratively for improved patient outcomes.

While the role of the DNP within the organization has been minimal, times are changing. It is not about what the role of the DNP is, but what the DNP does with the role. Healthcare is rapidly changing with better access to care, better quality and more affordable care while combating global health issues and an aging population. The vision of the DNP role for me involves expansion of the role and to design care delivery programs that significantly impact healthcare outcomes. My vision involves health policy development through a commitment to the 100 Communities Initiative, addressing the Preceptor Crisis, and establishing a collaborative partnership between UTTYLER and the Magnet hospital to establish an avenue to bridge the clinical practice gap for the improvement of our patients and community.

Summary: Strengths and Emotional Intelligence

Focusing on strengths leads to empowerment instead of focusing on weakness. The combination of strengths and Emotional Intelligence training has allowed me to grow personally, emotionally, physically, and professionally. Emotional intelligence includes self-awareness, self-regulation, motivation, and empathy. Nursing is a collaboration and requires interpersonal and social awareness to build the cohesive team. Understanding and recognizing my own emotions and reactions created an environment rich with empathy, acceptance, and professionalism leading to improved communication.

Strength training resulted in the encapsulation of my strengths: *Achiever, Restorative, Learner, Strategic, Responsibility* to understand and maximize them through reflection on emotions and behaviors. My unique strengths combination allowed me to complete my goals personally and professionally, both now and in the future. I love what I do and sharing it with other nurses. When asked what I will do with my DNP role, I want to change nursing and improve care for our patients and their families, but also impact nursing through improved opportunities for learning.

References

AHRQ. (2017). Evidence behind pain, agitation, and delirium: Assessments and sedation management: *Facilitator Guide*. Retrieved from https://www.ahrq.gov/professionals/quality-patient-safety/hais/tools/mvp/modules/technical/painmgmt-facguide.html

Amaral, A. C., Kure, L., & Jeffs, A. (2012). Effects of increasing compliance with minimal sedation on duration of mechanical ventilation: A quality improvement intervention. *Critical Care*, 16: R78. http://ccforum.com/content/16/3/R78

Anifantaki, S., Prinianakis, G., Vitsaksaki, E., Katsouli, V., Mari, S.,…Georgopoulos, D. (2009). Daily interruption of sedative infusions in an adult medical-surgical intensive care unit: Randomized controlled trial. *Journal of Advanced Nursing*, 65(5): 1054-1060. Doi: 10.1111/j.1365-2648.2009.04967.x

ASQ. (2018). Run chart. *Online Reference*. Retrieved November 8, 2018 from https://asq.org

Barr, J., Fraser, G.L., Puntillo, K., Ely, E.W., Gelinas, 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*, 41(1); 2630306. Doi: 10.1097/CCM.0b013e3182783b72

Berry, E., & Zecca, H. (2012). Daily interruptions of sedation: A clinical approach to improve outcomes in critically ill patients. *Critical Care Nurse*, 32(1): 43-51. Doi: 10.4037/ccn2012599

Burry, L., Rose, L., McCullagh, I.J., Ferguson, N.D., & Mehta, S. (2014). Daily sedation interruption versus no daily sedation interruption for critically ill adult patients requiring invasive mechanical ventilation. *Cochrane Database Systematic Review,* 7: CD009176. Doi: 10.1002.14651858.CD009176.pub2

Carson, S.S., Kress, J.P., Rodgers, J.E., Vinayak, A., Campbell-Bright, S., Levitt, J.,…Hall, J. (2006). A randomized trial of intermittent lorazepam versus propofol with daily interruption in mechanically ventilated patients. *Critical Care Medicine,* 34(5): 1326-1332. Doi: 10.1097/01.CCM.0000215513.63207.7F

Cavallazzi, R., Saad, Mohamed, & Marik, P.E. (2012). Delirium in the ICU: An overview. *Annals of Intensive Care,* 2(49). Doi: 10.1186/2110-5820-2-49

Cook, C.R. (2012). Economics of mechanical ventilation and respiratory failure. *Critical Care Clinics*, 28(1), 39-55. Doi: http://dx.doi.org/10.1016/j.ccc.2011.10.004

Cox, C.E., Carson, S.S., Govert, J.A., Chelluri, L., & Sanders, G.D. (2007). An economic evaluation of prolonged mechanical ventilation. *Critical Care Medicine*, 35(8); 1918-1927. Doi:10.1097/01.CCM.0000275391.35834.10

Dasta, J.F., Mclaughlin, T. K., Mody, S.H., & Tak Piech, C. (2005). Daily cost of an intensive care unit day: The contribution of mechanical ventilation. *Critical Care Medicine,* 33(6); 1266-1271. Doi: 10.1097.01.CCM.0000164543.14619.00

DeGuzman, P.B., & Wayner, C.A. (2014). Nursing and organizational barriers to daily interruption of sedation in U.S. hospitals: A thematic review of literature. *Clinical Nursing Studies,* 3(1): 55-61. http://dx.doi.org/10.5430/cns.v3n1p55

Devlin, J.W, Fong, J.J., & Schumaker G.L. (2006). Identifying factors that could account for differences in duration of mechanical ventilation between intermittent lorazepam and propofol treated patients. *Critical Care Medicine*, 34(12): 3036. Doi: 10.1097/01.CCM.0000248911.24389.14

Devlin, J.W., Skrobik, Y., Gelinas, C., Needham, D.M., Slooter, A.J.C., Watson, P.L.,…Alhazzani, W. (2018). Clinical Practice Guidelines for the prevention and management of pain, agitation/sedation, delirium, immobility, and sleep disruption in adult patients in the ICU. *Critical Care Medicine*, 46(9): e825-e873. Doi: 10.1097/CCM. 0000000000003299

Ely, E.W., Inouye, S.K., Bernard, G.R., Gordon, S., Francis, J., May, L.,…Dittus, R. (2012). Delirium in mechanically ventilated patients: Validity and reliability of the confusion assessment method for the intensive care unit. *JAMA*, 286(21); 2703-2710. Doi: 10.1001/jama.286.21.2703

Ferrell, B.A., & Girard, R.D. (2014). Sedative choice: A critical decision. *American Journal of Respiratory and Critical Care Medicine*, 189(11): 1295-1297. https://doi.org/10.1164/rccm.201404-0788ED

Fialkow, L., Farenzena, M., Wawrzeniak, I.C., Brauner, J.S., Vieira, S.R., Vigo, A., & Bozzetti, M.C. (2016). Mechanical ventilation in patients in the intensive care unit of a general university hospital in southern Brazil: An epidemiological study. *Clinics*, 71(3), 145-151. Doi: 10.6061/clinics/2016(03)05

Fuchs, B., & Bellamy, C. (2017). Sedative-analgesic medications in critically ill adults: Selection, initiation, maintenance, and withdrawal. *UpToDate*. https://www.uptodate.com/contents/sedative-analgesic-medications-in-critically-ill-adults-selection-initiation-maintenance-and-withdrawal

Fuchs, L., Chronaki, C.E., Park, S., Novack, V., Baumfeld, Y., Scott, D.,…Celi, L. (2012). ICU admission characteristics and mortality rates among elderly and very elderly patients. *Intensive Care Medicine*, 38(10): 165401661. Doi: 10.1007/s00134-012-2629-6

Jackson, D.L., Proudfoot, C.W., Cann, K.F., & Walsh, T. (2010). A systematic review of the impact of sedation in the ICU on resource use, costs, and patient safety. *Critical Care*, 12: R59. Doi: http://ccforum.com/content/12/2/R59

Jakob, S.M., Lubszky, S., Friolet, R., Rothen, H.U., Kolarova, A., & Takala, J. (2007). Sedation and weaning from mechanical ventilation: Effects of process optimization outside a clinical trial. *Journal of Critical Care*, 22: 219-228. Doi: 10.1016/j.jcrc.2007.01.001

Khalil, N.S., Mohamed, W.Y., & Sharkawy, M.A.M. (2018). Patients' weaning from mechanical ventilation: Complete versus incomplete ventilator bundle implementation. *International Journal of Africa Nursing Sciences*, 8: 28-32. https://doi.org/10.1016/j.ijans.2018.02.003

Khan, B.A., Guzman, O., Campbell, N.L., Walroth, T., Tricker, J.L., Hui, S.L.,…Boustani, M.A. (2012). Comparison and agreement between the Richmond Agitation-Sedation Scale and the Riker Sedation-Agitation Scale in evaluating patients' eligibility for delirium assessment in the ICU. *Chest*, 142(1): 48-54. Doi: 10.1378/chest.11-2100

Klompas, M., Lingling, L., Szumita, P., Kleinman, K., & Murphy, M.V. (2016). Associations between different sedatives and ventilator-associated events, length of stay, and mortality in patients who were mechanically ventilated. *CHEST*, 149(6): 1373-1379. Doi: http://dx.doi.org/10.1378/chest.15-1389

Kress, J.P., Pohlman, A.S., O'Connor, M.F., & Hall, J.B. (2000). Daily interruption of sedative infusions in critically ill patients undergoing mechanical ventilation. *New England Journal of Medicine*, 342: 1471-1477. Doi: 10.1056/NEJM200005183422002

Loss, S.H., de Oliveira, R.P., Maccari, J.G., Savi, A., Boniatti, M.M., Hetzel, M.P.,…Teixeira, C. (2015). The reality of patients requiring prolonged mechanical ventilation: A multicenter study. *Rev Bras Ter Intensiva*, 27(1); 26-35. Doi: 10.5935/0103-507X.20150006

Mehta, S., Cook, D., Fergusson, D., Steinberg, M., Granton, J., Herridge, M., Ferguson, N., Devlin, J., Tanios, M., Dodek, P., Fowler, R., Burns, K., Jacka, M., Olafson, K., Skrobik, Y., Hebert, P, Sabri, E., & Meade, M. (2012). Daily sedation interruption in mechanically ventilated critically ill patients cared for with a sedation protocol: A randomized controlled trial. *JAMA*, 308(19): 1985-1992. https://www.ncbi.nlm.nih.gov/pubmed/23180503

Miller, M.A., Krein, S.L., Saint, S., Kahn, J.M., & Iwashyna, T.J. (2012). Organizational characteristics associated with the use of daily interruption of sedation in US hospitals: A national study. *BMJ Qual Saf*, 21: 145-151. Doi: 10.1136/bmjqs-2011-000233

Moreira, F.T., & Neto, A.S. (2016). Sedation in mechanically ventilated patients: Time to stay awake. *Annals of Translational Medicine*, 4(19): 382. Doi: 10.21037/atm.2016.09.37

Nassar, A.P., Jr., & Park, M. (2014). Daily sedative interruption versus intermittent sedation in mechanically ventilated critically ill patients: A randomized trial. *Annals of Intensive Care*, 4(14). Doi: 10.1186/2110-5820-4-14

Navalesi, P., Frigerio, P., Patzlaff, A., Haubermann, S., Henseke, P., & Kubitschek, M. (2014). Prolonged weaning: From the intensive care unit to home. *Rev Port Pneumologia*, 20(5); 264-272. Doi: 10.1016/j.rppneu.2014.04.006

Nedergaard, H.K., Jensen, H.I., Lauridsen, J.T., Sjogaard, G., & Toft, P. (2015). Non-sedation versus sedation with a daily wake-up trial in critically ill patients receiving mechanical ventilation-effects on physical function: Study protocol for a randomized controlled trial: A substudy of the NONSEDA trial. *BioMed Central*, 16: 310. Doi: 10.1186/s13063-015-0856-1

Neuville, M., Mourvillier, B., Bouadma, L., & Timsit, J.F. (2017). Bundle of care decreased ventilator-associated events-implications for ventilator-associated pneumonia prevention. *Journal of Thoracic Disease*, 9(3): 430-433. Doi: 10.21037/jtd.2017.02.72

Newhouse, R., Dearholt, S., Pose, S., Pugh, L., & White, K. (2005). Evidence-based practice: A practical approach to implementation. *Journal of Nursing Administration*, 35(1): 35-40. https://www.ncbi.nlm.nih.gov/pubmed/15647668

Olson, D.M., Zomorodi, M.G., James, M.L., Cox, C.E., Moretti, E.W., Riemen, K.E., & Graffagnino, C. (2014). Exploring the impact of augmenting sedation assessment with physiologic monitors. *Australian Critical Care*, 27(3); 145-150. https://doi.org/10/1016/j.aucc.2013.09.001

PayScale Inc. (2018). *Online Reference*. Retrieved July 25, 2018, from https://www.payscale.com/research

Plost, G., & Nelson, D.P. (2007). Empowering critical care nurses to improve compliance with protocols in the intensive care unit. *American Journal of Critical Care*, 16(2): 153-156. http://ajcc.aacnjournals.org/content/16/2/153.long.

