LIBERATION BUNDLE USE IN AN INTENSIVE CARE UNIT

by

Marjorie Amity

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As members of the DNP Project Committee, we certify that we have read the DNP project prepared by Marjorie Amity, titled Liberation Bundle Use in an Intensive Care Unit, and recommend that it be accepted as fulfilling the DNP project requirement for the Degree of Doctor of Nursing Practice.

Allen Prettyman
Allen Prettyman (Apr 3, 2024 16:17 PDT)
________________________ Date: Apr 3, 2024
Allen Prettyman, PhD, FNP-BC, FAANP, FNAP

Ambur Lindstrom-Mette
________________________ Date: Apr 3, 2024
Ambur Lindstrom-Mette, DNP, FNP-C, RN

Kealy Ham (Apr 3, 2024 17:34 PDT)
________________________ Date: Apr 3, 2024
Kealy Rae Ham, MD

Final approval and acceptance of this DNP project is contingent upon the candidate's submission of the final copies of the DNP project to the Graduate College.

I hereby certify that I have read this DNP project prepared under my direction and recommend that it be accepted as fulfilling the DNP project requirement.

Allen Prettyman
Allen Prettyman (Apr 3, 2024 16:17 PDT)
________________________ Date: Apr 3, 2024
Allen Prettyman, PhD, FNP-BC, FAANP, FNAP
DNP Project Committee Chair
College of Nursing

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With heartfelt appreciation,

Marjorie Amity

LAND ACKNOWLEDGEMENT

We respectfully acknowledge the University of Arizona is on the land and territories of Indigenous peoples. Today, Arizona is home to 22 federally recognized tribes, with Tucson being home to the O'odham and the Yaqui. Committed to diversity and inclusion, the University strives to build sustainable relationships with sovereign Native Nations and Indigenous communities through education offerings, partnerships, and community service.

DEDICATION

To my past instructors and mentors,

Your guidance and wisdom have been invaluable on my journey to this point. This DNP project reflects the knowledge and inspiration you've imparted. Thank you for shaping my path and helping me reach this milestone.

With gratitude,

Marjorie Amity

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ABSTRACT

Purpose

This quality improvement (QI) project aimed to increase advanced practice providers (APPs) and bedside RNs knowledge and prospects to incorporate the Liberation Bundle into daily practice.

Background

Patients admitted to an intensive care unit were vulnerable to adverse effects from the care rendered during their admission. These effects included an increased chance of developing delirium, in-hospital mortality, prolonged ventilator time, and hospital length of stay. The Liberation Bundle was designed to aid clinicians in assessing aspects of care that reduced rates of delirium, prolonged ventilator time, and hospital length of stay.

Methods

The QI project measured the knowledge and attitude of APPs and RNs toward incorporating the Liberation Bundle into their practice. Pretests and posttests were conducted with the in-person educational sessions. Recruitment was voluntary.

Results

The results were gathered and analyzed using the Qualtrics website and software. Each participant used a QR code for the survey. Of the 25 participants (11 APPs & 14 RNs) who attended educational sessions,74% lacked formal training. Capturing knowledge levels before education supported the hypothesis of the increased likelihood of Liberation Bundle use when the material was better understood. Based on survey results, respondents rated the likelihood of using the Liberation Bundle increased from 62.5% to 84%.

Conclusions

An educational gap was identified among healthcare providers, emphasizing the need for additional educational efforts to ensure broader acceptance and adoption of the Liberation Bundle. Increased participation in other facilities will allow for an increased understanding of the relationship between knowledge and the likelihood of adopting the Liberation Bundle.

INTRODUCTION

Patients admitted to an intensive care unit (ICU) have limited autonomy and independence due to the interventions to manage their acute illness (Ely, 2017). The importance of maintaining patient independence was lost with varied treatments to combat a patient's acute illness. The interventions intended to care for a patient, mechanical ventilation, sedatives, and restraints, increased the chance of delirium and length of stay (LOS) in an ICU (Ely, 2017) and limited their autonomy. Utilizing the Liberation Bundle reduced delirium, coma days, restraint use, and ICU readmissions (Dirkes & Kozlowski, 2019; Pun et al., 2019).