PulmCCM. (2014). *What are ventilator-associated events (and why should you care)?* Retrieved January 15, 2018, from https://pulmccm.org/review-articles/ventilator-associated-events-care/

Ramoo, V., Abdullah, K.L., Tan, P., Wong, L.P., Chua, Y.P., & Tang, L.Y. (2015). Sedation scoring and managing abilities of intensive care nurses post educational intervention. *Nursing in Critical Care*, 22(3): 141-149. https://doi.org/10.1111.nicc.12180

Ranzani, O.T., Simpson, E.S., Augusto, T.B., Cappi, S.B., & Noritomi, D.T. (2014). Evaluation of a minimal sedation protocol using ICU sedative consumption as a monitoring tool: A quality improvement multicenter project. *Critical Care*, 18: 580. http://ccforum.com/content/18/6/580

Reade, M.C., Phil, D., & Finfer, S. (2014). Sedation and delirium in the intensive care unit. *New England Journal of Medicine*, 370: 444-454. Doi: 10.1056/NEJMra1208705

Rumpke, A., & Zimmerman, B.A. (2010). Implementation of a multidisciplinary ventilator-weaning and sedation protocol in a community intensive care unit. *Dimensions of Critical Care Nursing*, 29(1): 40-49. Doi: 10.1097/DCC.0b013e3181be4bbf

Schulingkamp, D., Woo, S., Nguyen, A., Sich, N., & Shadis, R. (2016). Assessment of continuous sedation versus intermittent sedation in mechanically ventilated patients. *Critical Care Medicine*, 44(12); 292. Doi: 10.1097/01.ccm.0000509539.41912.86

Shehabi, Y., Chan, L., Kadiman, S., Alias, A., Ismail, W.N., Tan, M.A.T.,…Bailey, M. (2013). Sedation depth and long-term mortality in mechanically ventilated critically ill patients: A prospective longitudinal multicenter cohort study. *Intensive Care Medicine*, 39: 910-918. Doi: 10.1007/s00134-013-2830-2

Shinotsuka, C.R. (2013). Implementing sedation protocols: Closing the evidence-practice gap. *Rev Bras Ter Intensiva*, 25(3): 186-187. Doi: 10.5935/0103-507X.20130033

Sneyers, B., Laterre, P.F., Bricq, E., Perreault, M.M., Wouters, D., & Spinewine, A. (2014). What stops us from following sedation recommendations in intensive care units? A multicentric qualitative study. *Journal of Critical Care*, 29: 291-297. http://dx.doi.org/10.1016/j.jcrc.2013.11.004

Sneyers, B., Laterre, P.F., Perreault, M.M., Wouters, D., & Spinewine, A. (2014). Current practices and barriers impairing physicians' and nurses' adherence to analog-sedation recommendations in the intensive care unit: A national survey. *Critical Care*, 18(6): 655. Doi: 10.1186/s13054-014-0655-1

SCCM. (2017). *Critical Care Statistics.* Retrieved October 13, 2017, from https://www.sccm.org/Communications/Pages/CriticalCare Stats.aspx

Strom, T., Martinussen, T., & Toft, P. (2010). A protocol of no sedation for critically ill patients receiving mechanical ventilation: A randomized trial. *The Lancet*, 375: 475-480. Doi: 10.1016/S0140-6736(09)62072-9

Sutherland, K. (2013). Applying Lewin's Change Management Theory to the implementation of bar-coded medication administration. *Canadian Journal of Nursing Informatics*, 8(1&2). https://cjni.net/journal/?p=2888

U.S. Department of Health & Human Services. (2017). Overview: Getting patients off the ventilator faster: Facilitator guide. *AHRQ Online*. Retrieved May 9, 2018, from https://www.ahrq.gov/professionalss/quality-patient-safety/hais/tool/mvp/modules/vae/overview-ptsoffventilator-facguide.html

VentureWell. (2015). *AWAIR: Reducing discomfort for patients on ventilation.* Retrieved May 9, 2018, from https://venturewell.org/awair-reducing-discomfort-patients-ventilation/.

Williams, T.A., Ho, K.M., Dobb, G.J., Finn, J.C., Knuiman, M., & Webb, S.A.R. (2010). Effect of length of stay in the intensive care unit on hospital and long-term mortality of critically ill adult patients. *British Journal of Anaesthesia*, 104(4); 459-464. Hyyps://doi.org/10.1093/bja/aeq025

Zhang, Z., Chen, K., Ni, H., Zhang, X., & Fan, H. (2016). Sedation of mechanically ventilated adults in intensive care unit: A network meta-analysis. *Scientific Reports*, 7:44979

Appendix A: Internal Data

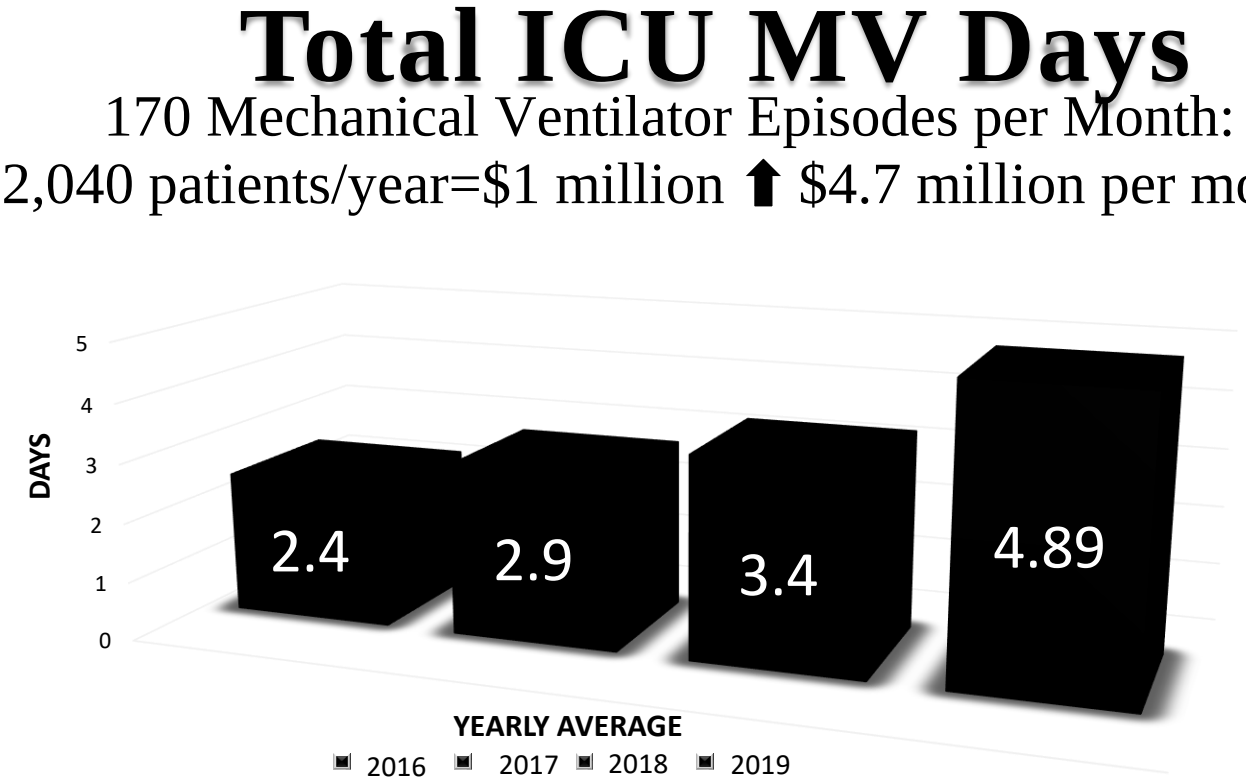
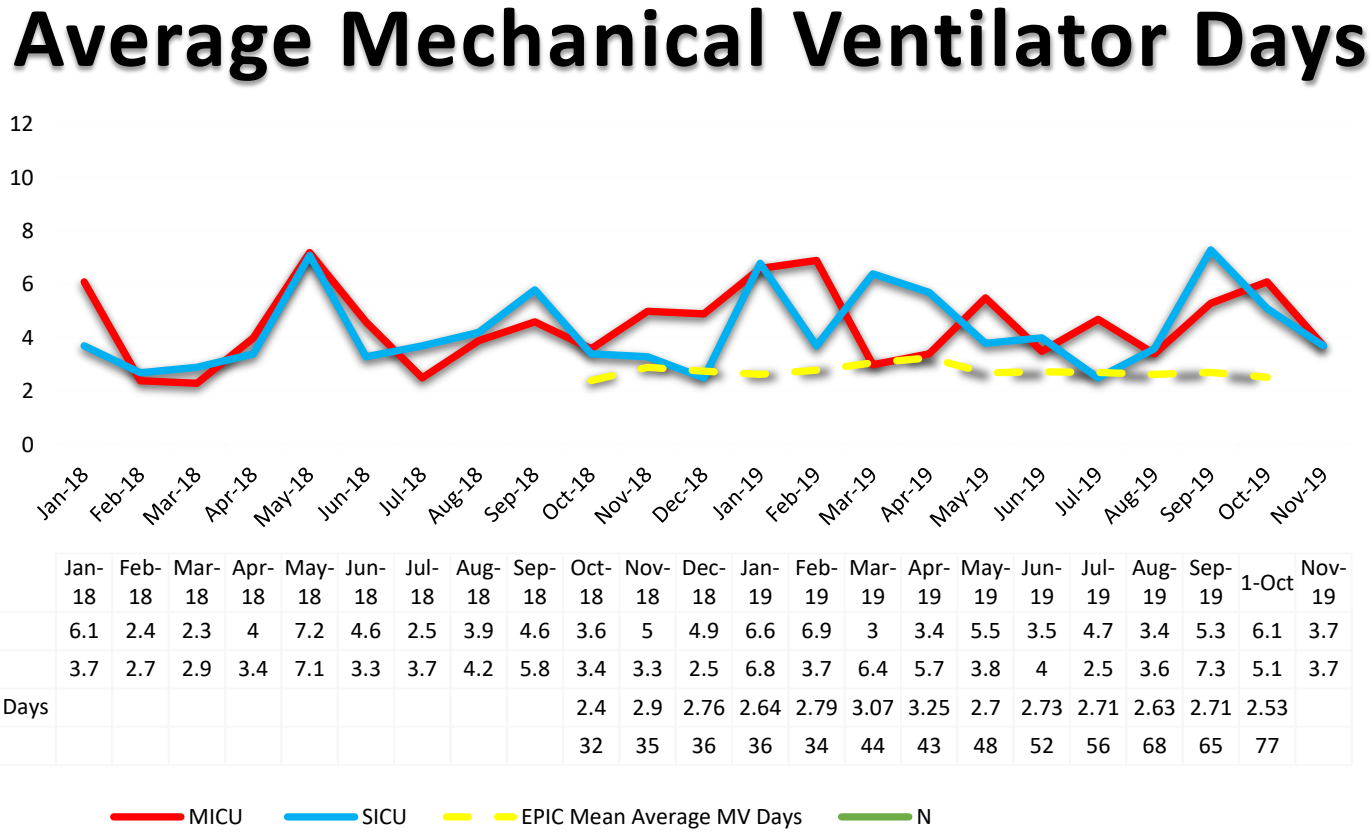
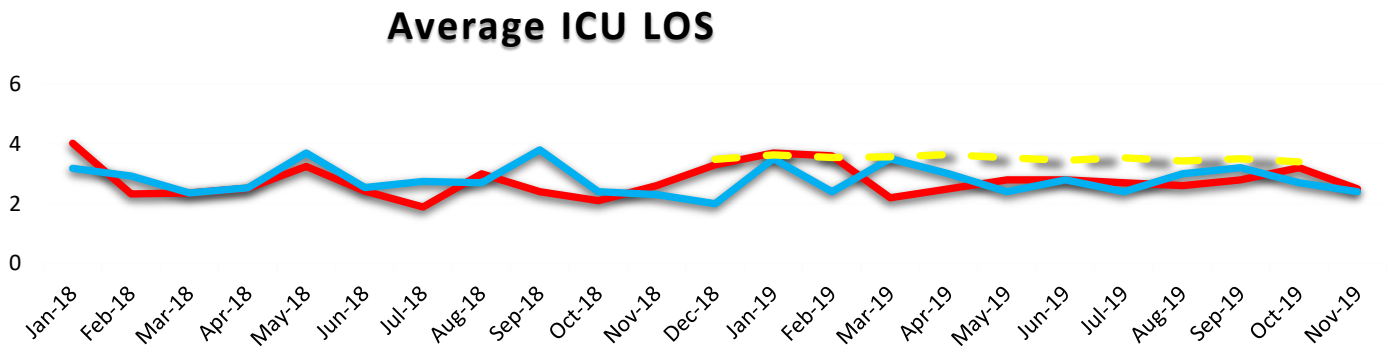


Figure A1 Total ICU average mechanical ventilator days, 2016-2019



	Jan-18	Feb-18	Mar-18	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18	Oct-18	Nov-18	Dec-18	Jan-19	Feb-19	Mar-19	Apr-19	May-19	Jun-19	Jul-19	Aug-19	Sep-19	1-Oct	Nov-19
MICU	6.1	2.4	2.3	4	7.2	4.6	2.5	3.9	4.6	3.6	5	4.9	6.6	6.9	3	3.4	5.5	3.5	4.7	3.4	5.3	6.1	3.7
SICU	3.7	2.7	2.9	3.4	7.1	3.3	3.7	4.2	5.8	3.4	3.3	2.5	6.8	3.7	6.4	5.7	3.8	4	2.5	3.6	7.3	5.1	3.7
EPIC Mean Average MV Days										2.4	2.9	2.76	2.64	2.79	3.07	3.25	2.7	2.73	2.71	2.63	2.71	2.53	
N										32	35	36	36	34	44	43	48	52	56	68	65	77	

Figure A2 Average mechanical ventilator days in MICU/SICU



	Jan-18	Feb-18	Mar-18	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18	Oct-18	Nov-18	Dec-18	Jan-19	Feb-19	Mar-19	Apr-19	May-19	Jun-19	Jul-19	Aug-19	Sep-19	Oct-19	Nov-19
MICU	4.02	2.33	2.36	2.52	3.25	2.42	1.89	3	2.4	2.1	2.6	3.3	3.7	3.6	2.2	2.5	2.8	2.8	2.7	2.6	2.8	3.2	2.5
SICU	3.18	2.92	2.36	2.53	3.69	2.54	2.74	2.7	3.8	2.4	2.3	2	3.5	2.4	3.5	3	2.4	2.8	2.4	3	3.2	2.7	2.4
Epic Average LOS (Days)												3.48	3.63	3.54	3.57	3.64	3.53	3.45	3.53	3.43	3.5	3.4	
N												119	132	157	179	177	181	192	202	219	205	240	

Figure A3 Monthly Average ICU Length of Stay in MICU/SICU

Appendix B: Systematic Search

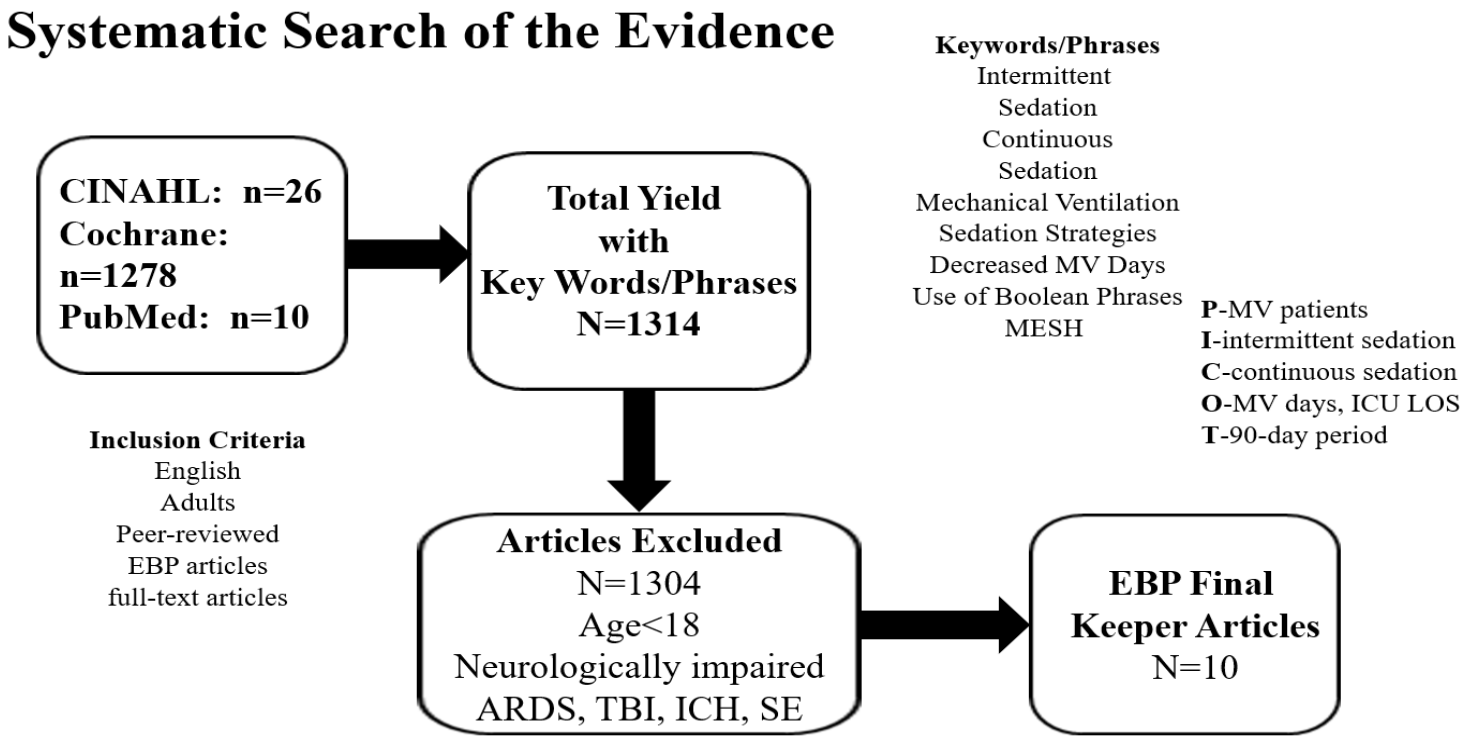


Figure B 1 Search Strategy Flowchart

Table C1: Evaluation tables of keeper studies: Intermittent vs. continuous sedation

Appendix C: Evaluation Tables

CLINICAL QUESTION: In adult mechanically, ventilated patients (P) how does PRN or no sedation (I) compared to continuous sedation with daily sedation interruption, or compared to sedation by protocol (C) affect duration of mechanical ventilation, ICU and hospital length of stay (O) over a 90-day period (T)?

Citation:	Purpose of Study	Concept Framework	Design/ Method	Sample/Setting	Major Variables	Measurement of Major Variables	Data Analysis	Study Findings	Appraisal of Worth to Practice Strength of the Evidence RECOMMENDATIONS
Carson, et al. (2006). A randomized trial of intermittent lorazepam versus propofol with daily interruption in mechanically ventilated patients. *Critical Care Medicine*, 34(5): 1326-1332	Compare MV pts randomized to receive LOR by INT vs CONT of PROP using protocols that included scheduled DIS	None	**Design:** RCT **Method:** Simple computer-generated randomization scheme/ Paper enclosed in consecutively numbered sealed opaque envelope Open-label fashion study	**Setting:** Medical ICU-2 tertiary care medical centers **N=132** MV pts>18 years with >48 hours on MV **N=64** pts INT bolus group **N=68** pts PROP group	**IV1:** INT bolus LOR **IV2:** CONT PROP with DIS **DV1**: DMV **DV2:** 28-day vent-free survival **DV3:** ICU LOS **DV4:** HLOS **DV5:** MOR	**DV1-4:** # of Days	Intention to treat analysis Wilcoxon rans-sum test	**DV1-IV2/IV1** ↓ group (5.8/ 8.4, p=.04) **DV2-IV2/IV1**-4.4/9.0, -(p=0.006) **DV3-IV2/IV1**: 8.3/ 10.4, (p=.2) **DV4:** NSD 20(12,30) vs 18 (12,29), P=.55 **DV5**-NSD, 24(38) vs 25 (37), P=.82	**LOE**: II **Weaknesses**: • Unblinded study **Strengths:** • RCT study design **Risks**: Risk of self-extubation, removal of life-saving lines and devices from interventions **Feasibility**: Consistent with current SED protocol in use **Conclusion**: SED using CONT PROP infusions with DIS=↓ DMV & ICU LOS compared with INT LOR dosing. **Recommendation:** Use of non-benzodiazepines ↓ DMV, ICU LOS **Notes**: PROP has rapid decline in plasma concentrations=more rapid

									awakening & better performance of SBY Pharmacokinetics of LOR has longer clearance rate than PROP SCCM CPG recommends use of PROP for pts requiring rapid awakening
Berry et al. (2012). Daily interruptions of sedation: A clinical approach to improve outcomes in critically ill patients *ACCN*; 32(1)	Evaluate safety & effectiveness of DIS & evoked outcomes	None	**SR**-RCTs **Searched** PM Medline Ovid CL NGC CN	**Sample**: **N=7** studies Girard et al (2008) N=336 patients Kress et al (2000) N=128 patients Schweickert et al (2004) N=126 patients Kress et al (2007) N=74 patients Kress et al (2003) N=32 patients	**IV1**: DIS **IV2**: No SED **DV1:** ICU LOS **DV2**: DMV **DV3:** HLOS	**DV1-3**: # of Days	Absolute reduction P value	**IV1↓DV2** by 2.4 days (p=.004) **IV1↓DV1** by 2.5 days (p=.02) **IV1 NDS DV3** **IV2↓DV2** compared to **IV1** (p=.02) **IV2↓DV1** (p=.03) **IV2↓DV3** (p=.003)	**LOE: I** **Weaknesses**: • Only medical ICU pts limiting generalizability • Data limited on psychological safety of DIS • Smaller sample sizes **Strengths**: • All RCTs • Consistency across RCTs and before/after studies **Risk**: Misunderstanding of barriers to DIS implementation & safety **Feasibility:** Limited generalizability, my ICU has medical/surgical/neuro/cardiac patients, consistency between units and providers **Conclusions**: Valid evidence to support DIS Implementation ↑ PO, ↓ DMV and ICU LOS

				Strom et al (2010) N=140 patients					CONT SED ↑ DMV No SED ↓ DMV, ICU & HLOS **RECOMMENDATION:** DIS used with valid assessment tools can facilitate ↑ PO ↓ DMV **NOTE**: Defined SED goal & endpoint necessary=↓ Complications of protocol implementation
Jackson et al. (2010). A systematic review of the impact of sedation and practice in the ICU on resource use, costs and patient safety. *Critical Care*, 12: R59	Compare impact changes in or different protocols for SED management on economic & PSO	None	SR **Search**: MD EM CI **Inclusion Criteria**: Adults MV SED>24 hrs English	**N=19** studies 15 observational 4 RCTs Sample sizes: 40-1105 pts	**IV1**: Various SED protocols, included guidance on frequency & method of assessment, set target SED levels & drug choice **DV1**: DMV **DV2:** Weaning time **DV3**: ICU LOS **DV4**: HLOS **DV5**: PSO (VAP,	No quantitative synthesis completed	Absolute differences per study Reported in general effect direction	SED hold ↓ DMV by 1.5 times in the RCT, and by more than 3 in the observation study. **DV1:** IV1 ↓ DMV **DV2:** IV1 ↓ in weaning time **DV3:** IV1 ↓ ICU LOS **DV4:** IV1 ↓ HLOS **DV5:** IV1 ↓ PSO	**LOE**: **I** **Weaknesses:** • Overall study quality was low • No quantitative synthesis due to varied study design, pt population, setting, intervention. • Varied differences in individual study definitions of outcomes. • RCTs small scale<500 patients **Strengths**: • RCTs • Consistent finding across RCTs & before-after studies **Risk:** Misunderstanding baseline SED practice **Feasibility**: Generalizability to all ICU MV pts for consistency among bedside staff & providers **Conclusions**: DIS is strongly associated with ↓ MV & ICU

					DEL, MOR)				LOS. Light SED practices ↓ healthcare costs. **Recommendation**: DIS works & should be cost effective, ↓ MV & ICU LOS
Zhang et al. (2006). Sedation of mechanically ventilated adults in intensive care unit: A network meta-analysis. Scientific Reports, 7: 44979	Efficacy and safety of sedatives for provision of updated & unbiased evidence for clinical practice	Graph theoretical methods	**Design**: SR, Network meta-analysis **Search:** PM Scopus ISI EM from inception to April 2016	**N=51 RCTs** **Setting:** ICU **Inclusion Criteria**: ICU admissions Long-term MV **Sample sizes: 20-500 pts**	**IV1**: MID **IV2:** DEX **IV3:** PROP **IV4**: CLON **IV5:** LOR **DV1:** ICU LOS **DV2**: HLOS **DV3:** DMV **DV4**: DEL	**DV1-2:** # of Days **DV3**: # of Hours **DV4**: Yes/No (dichotomous)	MD, CI OR, CI	**DV1:** NSD with IV1, IV2, IV3, IV4, IV5 **DV2**: IV2 ↓ DV2; MD:4.6; 95% CI; 1.2-8.1 days **DV3:** IV1 (MD: 10.2; 95% CI: 7.7-12.7 hrs); IV2 ↓ DMV (MD: 68.74; 95% CI: 18.2-119.3); IV3 (MD: 3.4; 95% CI: 0.9-5.9 hrs) **DV4**: MID ↑ DEL; OR:2.14; 95% CI; 1.17-5.19; IV3 ↑ DEL; OR:2.14; 5% CI; 0.94-4.89	**LOE**: I **Weaknesses**: • Risk of bias assessment • >2/3 of studies had sample size <100 • Specific methods to generate random sequence not explicitly reported • Heterogeneous patient population **Strengths**: • Only RCTs included **Conclusion**: SED med choice affects DMV, LOS. DEX ↓ DMV compared to other SED meds **Recommendations**: DEX ↓ DMV & DEL Prefer PROP over BENZO SED choice consideration to improve PO & safety
Nasaar et al. (2014). *Annals of Intensive Care*, 4:14	Compare DIS and ID during MV in a low nurse staffing ICU	None	**RCT** 1:1 ratio to ID or CD with DIS Concealed treatment allocation by	**Setting**: Closed multidisciplinary 6 bed ICU Nurse-to-patient ratio 1:6 & nursing assistant-to-	**IV:** **IV1**-ID **IV2**- CD with DIS **SED**: infusion of SED drugs MID or PROP	**DV1**: Days **DV2**: Days **DV3**: Days **DV4**: # of Days	**DV1**: MD, CI, P **DV2**: MD, HR, CI, p **DV3**: MD, p **DV4**: p	**DV1:** **IV/IV2:** n=55/58; 13.8:9.6; MD 4.2 days (95% CI, p=0.035 **DV2:** **IV1/IV2**: MD:9.7 days	**LOE: II** **Weaknesses:** • Single ICU teaching hospital • Study was not able to reach target sample • Hypothesis not met-ID would ↑ MV free days

			random selection of opaque sealed envelopes Unblinded study	patient ratio is 1:2 **Sample: N=60** Patients needing MV>24hrs	Pain treated FEN DIS-SAS of 3-4 After DIS, sedative restarted at ½ previous dose **DV**: **DV1**-MV free days **DV2**-ICU LOS **DV3**-HLOS **DV4**-ICU MOR			HR: 1.86, 95% CI, p=0.0316 **DV3: IV1/IV2:** MD 24 days **P**=0.0039 **DV4**: **IV1/IV2:** 12/22, p=0.06	• Dexmedetomidine was not used, associated with positive finding compare to benzodiazepines. **Strengths**; • RCT • Physiological variables were similar in both groups **Risks**: Accidental extubation and removal of catheters **Feasibility**: Results show lighter sedation approaches feasible & safe even in low nurse staffed ICUs **Conclusion**: NSD in DMV between both groups Valid evidence to show lighter SED ↓ VD, ICU LOS, HLOS, DEL, and MOR **Recommendation:** ↓ SED=↓ ICU LOS, MV days=↓ costs and ↑ patient outcomes
Strom et al. (2010). A protocol of no sedation for critically ill patients receiving mechanical ventilation: A	Establish whether no sedation vs sedation with DIS reduced the DMV	None	RCT	**N=140** pts **Inclusion:** MV>24hrs Random assigned to 1:1 unblinded to receive No SED group **(N=70)** SED with DIS **(N=70)**	**IV1:** SED (CONT PROP wit DIS) **IV2:** No SED, INT pain med **DV1:** DMV/28-day period **DV2:** ICU LOS	**DV1-4:** # of Days **DV5**: Number	**DV1**: N, mean, CI, p **DV2**: HR, CI, P, Cox Regression analysis, Kaplan-Meier, **DV3**: MD, p, Kaplan-Meier	**DV1: IV1 ↓ DV1** (N=55; mean 13.8 days, SD 11 IV2: N=58; mean 9.6 days, SD 10.0, MD 4.2 days, 95% CI, 0.3-8.1; p=0.0191) **DV2: IV1 ↓ DV2** (HR 1.86, 95% CI	**LOE**: **II** **Strengths**: • Included medical/surgical patients. **Weaknesses**: • Single center • Unblinded • Limited generalizability due to 1:1 nurse: patient ratio

randomized trial. *Lancet*, 375:475-480				**Exclusion:** <18 yrs old ↑ ICP, pregnant, SE, CA	**DV3**: HLOS **DV4**: DEL **DV5**: self-extubations		**DV4:** N, %, P, proportional hazard assumption **DV5**: n, p	1.05-3.23; p=0.0316) **DV3: IV2 ↓ DV3** (3.57, 1.52-9.09; p=0.003) **DV4: IV2 ↑ DV4** (n=11, 20% vs n=4, 7%; p=0.0400) **DV5: IV1=IV2** NSD N=7/6, p=0.69	**Conclusions:** Protocol of no SED significantly ↑ free DMV compared to DIS, with ↓ in ICU and HLOS ↑ DEL **Recommendations:** Protocol of lighter or no SED for ↓ DMV
Klompas et al. (2016). Associations between different sedatives & VAE, LOS, & mortality in patients who were MV. Critical Care, 149(6): 1373-1379	Evaluate associations between different sedatives & pt outcomes within a large diverse cohort of unselected pts.	None	Large observational study/Cohort study	**N=9,603 pts** >18 years of age MV for > 3 days over a 7-year periods in a large academic medical center	**IV1**: BENZO **IV2**: PROP **IV3**-DEX **DV1:** DMV **DV2**: HLOS **DV3**: MOR **DV4:** ICU LOS **DV5**: VAE **DV6:** DEL	None provided	None provided	**DV1**: IV2/3 ↓ DV1 **DV2:** NSD **DV3**: NSD **DV4**: IV3 ↓ DV4 **DV5**: IV1/IV2 ↓ DV5 **DV6**: IV3 ↓ DV6	**LOE:** IV **Weaknesses:** • Single center study • Decreased generalizability • Dosage of drugs not assessed, just received dose **Strengths**: • Large sample size **Feasibility:** DEX used in our facility for weaning, promotes awakening **Conclusion:** DEX ↓ DMV, ICU LOS, and DEL= ↓ healthcare costs. **Recommendations:** DEX ↓ SED without respiratory depression **Notes**: DEX is SED of choice due to ↓ respiratory effects
Anifantaki, et al. (2009). *Journal of Advanced*	If nursing-implemented protocol of DIS vs ICU team directed	None	RCT Method: RCT from	**N=97** MV patients Medical Surgical	**IV1: Intervention group**: DIS of sedation	**DV1-3:** # of Days **DV4:** Y/N	**DV1-3**: median, IR, P **DV4:** P	**DV1**: IV1 & IV2 similar 8.7(0.2-50.3) vs 7.7(1.75-82.75); P=0.7	**LOE: II** **Weaknesses:** • Bias due to not blinded study