An interprofessional group of critical care clinicians led by the Society of Critical Care Medicine (SCCM) developed the Liberation Bundle as a quality improvement (QI) project (Ely, 2017). The SCCM QI project goal encouraged consistently implementing the Pain Agitation Delirium Immobility Sedation (PADIS) guidelines (Ely, 2017). The Liberation Bundle was a set of guidelines to accompany clinical judgment, including assessing and treating pain, spontaneous and awakening breathing trials to decrease sedation and readiness to wean and extubate from ventilators, choice of sedation agents, monitoring and managing delirium, early exercise and mobility, and family engagement (Pun et al., 2019).

Background Knowledge and Significance

The elements of the Liberation Bundle were addressed daily in the ICUs; however, it was not performed in a streamlined manner, which led to a lack of consistent use (Balas et al., 2019; Barr et al., 2020). Incorporation of the Liberation Bundle into daily practice allowed providers and staff a tool to liberate patients from the ICU in an organized manner. The six elements of the Liberation Bundle refer to the following: A, assessed and managed pain; B, spontaneous awakening and breathing trials for those on mechanical ventilation; C, choice of sedation or analgesia; D, assessed, prevented, and managed delirium; E, early mobility, and exercise; and F, engagement and empowerment of family.

The Liberation Bundle was a tool to guide clinicians to address the needs of patients admitted to an ICU (Balas et al., 2019). It aided in decreasing the inappropriate use of sedation, increased mobility and nutrition, and decreased time on mechanical ventilators, rates of delirium, and morbidity and mortality (Moraes et al., 2022; Sosnowski, 2023; Wyler et al., 2018). These benefits decreased patients' time admitted to an ICU and their hospital LOS (Pun et al., 2019). The proposed quality improvement (QI) project implemented and used the SCCMs ICU Liberation Bundle tool in daily rounds of the Mayo ICU.

The tool enabled the teams caring for the patient to assess the progress of liberation from ICU care and reinstituted patient independence (Ely, 2017; Pun et al., 2019). The use rate was tracked with electronic health record (EHR) tools to allow for easy documentation and reference of the elements. Balas et al. (2022) described a lack of consistency in using the tool for daily ICU practice. Various reasons cited for inconsistent use include the complexity of the Liberation Bundle, missed EHR support, and lack of staff comprehension of Liberation Bundle elements (Brown et al., 2022). This inconsistency increased morbidity, mortality, and healthcare expenditures (Balas et al., 2022). The consistent utilization of the Liberation Bundle has increased patients' ability to be liberated from the ICU and improved patient safety and quality indicators (Balas et al., 2019; Barr et al., 2020; Stollings et al., 2020).

Ely (2017) described the use of the Liberation Bundle with decreased ventilator-associated days and the rate of delirium that increased hospital days and staff ratios. Delirium increased healthcare costs more than those without delirium, and the severity of delirium increased the cumulative cost (Gou et al., 2021). Many of these costs were associated with staffing utilization, increased patient acuity, and daily tasks for staff to care for mechanically ventilated patients (Holle & Rudolph, 2018; Stollings et al., 2021).

The Liberation Bundle aided in decreasing the effects of prolonged sedation, immobility, and ventilator time. Dirkes and Koslowski (2019) described the physiological effects of immobility in patients as a decrease of muscle tissue by one to one and a half percent daily. That causes loss of diaphragmatic muscle strength while a patient is mechanically ventilated (Dirkes & Kozlowski, 2019). The Liberation Bundle helped break the oversedation cycle and prolonged mechanical ventilator times (Shay, 2018). Prolonged stays and complications from extended hospitalization affected the facility's revenue. The Liberation Bundle decreased inpatient days by addressing pain, agitation, delirium, immobility, and sleep disruption (PADIS) guidelines (Dirkes & Kozlowski, 2019; Ely, 2017; Moraes et al., 2022).