Nursing, 65(5): 1954-1056	SED effect on VD		Nov 2004 to March 2006 Compared intervention group (DIS) to physician driven SED	Neurosurgical Inclusion: CONT infusion of SED 48 hours after admission **Setting:** ICU medical/ surgical unit 11 bed unit in Greece	according to a nurse-implemented protocol (using PROP and remifentanil) **IV2: Control group**: SED per ICU team **DV1**: DMV **DV2:** ICU LOS **DV3:** HLOS **DV4:** Overall MOR			**DV2, DV3:** NSD 14 (5-86) vs 12 (5-66); P=0.5, 31(5-291) vs 21(5-192); P=0.1 **DV4:** NSD (P=0.2)	• No use of pain assessment tool, analgesic titration was done to achieve desired Ramsay score for sedated patients **Strengths:** • RCT **Feasibility:** Similarity with our facility, 24 hr intensivist, nurse/patient **Conclusion: I**mplementation of DIS with NSD on DMV & ICU LOS, contrary with other studies. **Recommendation:** Titration of SED according to patient needs
Barr et al. (2013). *Critical Care Medicine*, 41(1): 263-306	Revise "clinical practice guidelines for sustained use of SED and analgesics in the critically ill adult "published in *Critical Care Medicine* in 2002	None	**Design:** SR **Method:** Web-based, password-protected database using RefWorks Software. 8 databases: PubMed, MEDLI	**Setting:** 8 clinical search engines **Sample: N=19,000** references extracted from 8 clinical search engines.	**IV1:** pain **IV2**: analgesic **IV3**: SED **DV1**: Treating pain, agitation **DV2:** DEL **DV3**: DMV **DV4:** ICU LOS	No quantitative data		Nonbenzodiazepines use ↑ clinical outcomes Lighter SED ↑ clinical outcomes- ↓ DV3, ↓ DV4	**LOE: I** **Weaknesses:** • none **Strengths:** • Consensus based on expert opinion was not used as a substitute for a lack of evidence. • Consistent method for addressing potential conflict of interest was followed. • The development of this guideline was independent of any industry funding. • Systematic review

			NE, Cochrane of SR, Cochrane Central Register of Controlled Trials, CINAHL, Scopus, ISI Web of Science, International Pharmaceutical Abstracts. **Inclusion:** English only Adult humans> 18 years old From December 1999 through December 2010						• Strength of recommendation was ranked as strong-1, or weak-2, and either in favor of +, or against- an intervention. • unbiased **Feasibility:** Currently used, not consistently, need RN education and active participation in rounds. **Conclusion:** Lighter SED ↑ clinical outcomes including ↓ DMV, ↓ ICU LOS **Recommendation:** **N**onbenzodiazepines (either PROP or DEX) over MID or LOR with analgesia-first strategy with DIS & use of SED assessment tools Early mobility, day/night policy, clustering of activities to protect patients' sleep cycles. Interdisciplinary ICU team approach .
Mehta. S. et al. (2012). Daily sedation interruptio	Compare protocolized sedation with protocolized sedation plus daily sedation	None	**Design: RCT**	**Setting**: 16 tertiary care medical & surgical ICU (Canada &	**IV1:** CONT opioid/benzo infusions **(N=209 control)**	**DV1**: Days **DV2**: Days **DV3**: Doses **DV4**: Y/N **DV5:** Y/N **DV6**: Y/N	**DV1**: HR, median, IR, CI, P **DV2**: median, IR, P	**DV1**: median (IR),7(4-13) vs 7(3-12), HR 1.08, 95% CI, 0.86-1.35, P=.52	**LOE: I** **Weaknesses:** • Non-blinded study • Did not screen for drug withdrawal

n in mechanically ventilated critically ill patients cared for with a sedation protocol: A randomized controlled trial. *JAMA*, 308(19): 1985-1992	interruption in critically ill patient			US) 1/2008-2011 **Sample: N=430 MV pts**	**IV2:** protocolized SED with DIS **(N=214)** **DV1:** DMV **DV2:** ICU LOS **DV3:** SED/opioid doses **DV4:** unintentional device removal **DV5:** DEL **DV6:** nurse/RT clinical workload **DV7:** HLOS	**DV7**: Days	**DV3**: mg/d, P **DV4**: %, RR, CI, P **DV5:** %, RR, CI, P **DV6**: VAS score, MD, CI, P **DV7**: median, IR, P	**DV2**: median (IR), 10(5-17 days) vs 10 (6-20 days), P=.36 **DV3**: MID (102 mg/d vs 82 mg/d; P=.04 Fentanyl (median (IR), 550 (50-1850) vs 260 (0-1400); P<.001 More daily doses of Benzos: mean, 0.253 vs 0.177; P=.007 Opiates: mean, 2.18 vs 1.79; P<.001 **DV4:** 10 of 214 (4.7%) vs 12 of 207 (5.8%), RR 0.82, 95% CI, 0.36-1.84, P=.64 **DV5**: 53.3% vs 54.1%, RR 0.98, 95% CI, 0.82-1.17, P=.83 **DV6:** VAS score, 4.22 vs 3.80, MD 0.41, 95% CI, 0.17-0.66, P=.001	• Results may not be applicable to pts receiving shorter-acting agents-PROP, DEX **Strengths:** • multicenter pragmatic design • broad mix of pts **Risks:** Pt discomfort, respiratory distress, pt safety, additional workload **Feasibility:** similar setting, consistent with current protocol that includes DIS **Conclusion:** MV pts managed with protocolized SED, addition of DIS did not ↓ DMV or ICU LOS **Recommendations:** DIS & protocolized SED=DMV, ICU LOS Protocolized SED defined: bedside nurses using clinical judgement titrating analgesic & SED infusions according to protocol prioritizing pain, using RASS/SAS

								DV7: median (IR), 20(10-36 days) vs 20 (10-48 days), P= .42	

Table C2: Evaluation tables of keeper studies: Barriers to implementation

Evaluation Tables Barriers to Implementation									
Citation:	**Purpose of Study**	**Concept Framework**	**Design/ Method**	**Sample/Setting**	**Major Variables**	**Measurement of Major Variables**	**Data Analysis**	**Study Findings**	**Appraisal of Worth to Practice Strength of the Evidence RECOMMENDATIONS**
Amaral, A.C, Kure, L., & Jeffs, A. (2012). Effects of increasing compliance with minimal sedation on duration of mechanical ventilation: A quality improvement intervention. *Critical Care*, 16: R78	Compliance to protocol leads to ↓ DMV	None	**Design**: QI **Method:** Data collection on compliance over 12-month period	**Setting:** 6 CC units 3 level 3 units in tertiary teaching hospital-Toronto **Sample: 1556 MV pts** PRE: **N=753** POST: **N=803**	**IV1**: Identify barriers/solutions **IV2**: Protocol design **IV3**: Reminder **IV4**: Education **DV1**: DMV **DV2:** Compliance with minimizing SED	**DV1:** %, days **DV2**: %	**PRE:** **DV1**: regression coefficient, P, mean, SD, IR DV2: **POST:** **DV1**: regression coefficient, P DV2: CI, %	**IV1:** Lack of knowledge of protocol Complexity of protocol Time to start DIS considered unsafe & not realistic Lack of accountability **DV1**: DMV ↓ 14.5% (IR 13.8% to 15.8%) post intervention **DV2: baseline** 80.4% (95% CI: 66.9 to 90.2) **DV2 Post**: 96.2% (95% CI: 95.2 to 97.0)	**LOE: V** **Weaknesses:** • Difference in admit categories • Environment where study took place-Nurse:pt ration 1:1 • Customized strategy to ↑ compliance-limited generalizability **Strengths:** • Components of approach easily transportable to other environments • Interrupted-time series analysis **Feasibility:** Simple & effective tool Small ↑ in compliance= ↑ in efficiency **Conclusion:** Outcomes can be improved even if high levels of compliance exist **Recommendation:** QI intervention ↓ DMV even when baseline compliance is already high Recommend ongoing education and assessment for compliance/barriers

DeGuzman, P.B. & Wayner, C.A. (2014). Nursing and organizational barriers to daily interruption of sedation in U.S. hospitals: A thematic review of the literature. *Clinical Nursing Studies*, 3(1)	Understand how nursing and organizational barriers affect adherence to DIS protocols	Thematic synthesis	**Design**: Literature Review **Method:** Search of CINAHL	**Sample**: N=9 articles-2006-2013 **Setting**: U.S. hospitals	**IV1:** consistency **DV1**: improved outcomes through DIS **DV2**: adherence to protocol	**DV1:** Y/N **DV2**: Y/N	**DV1:** Categorical analysis **DV2**: Thematic	**DV1**: Lack of communication Difference in beliefs Lack of collaboration Differences in practice Multidisciplinary teams Organizational characteristics Organizational structure **DV2:** **Themes:** Collaborative, multidisciplinary culture ↑ adherence Organizational structure NSD to influence DIS practice Gap between EB & practice due to nursing education & experience	**LOE:** V **Weaknesses**: • Only review of CINAHL • Limited research • No distinguishing between nursing & other disciplines in responses **Strengths**: • Multidisciplinary members included physicians & nurses • Multiple geographic locations • Mostly descriptive studies **Feasibility**: Single ICU settings **Conclusion:** Consistency demands collaboration, multidisciplinary teams, organizational support, education Nursing experience with DIS possible predictor of DIS implementation **Recommendation**: Nurse participation in IDR Additional nurse education for all aspects of sedation management Multidisciplinary approach ↑ impact on outcomes
Miller et al., (2012). Organizational characteristics	Specific hospital organizational characteristics are associated	None	**Design**: National mailed survey **Method:** Survey items	**Setting:** US hospitals in 2009 Ranged in size from 25-1359 beds	**IV1**: Leadership focus on safety culture **IV2**: Receptive	**DV1, DV2, DV3:** 5-point Likert scale dichotomized to a positive (1-	**DV1**: Descriptive univariate analysis, % **DV2:** Descriptive	80% regular DIS use 75.4% leadership focus on safety culture (p=0.04)	**LOE: VII** **Weaknesses:** • Survey, not beside audit • No specific unit characteristics • Unit difference in organizational culture

associated with the use of daily interruption of sedation in US hospitals: A national study. *BMJ Qual Saf,* 21: 145-151	with routine use of DIS		enquired about DIS use, institutional structure, & organizational culture	**Sample:** N=386 hospitals	staff to practice change **DV1**: Regular use of DIS **DV2**: Institutional structure **DV3**: Organizational culture	2) or negative (3-5) response	univariate analysis, % **DV3:** Descriptive univariate analysis, %	42.7% receptive staff to practice change (P=0.02)	• Response rate of 70%, some non-response • Cultural perception **Strengths:** • Plausible benefits for other EBP **Feasibility:** useful associations targeting leadership & staff receptivity may benefit other evidence-based interventions **Conclusion:** DIS=proven benefits, erratic implementation Involvement in collaborative effort, leadership-driven safety culture & staff receptivity to change =regular DIS use **Recommendation:** Organizational approach with clear leadership
Sneyers, & Laterre, et al. (2014). What stops us from following sedation recommendations in intensive care units? A multicentric qualitative study. *Journal of*	Explore HCP's perceptions about SED Identify factors influencing adherence of HCPs to SED rec in Belgian ICUs	Interdisciplinary framework	**Design**: Qualitative study **Method:** Face/face semi structured interviews	**Setting:** 4 Belgian hospitals **Sample:** HCP N=21	**IV1:** Perceived barriers **IV2:** Knowledge **IV3**: Expected outcomes **IV4:** Responsibilities **DV1**: HCP characteristics **DV2:** guideline characteristic **DV3**: system	**DV1/DV2/ DV3/DV4:** Open-ended	Descriptive Themes/Definitions Content analysis	**DV1**: dependent on HCP knowledge, conceptual agreement with guidelines, poor outcome expectancy, lack of motivation **DV2:** compatibility, trialability, observability & exception ambiguity **DV3:** tasks, logistics,	**LOE: VII** **Weaknesses:** • Generalization of data out of context • **Limited number of** stakeholders • Only interviews-not triangulating methods • Updated guideline published since study **Strengths:** • Purposive sampling to maximize variability • Researchers with complimentary backgrounds • First European perspective study

Critical Care, 29: 291-297					characteristic **DV4:** adherence			physical environment & organizational constraints **DV4**: Fear of adverse events, pt discomfort, nurses workflow	• Interdisciplinary framework-allowed barrier identification from HCP, guidelines, system perspectives • Source triangulation **Feasibility:** identify organizational & cultural issues, gain insight into social interactions, health care delivery processes, & communication **Conclusion:** Barriers impairing SED implementation varied to type of HCP and choice of strategy **Recommendation:** Key factors influencing adherence • Profession • Level of experience Type of SED recommendation
Rumpke & Zimmerman. (2010). Implementation of a multidisciplinary ventilator-weaning and sedation protocol in a community	Improve pt outcomes by↓ ICU LOS, DMV, healthcare-associated costs with standardized approach to weaning directed by nurses & RTs	None	**Design**: Quality improvement project	**Setting:** 18-bed mixed medical, surgical, community ICU **Sample**: N=27 pts	**IV1**: Standardized approach to weaning directed by nurses and RTs-protocol **IV2:** staff education & acceptance **DV1**: ICU LOS **DV2:** DMV	**DV1**: Days **DV2**: hours	**DV1**: % **DV2**: %	**Time to extubation (hours):** <1: n= 2-7.4% 1.1-2: n=6-22.2% 2.1-3: n=3-11.1% 3.1-4: n=2-7.4% >4: n=2-7.4% Extubation failures: 0 Not extubated/expired/chronic vent: 12-44.4%	**LOE: V** **Weaknesses:** • Small sample size • Lack of random assignment • Employment of short time frame for fact collection, utilization of historical controls **Strengths:** • Protocol safety • Multidisciplinary approach **Feasibility:** Allows for weaning based on clinical autonomy,

intensive care unit. *Dimensions of Critical Care Nursing*, 29(1): 40-49								DMV>96 hours ↓ after protocol implementation No change in LOS	empowered judgement & decision making **Conclusion:** DIS=enhanced patient outcomes Multidisciplinary & multifactorial approach to quality improvement ↓ DMV=reduced healthcare costs **Recommendation:** Multidisciplinary and multifactorial approach to quality improvement regarding MV weaning & SED
Khalil, Mohamed, & Sharkawy. (2018). Patients' weaning from mechanical ventilation: Complete versus incomplete ventilator bundle implementation. *International Journal of Africa Nursing Sciences*, 8: 28-32	To examine effect of complete vs incomplete MV bundle implementation on weaning scores of MV pts	None	**Design:** Quasi-experimental	**Setting:** Critical care unit in Maadi District private hospital **Sample:** N=60 MV pts, all modes of ventilation Control N=30 Study N=30	**IV1:** Complete implementation of MV bundle **DV1:** weaning scores **DV2:** DMV	**DV1:** BWAP Weaning Score **DV2:** Days	**DV1:** BWAP score **DV2:** SD T test P value	**Study group**: **DV1**:19.5 **DV2:** 18(3-6 days) 9(7-10 days) 3(>10 days) T test 4.2 P=0.0001 **Control group** **DV1**: 14.94 **DV2:** 8 (3-6 days) 11(7-10 days) 11(>10 days)	**LOE: II** **Weaknesses:** • Limited national & international studies with correlation between MV weaning and bundle implementation, limited comparison discussion **Strengths:** • Quasi 2-group design **Feasibility:** description of setting in ICU with nurse: patient ration of 1:2 with various pt. diagnosis like our facility **Conclusion:** Pts receive complete ventilator bundle ↑ weaning scores & Implementation of complete ventilator bundle elements by trained nurses =effective acceleration of safe weaning of pts and ↓ DMV **Recommendation:** Implementation of complete ventilator bundle elements by trained nurses =effective

									acceleration of safe weaning of pts and ↓ DMV
Truman et al. (2005). Large-scale implementation of sedation and delirium monitoring in the intensive care unit: a report from two medical centers. *Critical Care Medicine*, 33(6): 1199-1205	Implement SED & DEL monitoring via process improvement project		**Design:** **P**rospective observational cohort study	**Setting:** 2 medical ICUs-Vanderbilt \, community Veterans Affairs hospital **Sample:** N=711 admitted to MICU for >24 hrs & followed over 4,163 days during 21-month study period N=64 nurses for compliance with RASS & CAM-ICU	**IV1:** Unit-wide nursing documentation changed to accommodate sedation scale (RASS) **IV2:** delirium instrument (CAM-ICU) **DV1:** Compliance with RASS **DV2:** Compliance with CAM-ICU **DV3:** Implementation	**DV1:** **DV2:** **DV3:** Years	**DV1**: CI Mean SD IR **DV2**: Mean, CI **DV3**: Mean, SD	**Vanderbilt-baseline data** **DV1:** 0.69(95% CI, 0.63 to 0.75) **DV2**: 0.20(95% CI, 0.13 to 0.2) **DV3**: mean ±SD 13.9±8.7 years' experience **Veteran's Hospital** **DV1:** 0.71(95% CI, -0.61 to 0.82) **DV2:** 0.03(05% CI, -0.08 to 0.15) **DV3**: mean ±SD of 7.4 ±9.1 years of nursing experience **Vanderbilt-implementation** **DV1:** 94.4% (21,931 of 23,220) **DV2:** (7,323 of 8,166) **Veteran's Hospital**	**LOE: IV** **Weaknesses:** • Study did not exclude pts with dementia, primary neuro disease, or baseline psychiatric illness-decreases generalizability • Physicians were not trained & monitored during this process **Strengths:** • Process-improvement framework-simple & flexible • Incorporation of feedback at individual & unit level • Overall high compliance at both institutions • Varied hospital settings & inclusion of all nurses in both ICUs **Feasibility:** Study demonstrates feasibility of large-scale implementation of validated tools to monitor SED & DEL level in ICU **Conclusion:** compliance of bedside nurses using SED & DEL tools ↑ outcomes **Recommendation:** Nursing evaluation to determine key features that support &

								DV1: 99.7% (5,385 of 5,403) **DV2:** 84% (1,571 of 1,871)	detract from successful & sustained implementation
Mclean et al. (2006). Improving adherence to a mechanical ventilation weaning protocol for critically ill adults: Outcomes after an implementation program. *American Journal of Critical Care*, 15(3): 299-309	Assess effectiveness of using an implementation program, the Model for Accelerating Improvement, to improve adherence & clinical outcomes after restarting a MV weaning protocol	none	**Design:** Prospective comparative design	**Setting:** 29-bed closed ICU unit in university teaching hospital **Sample:** **N=**129 pts & 112 multidisciplinary team members >18 yrs old On MV Eligible to be on ICU MV weaning protocol	**IV1:** implementation of Model for Accelerating Improvement **DV1:** unsuccessful extubations **DV2**: VAP **DV3:** DMV **DV4**: staff's perceptions of practice safety climate **DV5:** adherence to protocol	**DV1:** Y/N, incidence **DV2:** Y/N, incidence **DV3:** hours **DV4:** Y/N **DV5:** Y/N	**DV1**: %, p **DV2**: %, p **DV3**: mean, SD, p **DV4**: mean, SD, p **DV5**: %, p	**DV1**: 12.7% (n=8) pre↓ 3.0% (n=2) post, p=.05 **DV2**: 107.8 per 1,000 MV days (52.4%) ↓ 78.3 per 1,000 (35.1%) post, p=.14 **DV3**: 86.0(68) pre↓70.8(67.5) Post, p=.20 **DV4:** 112:31, Mean 9.8:12.8, SD 2.12:2.17, p=<.001 **DV5:** 1.6% pre, 21.2% post P<0.001	**LOE: III** **Weaknesses:** • Limited sample size • Length of follow-up • ? clinician bias • Definition of study outcomes • Adherence documentation may not be consistent **Strengths:** • Study design **Feasibility:** **Conclusion:** Implementation of Model for Accelerating Improvement improved understanding of & adherence to protocol-directed weaning & reduced rate of unsuccessful extubations **Recommendation:** understanding of protocol-directed weaning ↑ significantly after intervention Model for Accelerating Improvement was recommended as model for activating change-using an improvement process

									improves staff's understanding of & adherence to weaning protocol
Plost, G. & Nelson, D.P. (2007). Empowering critical care nurses to improve compliance with protocols in the intensive care unit. *American Journal of Critical Care*, 16 (2): 153-156	Improve compliance with EBP protocol in ICU		**Design:** audit	**Setting:** 35-bed adult ICU **Sample:** 9 protocols for 100% audit	**IV1:** extrinsic rewards (catered dinner party for entire ICU staff, drawings at party for individual rewards, educational trip) **DV1:** Compliance-1-month post **DV2:** compliance -4 months post **DV3:** compliance -3 years post	**DV1:** Y/N **DV2**: Y/N **DV3:** Y/N	DV1: DV2: DV3:	**Baseline** compliance-pre-62% to 77%-post **DV1:** 90% **DV2**: 95% **DV3**: >90% 97.5% clinicians require some type of behavior-oriented change strategy in addition to knowledge-oriented change strategies for meaningful change to occur	**LOE: IV** **Weaknesses:** • Small sample • Small setting **Strengths:** • Use of Project IMPACT database **Feasibility:** 2 methods motivate behavior change: 1. Knowledge & behavior-oriented strategies 2. directive strategies **Conclusion:** Extrinsic rewards improved compliance with protocols=change in ICU culture=cumulative outcome **Recommendation:** Education, removing barriers, directive strategies to ↑ compliance /sustainability
Sneyers et al. (2014). Current practices and barriers impairing physicians' and nurses'	Describe utilization of analog-SED regimens & strategies To describe & compare perceptions challenging utilization of strategies	none	**Design:** Survey-nationwide	**Setting:** 101 adult ICUs in Belgium **Sample:** 7 nurses per ICU N=1,491 participants	**IV1:** analog-SED regimen **IV2:** DIS **DV1:** Validated scale use **DV2**: Frequency	**DV1**: Y/N **DV2:** Y/N **DV3:** Y/N **DV4:** Y/N **DV5:** Y/N **DV6**: Y/N **DV7:** Y/N	**DV1**: frequency, % **DV2**: Never-hourly **DV3**: frequency, %, p	**IV1 availability** **DV1:** 11-75% of respondents **IV1:**31% never used **DV2:** 17% used< TID; 53% used < 6xper day	**LOE: V** **Weaknesses:** • Responder bias • Nonresponder bias • Limited to Belgium-may not be fully applicable to other countries **Strengths:**

adherence to analog-sedation recommendations in the intensive care unit-a national survey. BioMed Central, 18(6): 655	amongst physicians & nurses			**Analog-SED:** strategy that manages patient pain & discomfort first before providing SED therapy	of validated scale use **DV3**: Nurse autonomy **DV4**: Cost control **DV5:** use of DIS **DV6**: patient comfort **DV7**: complications		**DV4**: frequency,%, p **DV5:** frequency,% p **DV6:** frequency,% p **DV7**: frequency, %, p DV1-DV7: descriptive analysis	**DV3:** 82%:68%, p<0.001 **DV4:** 54%:29%, p<0.001 **DV5:** 75% of respondents used <25% **IV2↑DV6:** 60%:37%, p<0.001 **IV2↑DV7:** 82%:69%, p<0.001	• Participant diversity=generalizability • >50% response rate • Did not rely on convenience sampling • Survey instrument created by multidisciplinary team-ensure face & content validity **Feasibility:** Gaps in assessment of SED & pain present in facility Poor compliance need identification of barriers that impair adherence to SED protocol **Conclusion:** Physicians & nurses meet different challenges in using appropriate SED strategies **Recommendation:** Implementation interventions must be tailored according to profession
Ramoo et al. (2015). Sedation scoring and managing abilities of intensive care nurses post educational interventi	Assess nurses' SED scoring & management abilities at 3 & 9 month after educational interventions		**Design:** Post-test only, quasi-experimental design	**Setting:** 14 bed general adult ICU in 920 bed teaching hospital in Kuala Lumpur, Malaysia **Sample:** N=66 ICU nurses	**IV1:** educational interventions **DV1:** nurse's SED scoring 3/9 months **DV2:** nurse SED management abilities 3/9 **DV3:**	**DV1:** Y/N **DV2:** Y/N **DV3:** Y/N **DV4:** Y/N	**DV1**: median, IR, z, p **DV2**: Median, SD, p, t **DV3**: z score, p value **DV4:** Mean score, SD	**DV1:** 3months-2.0 (IR 1.75-3.0) vs 9 month 4.0 (IR=3.0-4.0) z (64) =-6.04, p=0.0001 **DV2**: **3-month** 1.84(.91)-adequacy 2.48 (1.25)-titration **9-month** 3.18(0.71)-adequacy	**LOE: III** **Weaknesses:** • Single ICU • Small sample-reduces generalizability • Same questionnaire used at 2 time points-threatens validity • Data collection using case scenarios not sensitive enough to detect nurse actual abilities

on. British Association of Critical Care Nurses,					Nurses' perceived self-confidence 3/9 **DV4:** barriers to effective SED management 3/9			3.66 (2.14)-titration T=-9.58 P value 0.0001 **DV3**: z=-3.471, p=0.001 **DV4:** 27.78 (SD: 6.26)	• Pt context & culture might influence nurse decision about SED **Strengths:** • Random spot checking of bedside RN abilities about SED scoring **Feasibility:** Majority of staff consists of junior nurses & lack experience, but educational initiatives can successfully improve & develop all nurses' skills regardless of demographics **Conclusion:** Adequate hands-on clinical practice following educational interventions ↑ nurses' knowledge & abilities **Recommendation:** Educational initiatives are necessary to ↑ ICU practice

Appendix D: Synthesis Tables

Table D1: Levels of evidence for sedation

Level of Evidence	1	2	3	4	5	6	7	8	9	10	Total
Level I: Systematic Review/Meta-Analysis		X	X	X					X	X	5
Level II: RCTs	X				X	X		X			4
Level III: Controlled Trial without Randomization											
Level IV: Systematic Review of Qualitative/Descriptive Studies											
Level IV: Cohort Studies											
Level VI: Qualitative/Descriptive Studies											
Level VII: Expert Opinion/Consensus							X				1

Table D2: Levels of evidence of barriers to successful implementation of sedation protocols

Barriers	11	12	13	14	15	16	17	18	19	20	21
Lack of nursing knowledge/experience/education	**X**	**X**		**X**						**X**	**X**
Perceived protocol safety/pt discomfort/Nurse workflow	**X**		**X**	**X**				**X**		**X**	
Lack of organizational structure		**X**		**X**						**X**	
Lack of collaboration		**X**									
Receptivity of staff to practice change			**X**	**X**							**X**
Lack of regular use of protocol			**X**					**X**			**X**