Local Problem

The basis for project selection stemmed from the personal and informal observation of a complex multidisciplinary adult ICU in the Phoenix area among advanced practice providers (APPs) and RNs from September 2022 to January 2023. The ICU expansion increased its bed capacity from 30 to 48 beds, required increased nursing and provider staff, and anticipated staff turnover. These factors lead to variations in patient care as staff adapted to the new institutional culture. Variations in practice and knowledge levels lead to decreased Liberation Bundle compliance rates (Barr et al., 2020). ICUs that used the Liberation Bundle consistently employed safety and collaboration characteristics in their institute's culture (Barr et al., 2020). This ICU did not have data on utilizing the Liberation Bundle.

Collaboration with key stakeholders ensured the success of a QI project (Roussel et al., 2020). Stakeholders included CCM leadership, medical and nursing, and those who provided direct care for patients, physicians, APP, and bedside RNs. Selecting appropriate and effective members aided in introducing and sustaining change (Roussel et al., 2020). The stakeholders in leadership positions provided the project's direction, authority, and resources. At the same time, those who participated in direct patient care provided perspective and experience to implement the project.

Batalden and associates described five aspects of a microsystem: purpose, population, process, patterns, and providers (Roussel et al., 2020). Analysis of each aspect provided rationales for improvement projects. The purpose was to provide data on the exact areas requiring improvement. The lack of consistent use of the Liberation Bundle among staff and providers in the ICU caused an increase in LOS and ventilator days (Balas et al., 2019). Population identifies the patient type and which diagnoses were affected by the inconsistent Liberation Bundle use. They performed process reviews of the workflow by visually mapping steps to determine common causes of deviation. Visualization of caring for patients in an ICU setting who require sedation, ventilation, and experience immobility provided insight into the workflow. Provider practice patterns were reviewed and aided the analysis of practice deviation or beliefs. Guidelines and standards of care were present among providers; each had nuances that differed from the other (Barr et al., 2020). The goal was not to remove the individuality or autonomy of practice decisions but to determine if significant variations existed.

Intended Improvement

Project Purpose

This quality improvement (QI) project aimed to determine the usefulness of an educational session about the use of the Liberation Bundle in an ICU among advanced practice providers and RNs.

Project Question

Would an educational session on ICU Liberation Bundle guidelines and recommendations be useful for adult intensive care unit staff?

Project Objectives

1) Educated APP and RNs on the Liberation Bundle about its use and benefits.
2) Assessed advanced practice providers (APPs) and RNs' likelihood of incorporating the Liberation Bundle into daily practice after educational sessions.

Theoretical Framework

Choosing an appropriate theory for change was essential for a successful practice change for a QI project. Lewin's Theory of change is a practical, simple, and user-friendly model to guide a project's momentum for change improvement. However, the simplicity of the theory is considered appropriate for linear rather than complex environments (Shirey, 2013). For the Liberation Bundle, Lewin's Theory of change allowed for ease of use and adaption to the project's focus of the checklist tool.

The theory comprised three stages: unfreeze, change, and refreeze. During the unfreeze stage, the primary investigator (PI) identified what required a change in addition to the rationale and benefits of change. The consistent use of the Liberation Bundle was the focus of the unfreezing stage. Based on previous observations, there was a lack of consistent use of the Liberation Bundle, which increased ICU LOS and time spent on a mechanical ventilator. A clear and concise mission and goal allowed for an easier transition and thorough preparedness. The goal of the project was to increase the consistent use of the Liberation Bundle by staff in the unit. This stage involved developing an implementation plan after determining the need for the change. Utilizing a survey of staff's knowledge of the Liberation Bundle allowed for a needs assessment. The key stakeholders were determined and identified which services to collaborate with, and a metrics review was performed in the unfreezing stage.

After planning and preparing during the unfreeze stage, the change or implementation stage and the transition process began. Once the needs assessment was complete, it was possible to identify areas for improvement. An education and implementation plan was developed using the survey regarding prior knowledge of the Liberation Bundle. The staff was educated on the Liberation Bundle's benefits and elements during the change phase. Before the education sessions, a brief five-question test was administered. The education sessions consisted of thirty minutes in person and another brief test after education.