Table D3: Continuous sedation with daily sedation interruption

	1	2	3	4	5	6	7	8	9	10
DMV	↓ α	↓ α	↓ α	↓ α	⊘	↑ α	↓ α	↓ α	↓ α	⊘
ICU LOS	⊘	↓ α	↓ α	↓ α	⊘	↑ α	↓ α	↓ α	↓ α	⊘
HLOS	⊘	↓ α	↓ α	↓ α	⊘	↑ α	⊘	↓ α	↓ α	⊘
DEL	NE	NE	↓ α	↓ α	⊘	↓ α	↓ α	NE	↓ α	⊘
ICU/Hospital MOR	⊘	NE	↓ α	⊘	⊘	↑ α	⊘	↓ α	↓ α	⊘
Self-extubation	↓ α	NE	↓ α	**NE**	⊘	⊘	↑ α	NE	NE	⊘

Table D4: Impact of PRN or no sedation on outcomes

	1	2	3	4	5	6	7	8	9	10
DMV	↑ α	↑ α	↑ α	↑ α	⊘	↓ α	↑ α	↑ α	↑ α	NE
ICU LOS	⊘	↑ α	↑ α	↑ α	⊘	↓ α	↑ α	↑ α	↑ α	NE
HLOS	⊘	↑ α	↑ α	↑ α	⊘	↓ α	⊘	↑ α	↑ α	NE
DEL	NE	NE	↑ α	↑ α	⊘	↑ α	↑ α	NE	↑ α	NE
ICU/Hospital MOR	⊘	NE	↑ α	⊘	⊘	↓ α	⊘	↑ α	↑ α	NE
Self-extubation	↑ α	NE	↑ α	NE	⊘	⊘	NE	NE	↑ α	NE

Table D5: Medications used for sedation/analgesics and effect on outcomes

	DEX	PROP	MID	LOR
DMV	↓ α	↓ α	↑ α	↑ α
ICU LOS	↓ α	↓ α	↑ α	↑ α
HLOS	↓ α	NE	NE	NE
DEL	↓ α	⊘	↑ α	↑ α
MOR	⊘	↓ α	↑ α	↑ α
COMP	**NE**	**NE**	↑ α	↑ α

Box D1: Recommendations for EB Sedation Protocol Compliance

- Propofol and dexmedetomidine as first choice medications
- Lighter sedation levels
- DIS medications standard
- Assessment of sedation using
    - Richmond Agitation-Sedation Scale (RASS)
    - Sedation-Agitation Scale (SAS)
- IP rounding team comprised of a nurse, respiratory therapist, pharmacist, dietitian, and physical therapist
- Required ongoing Awakening and Breathing Coordination, Delirium Monitoring and Management, and Early Mobility (ABCDEF) Bundle competency development

Appendix E: Phases of Implementation

Table E1: Phases of implementation

Phase 1: **Identification of Educational Needs**

- Nursing survey
  - Identify current perceptions
  - Educational needs
  - Experience
  - Barriers to compliance
- Prepare education
  - Pocket cards: RASS/CAM-ICU
  - Flyers
  - PPT presentation
  - Other educational needs found through survey
  - Education on *EPIC* update to physicians-Bundling order sets
- Identify key stakeholders
- Secure buy-in

Phase 2: **Education Presentation**

- Inservice: daily huddle meetings/monthly UBC/staff meetings/ICU residency course
  - Why do we do DIS?
  - Why does patient need sedation?
  - Inclusion and exclusion criteria for SAT/SBT?
  - How to titrate sedation appropriately
  - Sedation algorithm
  - SAT/SBT algorithm
  - Ongoing educational needs
- Pharmacist presentation on sedation/analgesic medications
- Physician education on new order set use
- Interdisciplinary Rounds
  - facilitate open communication on DIS/SAT/SBT

- Ensure patient appropriate for SAT/SBT
- IDR rounding tool
- Multidisciplinary team attendance to rounds-daily

➢

Phase 3: Evaluation

- ➢ Nursing follow-up survey
- ➢ EMR data collection
- ➢ PDSA
- ➢ Barriers

Phase 4: **Dissemination**

- ➢ Poster Presentation
- ➢ Written article for publication to appropriate nursing journal-Quality improvement article
- ➢ Power-point presentation to facility of implementation
- ➢ Presentation to Critical Care Collaborative Committee
- ➢ Presentation to nursing staff on improvement and compliance for sustainability

Phase 5: Sustainability

- ➢ Annual competency added to HealthStream
- ➢ Education added to annual Skills Fair: ongoing poster presentations of progress
- ➢ More access for ICU clinical directors to Dashboard for MV/ICU LOS tracking
- ➢ Collaborative effort by all disciplines involved in providing patients' care
- ➢ Staged educational interventions at regular intervals for nursing/RT/physician
- ➢ Weaning assessments done daily
- ➢ Consistency with IDRs: daily IDRs with all multidisciplinary team members in attendance, even on the weekend