Monitoring the project's progress involved analyzing the attitude towards Liberation Bundle use after education sessions. The project leader and other key team members guided the staff. The APP was ideal for the project leader due to its role in collaborating, communicating, and managing patients.

The final stage of Lewin's Theory was refreezing or stabilizing the change. After implementing the change, the hope was that the Liberation Bundle would be adopted as the unit's standard Critical Care Medicine (CCM) or working practice. Monitoring quality metrics of ICU

LOS and ventilator days gave staff a measurable marker of Liberation Bundle use. An informal method of assessing sustainability was rounding on the unit and inquiring about the staff's perception of the Liberation Bundle. Once the refreeze stage occurred, the goal was to ensure the longevity of the project change. Sustainability was achieved by reducing the variability of provider practice.

Literature Synthesis

Evidence Search

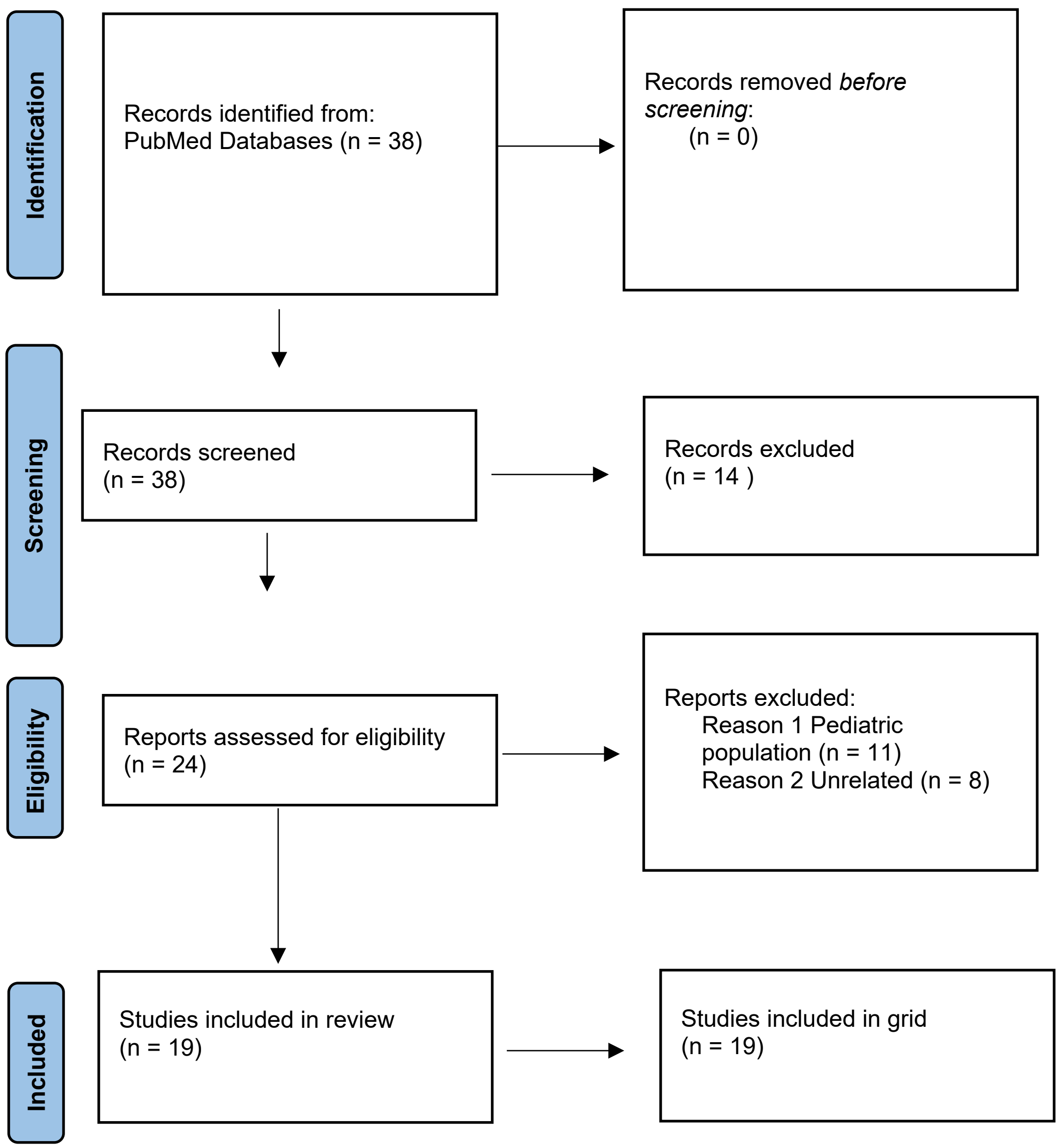
A literature search used PubMed searches for combinations of ICU Liberation Bundle and quality improvement projects. Further selection criteria for inclusion included peer-reviewed articles, a publication date of 2018 or later within an adult population, and written in English. Exclusion criteria included literature published before 2018, academic dissertations, and neonatal or pediatric population. Another challenge was the amount of literature relevant to the intended patient population of adults within a multidisciplinary ICU in the United States (US).