Appendix F: Models for Planning and Implementation

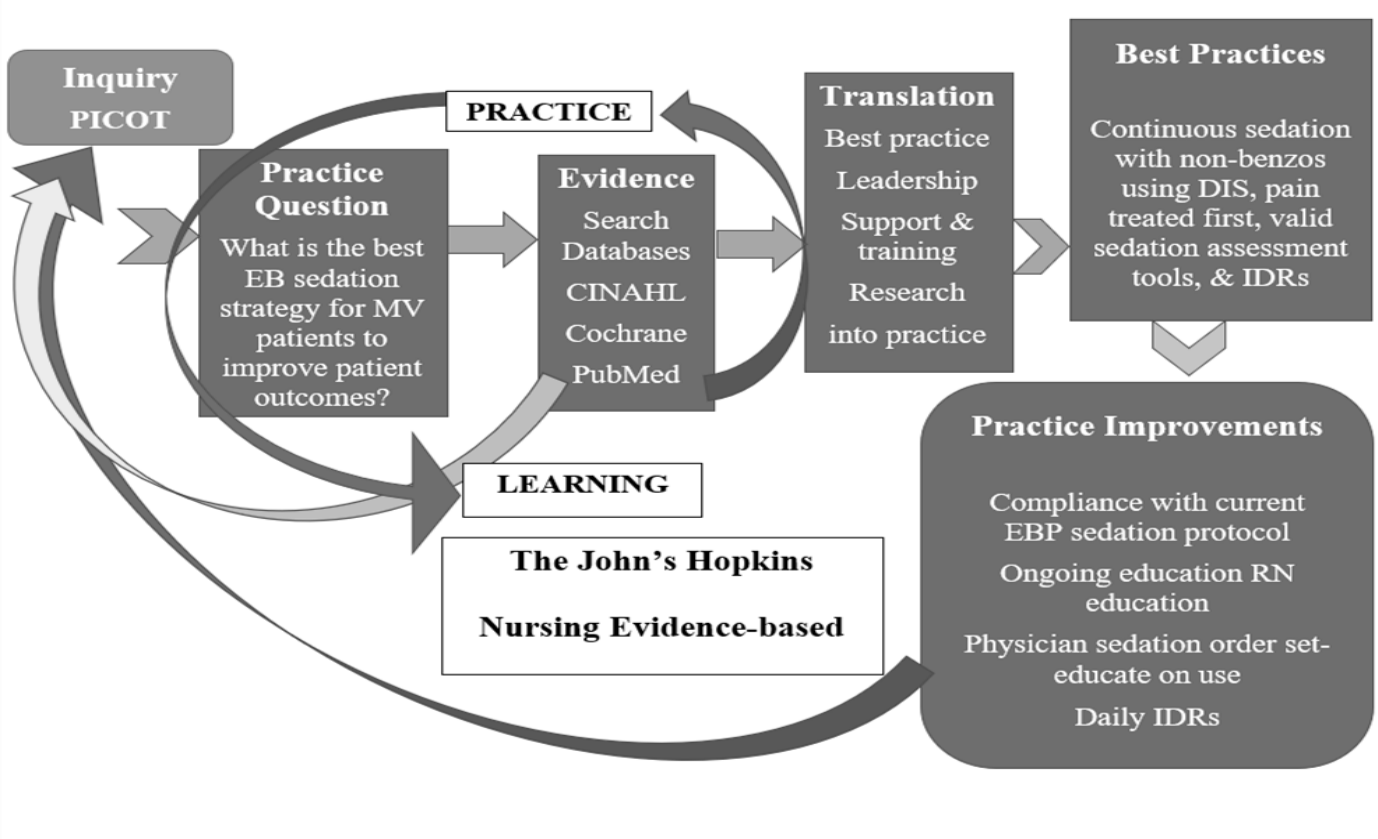


Figure F 1 The Johns Hopkins EBP model

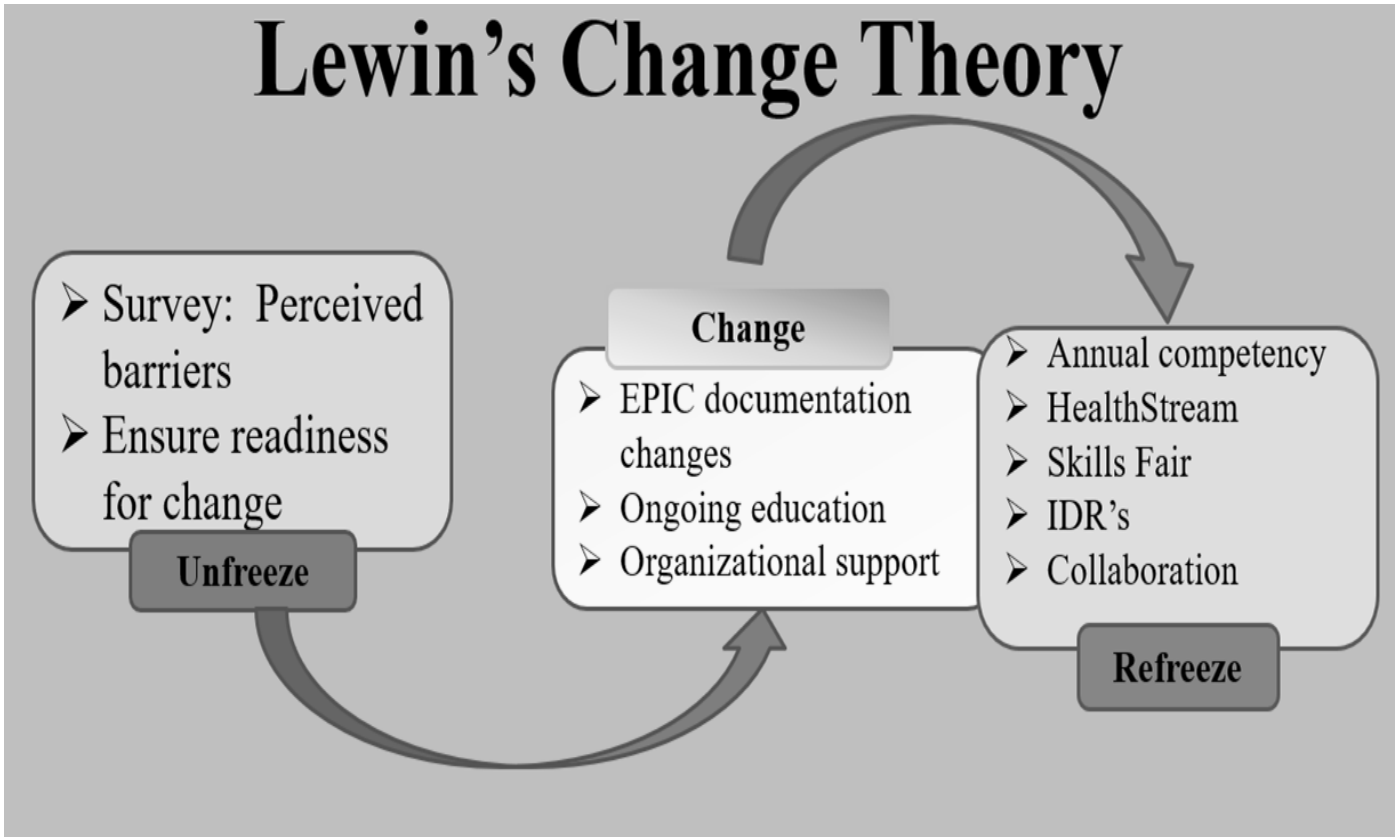


Figure F 2 Lewin's Change Theory

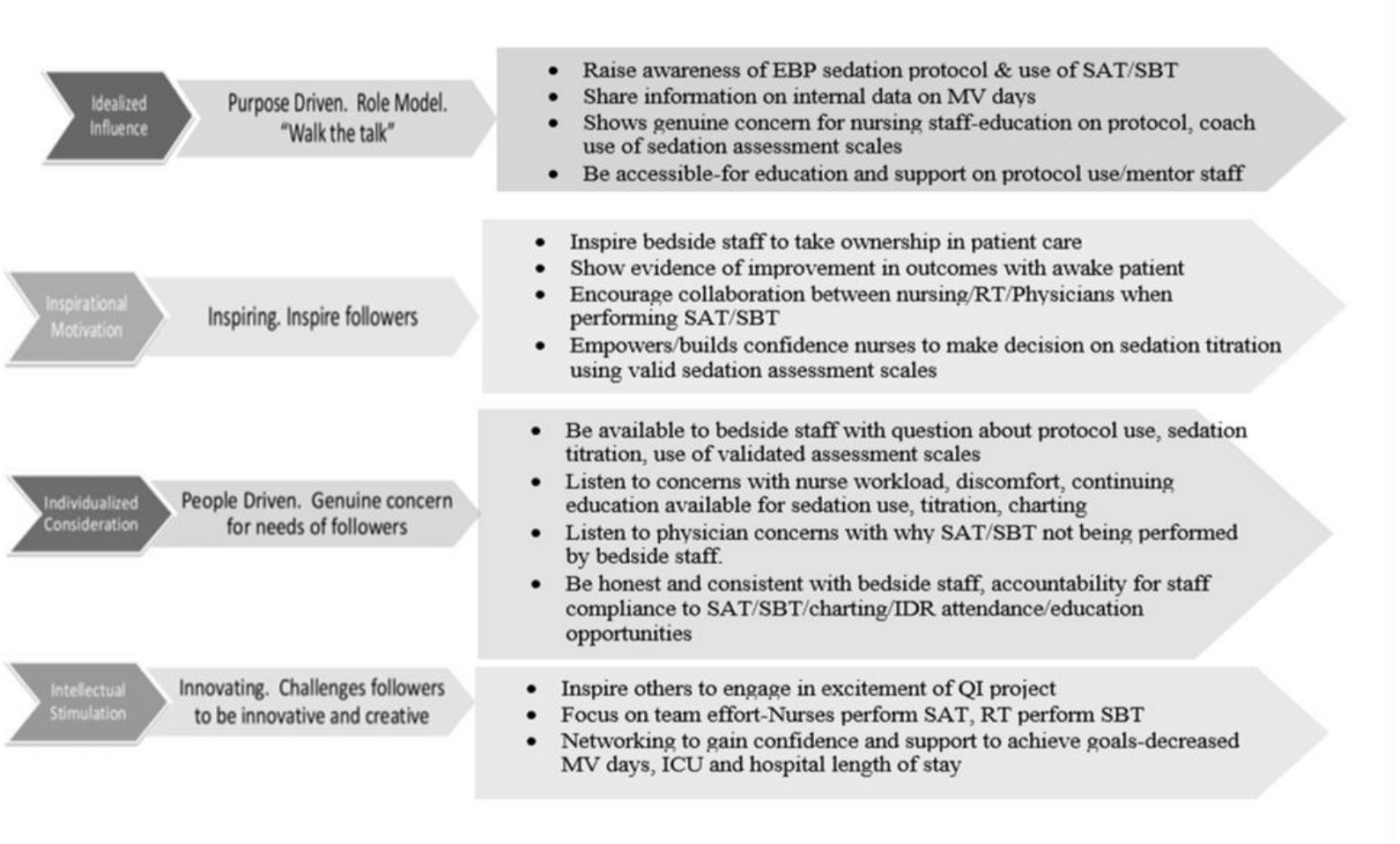


Figure F 3 Transformational Leadership Model

Table F1: Logic Model

Program Name: Logic Model Quality Improvement Project: Sedation Protocol Compliance for Decreased Mechanical Ventilator Days **Program Goal:** To decrease mechanical ventilator days, ICU/hospital length of stay, increase compliance with EBP sedation weaning protocol through a collaborative effort of interprofessional teams and consistent use of evidence-based sedation protocol by bedside staff and physicians
Resource Inputs:
• Trained bedside staff in neuro and MICU/SICU units in evidence-based criteria to identify patients ready to wean and extubate • Charge nurses from all ICUs to ensure follow-up with implementation and manage communication during IDR's • Trained respiratory therapy on SBT's during SAT • Collaborative communication • Consistency with all disciplines represented in IDRs • Pharmacist for sedation medication education to facilitate use of daily sedation breaks with no-benzodiazepine use and analgesic first method • Unit techs to assist with patient assistance while the RN is performing sedation breaks, especially if short-staffed or tripled nursing assignment • ICU directors to help manage the implementation of protocol and the communication during IDRs • Intensivist directors to help manage the implementation of protocol and ensure physician use of order set • Office supplies: paper, printers to place protocol on unit, computers to ensure nurse compliance with charting sedation breaks and policy location on intranet • Involvement of QI Department to ensure outcome metrics are measure in *EPIC* • IT systems, technology, data • ICU educator to ensure education of sedation protocol is incorporated into nurse residency training to ensure knowledge improvement and consistency for sustainability of protocol use • Access to ICU conference room for education during UBC, staff meetings

Constraints:				
• Nurse workload • Lack of knowledge • Nurses understanding and perceptions of evidence-based sedation protocol • Lack of nursing acceptance • Risk of patient assisted device removal • Patient discomfort • Inducement of respiratory compromise • Creation of traumatic memories • Organizational constraints • Clinician's preferences for care				
Outputs		**Outcomes**		
Activities	**Audiences**	**Short-Term**	**Mid-Term**	**Long-Term**
• Identify patients consistent with evidence-based criteria for weaning and extubation • Identify use of sedation order set by physicians • Develop ongoing educational activities and presentations for continued training and new nursing staff • Survey competed by	• Bedside RN's • ICU intensivist group • Respiratory therapy • Unit techs • Patients • Patient's families	• Increased nurse use of daily sedation breaks • Improved stakeholder attitude • Improved understanding of sedation protocol • Improved stakeholder buy-in and participation • Improved understanding of evidence-based criteria for	• Increased compliance with daily sedation breaks • Improved knowledge of sedation protocol • Improved education to patients and families for lighter sedation • Improved nursing perception on use of protocol and workload	• Sustainability of evidence-based sedation protocol • Consistent use of evidence-based sedation protocol • Decreased MV days • Decreased ICU LOS • Increased knowledge of EBP protocol • Decreased healthcare costs

physicians, nurses, and respiratory therapy with sections: use of sedation protocols & scales, reported indications and common perceptions regarding uses and effects, use of daily sedation interruptions, contraindications and common perceptions regarding use of daily sedation interruption, strategies regarding analgesia assessment		weaning and extubation		

Appendix G: Ethics & IRB Forms

Ethics Review Form G 1 UTT DNP EPIP Ethics Form Fall 2018

Validity of EPIP
To what extent does:

	Not much – Major gaps in BOE	Somewhat with some major gaps in BOE	Confidently but minor gaps in BOE	Without Question
1) BOE support intervention?	1	2	3	4
2) BOE validate ethical vetting of intervention?	1	2	3	4
3) BOE support process for intervention delivery?	1	2	3	4
4) BOE support reliable outcomes to expect and evaluate?	1	2	3	4
5) BOE supports measures to use for outcomes?	1	2	3	4
Total				20

Interpretation: <5 NOT SUPPORTED FOR UTT EPIP

6 -10 Student must submit valid rationale for elements of BOE that are reasonable to implement for EPIP 11-20 Valid for UTT EPIP

Ethics Review Form G 2 Ethics for EPIP

To what extent do:

	Identify patient names or ID numbers reported	Reflect individual identifiers that could make discovery of origin possible but no names or ID #	Need HIPAA Protection because data are identified, but reported in aggregate	Need protection as professional respect of organizational data, but all data are aggregate (no identified data)
6) case study or case studies used within EPIP	1	2	**3**	4
7) Baseline Data	1	2	**3**	4
8) Process indicator data	1	2	**3**	4
9) Completion outcome data	1	2	**3**	4
10) Sustainability data	1	2	**3**	4
Total	5			

Interpretation:

<5 -10-NEED DNP Ethics Board Review for HIPAA compliance

11-20 FM review and sign-off sufficient to validate data protection plan is clear about how data are protected

UTTYLER DNP Program IRB Discernment Form

UTTYLER DNP PROGRAM IRB DISCERNMENT FORM

ETHICAL CONSIDERATIONS FOR HUMAN SUBJECT RESEARCH, QUALITY IMPROVEMENT & EBP IMPLEMENTATION, & PROGRAM EVALUATION.

	HUMAN SUBJECT RESEARCH	QUALITY IMPROVEMENT/EBP IMPLEMENTATION	PROGRAM EVALUATION
INTENT	Study is to develop or **contribute to generalizable knowledge** (e.g., testing hypotheses)	Intent of project is to **monitor or improve a practice or process** within a particular institution or ensure it confirms with expected regulations or evidence-based norms	Intent of project is to **improve a specific program**, only to provide information for and about the setting in which it is conducted
MOTIVATION FOR PROJECT	Study occurs in large part as a result of individual professional goals and requirements (e.g., program of research, seeking tenure; obtaining grants; completing a thesis or dissertation)	Project occurs to ensure best practice, regardless of whether individual(s) conducting it may benefit professionally from conducting the project	Project occurs to improve program outcomes, regardless of whether individual(s) conducting it may benefit professionally from conducting the project
DESIGN	Designed to develop or contribute to generalizable knowledge; may involve randomization of individuals to different treatments, regimens, or processes; novel research ideas supported by	Not designed to develop or contribute to generalizable knowledge; does not involve randomization to different practices or processes	Not designed to develop or contribute to generalizable knowledge; does not involve randomization of individuals, but may involve comparison of variations in programs
ACTIVITIES MANDATE	l A it c e t ra ivi t u ie r s e are unique; search not mandated by institution or program; fostered by scientific inquiry	Activities are mandated by the research evidence or internal data, focused on updating operations, not the institution or clinic	Activity is measurement of outcomes and process of the program; not generated by usually its funder.
EFFECT ON PROGRAM OR PRACTICE EVALUATED	Findings of the study are not expected to directly or immediately affect institutional or programmatic practice	Results of the project are expected to directly affect only the institutional practice and identify corrective action(s) needed	Results of the evaluation are expected to directly affect the conduct of the program and guide improvements; evaluation concentrates on program improvements or whether the program should continue
SUBJECT POPULATION	Usually involves a subset of individuals from a population such as an entire clinic, program, or department; generally, statistical justification for sample size is used to ensure endpoints can be met (e.g., power analysis)	All participants who need project activity should be included (no sample or sample size)	All participants in the program are included (no sample or sample size)
BENEFITS	Must benefit more than the participants, who may or may not benefit directly – benefit	Participants are expected to benefit directly from the project activities	Benefit, generally, is to subsequent participants (not current);

DISSEMINATION OF RESULTS	• Intent to publish or present generally presumed at the outset of project as part of professional expectations, • dissemination of information usually occurs in research/scientific publications, grant proposals, or other research/scientific forum • results expected to develop of contribute to generalizable knowledge by filling a gap in scientific knowledge or supporting, refining, or refuting results from other research studies	• Intent to publish or present may or may not be presumed at the outset of the Project (final step in EBP process); • first dissemination of information occurs within organization, but may not be planned beyond the institution evaluated; • dissemination of information in QI/EBP journals • when published or presented to a wider audience, the intent is to suggest potentially effective models, strategies, assessment tools or benchmarks/baseline vs generalizable knowledge	Intent to publish or present may or may not presumed at the outset of the project; dissemination of information to program stakeholders and participants; may be publicly posted (e.g., website) to ensure transparency of results; when published or presented to a wider audience, the intent is to suggest potentially effective models, strategies, assessment tools or provide benchmarks or base rates rather than to develop or contribute to generalizable knowledge
DETERMINATION	IRB for ethical review of human subjects' research. exempt, expedited or full board review.	HIPAA review – complete review form and submit to FM	HIPAA review – complete review form and submit to FM

Ethics Review Form G 4 Faculty attestation of compliance with the UTT DNP EPIP Ethics

I attest that I have reviewed the **UTTYLER DNP EPIP ETHICS FORM** that the DNP student has completed based on justification using the **UTTYLER DNP PROGRAM IRB DISCERNMENT FORM**. I agree that the need for ethics review determination is correct and this DNP EPIP requires:

☐ FM Review Only
X -HIPAA ethics review by DNP Ethics Board
☐ HIPAA review form completed
X Organizational IRB review (based on policies of the organization in which the EPIP will be implemented)

_Ellen Fineout-Overholt __ _11-9-18
Faculty Mentor Signature Date

Ethics Review Form G 5 IRB Approval

CHRISTUS Health

February 26, 2019

Sonya Mae Grigsby, DNP student

2312 Pinnacle Circle

Tyler, TX 75703

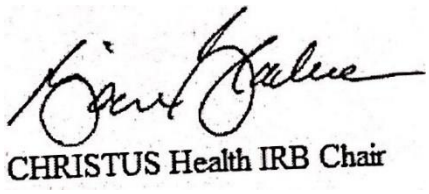
Re: 2019-027 — Quality Improvement Project for Compliance of Evidence-Based Sedation and Mechanical Ventilator Weaning Protocol Compliance

Dear Dr. Grigsby,

Based upon the information provided, the CHRISTUS Health IRB has determined that the above listed program of activity as described does not meet the federal regulatory definition of human subject research in accordance with 45 CFR 46.101 and 45 CFR 46.102. Therefore, this project does not require further review, consideration or approval from the CHRISTUS Health IRB.

However, any substantive change in program or project activity must be re-reviewed by the CHRISTUS IRB to assure that the project still meets the criteria for Not Human Subject Research (NHSR).
If you have any questions, please feel free to contact the CHRISTUS Health IRB office at 469-282-2686 or via email at christus.irb@christushealth.org.

Sincerely,



Signature applied by Brian Gladue on 02/26/2019 PM CST

Appendix H: EPIP Budget

Table H1: Proposed budget for quality improvement project

Sedation Protocol Compliance for Improved Outcomes in Intensive Care

Expenses

Salaries	**Description**	**Quantity**	**Cost**	**Total**
Pharmacist	education during ICU residency course	2	$56.07	$112
IT Personnel		2	$45.54	$91
Informatics Team		6	$20.25	$122
DNP Student		150	$32.35	$4,875
Sub - total Salaries				$5,200
Supplies	**Description**	**Quantity**	**Cost**	**Total**
Computer Paper		2	$58.00	$116
Computer Toner		1	$100.00	$100
RASS/CAM-ICU Pocket Cards		3	$96.90	$291
Survey Monkey		1	$276.00	$276
Sub-total Supplies				$783
Training	**Description**	**Quantity**	**Cost**	**Total**
Nurse Residents	11 nurse residents per quarter x $22.66	4	$249.26	$997.04
Sub-total Training				$997.04
Total Expenses				**$6,980.04**

Appendix I: Results

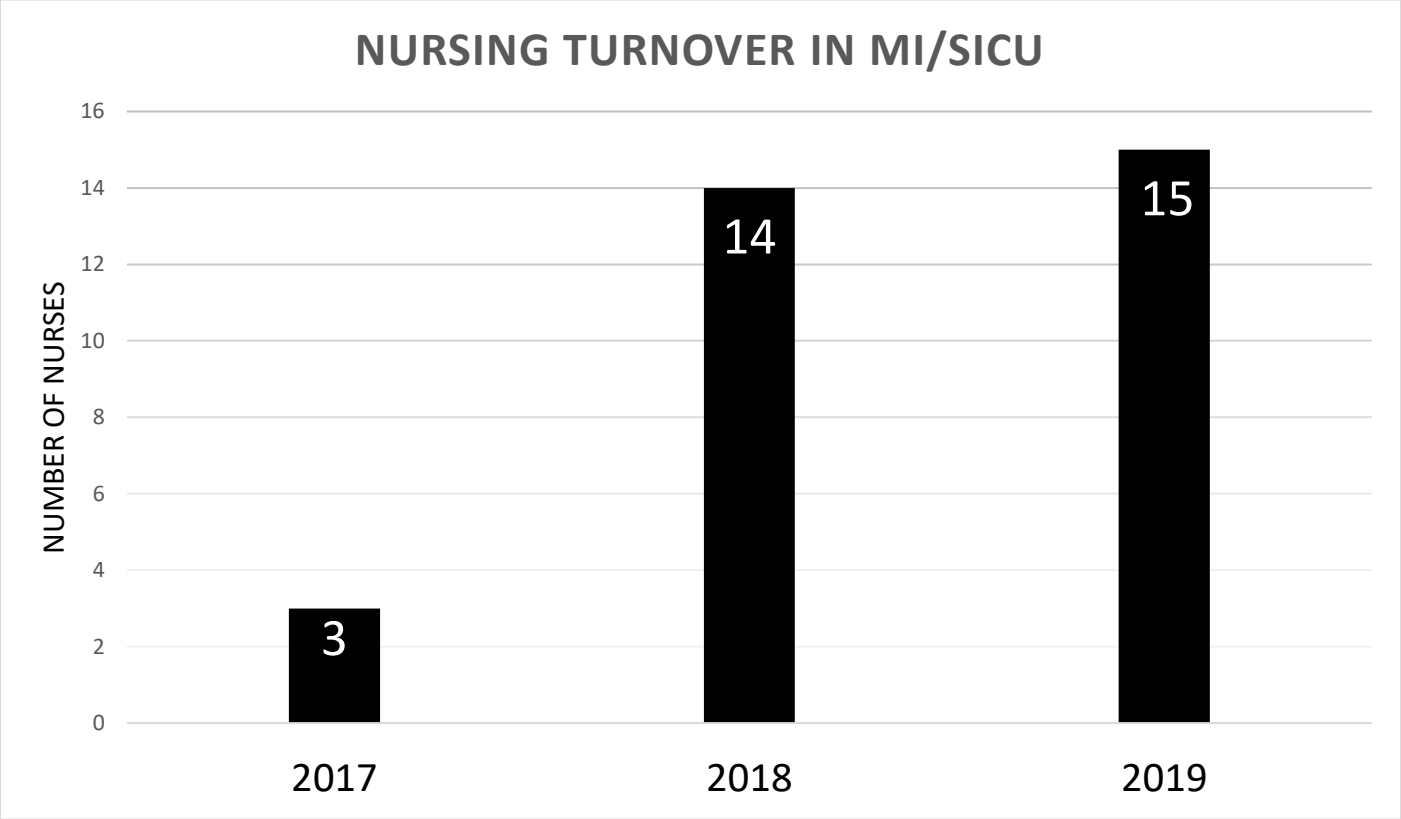
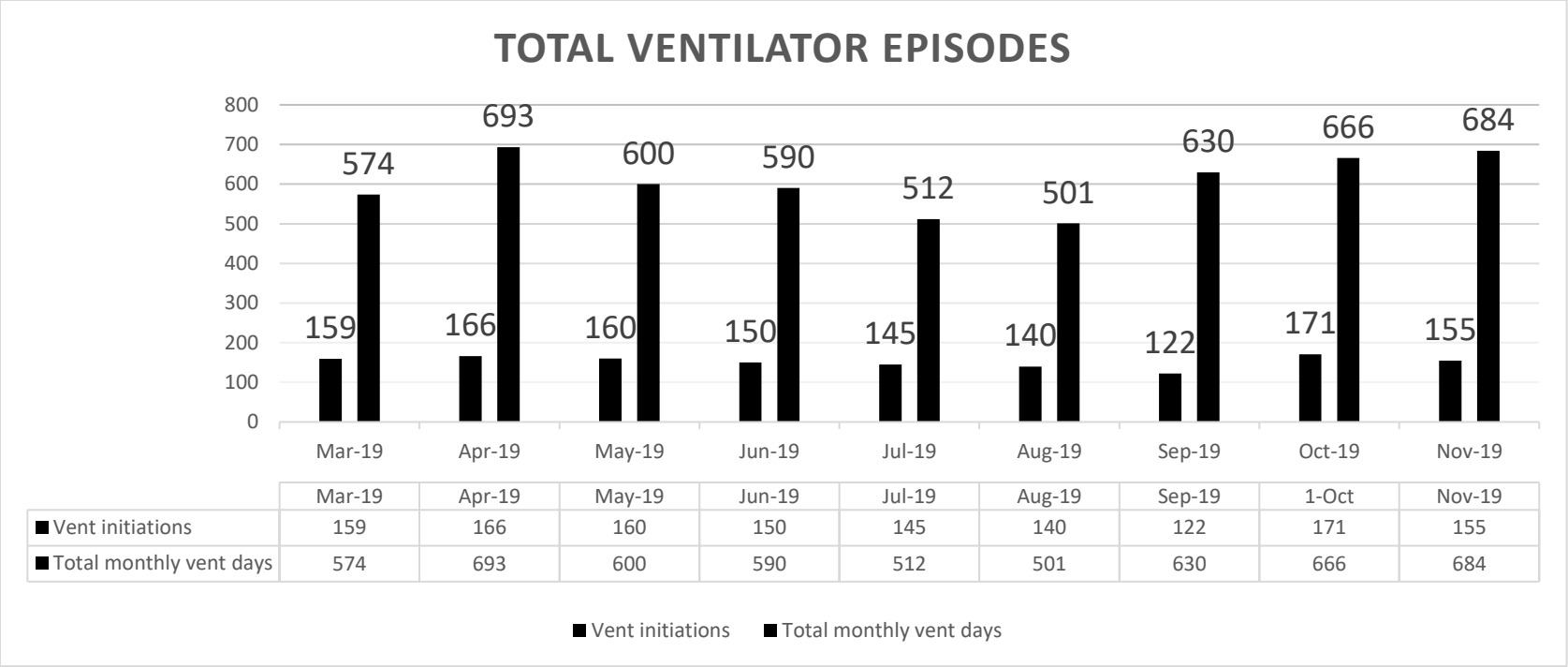


Figure I 1Nursing Turnover in MICU/SICU 2017-2019



	Mar-19	Apr-19	May-19	Jun-19	Jul-19	Aug-19	Sep-19	1-Oct	Nov-19
Vent initiations	159	166	160	150	145	140	122	171	155
Total monthly vent days	574	693	600	590	512	501	630	666	684

Figure I 2 Total number of mechanical ventilator initiations and total ventilator days

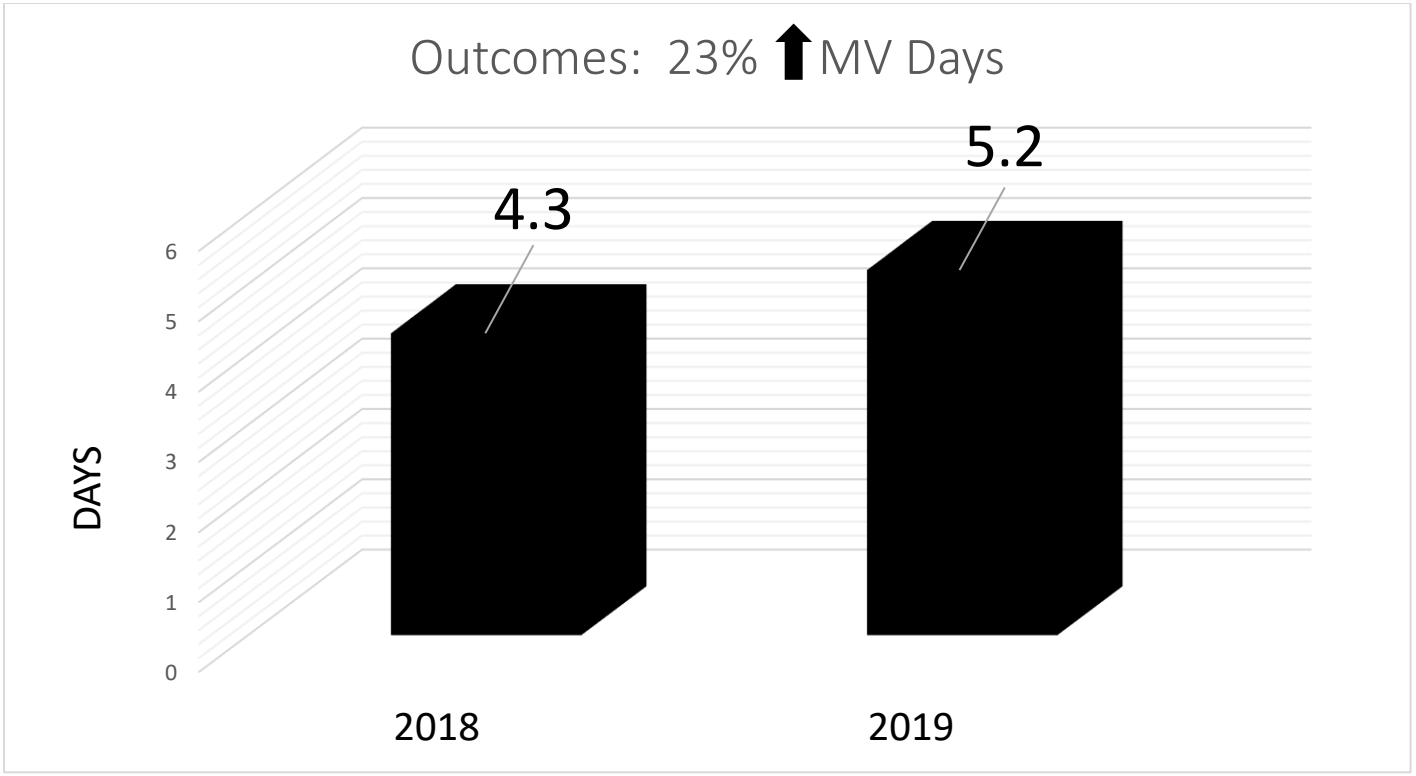


Figure I 3 3-month average ICU LOS (September-November 2018 compared to September-November 2019)

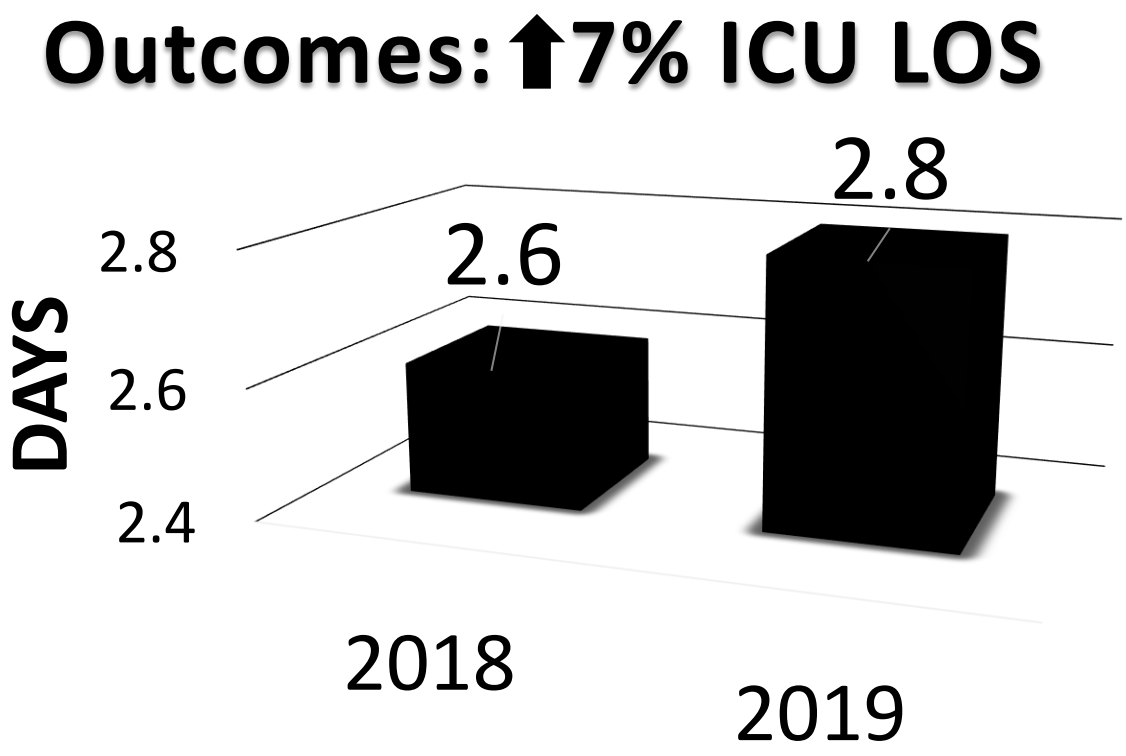


Figure I 4 ICU length of stay, MICU/SICU, 2018 vs 2019

Table I1: Actual barriers to compliance per nursing survey

Barriers to Compliance: Nursing Pre-Survey	% of Nurses
Timing of SAT/SBTs	11%
Lack of collaboration	16%
Lack of education	11%
Lack of communication	5%
Understanding of exclusion criteria	11%
Nursing workload	11%

Table I2: Nursing demographics in MICU/SICU in 2019

Nursing Demographics	**Data**
Total # of RNs in MICU/SICU	73
Mean ages of RNs	31.5 years
Mean years of service in nursing	3.4 years
Total number of new hires over the past 6 months	15

Biosketch

BIOGRAPHICAL SKETCH

Provide the following information for the key personnel and other significant contributors in the order listed on Form Page 2.
Follow this format for each person. **DO NOT EXCEED FOUR PAGES.**

NAME Sonya Mae Grigsby	POSITION TITLE MSN, APRN, AGACNP-BC
eRA COMMONS USER NAME	

EDUCATION/TRAINING *(Begin with baccalaureate or other initial professional education, such as nursing, and include postdoctoral training.)*

INSTITUTION AND LOCATION	DEGREE *(if applicable)*	YEAR(s)	FIELD OF STUDY
University of Texas at Tyler	Bachelor of Science	2011	Nursing
Walden University	Master of Science	2016	Nursing

A. Positions and Honors.

a. Sigma Theta Tau, Iota Nu Chapter
b. TNA DNP Policy Fellowship: 2018-2019 Fellow

B. Selected peer-reviewed publications

- Grigsby, S., Chapman, B., Kelley, C.B., Shipley, R., Garrett, C., & Davis, C. (2018). DNP and PhD: Complementary roles. American Nurse Today, 13(7), 8-13. https://american nursetoday.com/Digital/EducationGuide18-19/#p=10

- Shipley, R., Chapman, B., Davis, C., Garrett, C., Grigsby, S., & Kelley, C.B. (2019). DNPs: Healthcare Change Agents. American Nurse Today-Education Edition 2019-2020, 16-18. https://americannursetoday.com/Digital/EducationGuide19-20/#page=18