The literature search was conducted utilizing the following search strings: implementing ICU Liberation Bundle, ICU Liberation Bundle, ICU Liberation Care Bundles, and Liberation Bundle quality. The terms liberation and Liberation Bundle described the same phenomenon; therefore, they were included in the search. Many of the same articles were included in similar searches and search strings, thus decreasing the pool of selected articles. Please refer to the attached figure for a flow chart with decision points.

PubMed's Liberation Bundle quality search yielded 38 hits using the above search strings. Fourteen articles were deemed ineligible, including 11 articles that used the pediatric population, and the other eight articles were unrelated to the topic's specifics. Nineteen articles were included for review and included in the literature grid.

Figure 1

Flow Chart Adapted from PRISMA



Comprehensive Appraisal of Evidence

Admission to an ICU was beneficial due to vigilant monitoring, yet it increased the chances of developing delirium, morbidity and mortality, and immobility (Moraes et al., 2022). PADIS guidelines were developed to decrease delirium, morbidity and mortality, and immobility by utilizing the Liberation Bundle (Moraes et al., 2022; Pun et al., 2019; Sosnowski et al., 2023; Wyler et al., 2018). The Liberation Bundle was a tool for implementing PADIS guidelines (Stollings et al., 2019). Moraes et al. (2022) systematic review and Wyler et al. (2018) concluded that using the Liberation Bundle decreased morbidity, mortality, delirium, ICU LOS, and mechanical ventilator times. Sosnowski et al. (2023) compared the Liberation Bundle to the current standard of practice, which decreased delirium rates and improved patients' quality of life and functional ability. Despite evidence demonstrating the benefits of use, the compliance rate was low (Balas et al., 2019; Liu et al., 2021).

Benefits

The article by Balas et al. (2019) outlined other benefits of Liberation Bundle use. Consistent use encouraged practice standardization and decreased provider practice variability (Liu et al., 2021). Further, communication increased among staff and team members to work towards the common goal of adhering to PADIS guidelines (Balas et al., 2019). The Liberation Bundle promotes best practices and benefits institutions and patients' best interests (Balas et al., 2019). Incorporating the Liberation Bundle into daily activities increased interdisciplinary communication among teams (Marcarian et al., 2018; Shay, 2018).

Pun et al. (2019) described consistent Liberation Bundle use as associated with improved patient outcomes. These included lower incidence of coma, delirium, physical restraint use, ICU readmissions, and hospital death rate within seven days of being admitted to the ICU (Pun et al., 2019; Stollings et al., 2021). Liberation Bundle use with increased compliance was noted to decrease ICU costs and decrease admission to nursing homes (Stollings et al., 2021). For each 10% increased use and compliance of the Liberation Bundle, the rate of patient survival increased by 7% (Stollings et al., 2021).

Barriers

The daily use of the Liberation Bundle was cited as a challenge (Balas et al., 2019; Liu et al., 2021). The challenge stemmed from varied ICU practices, different-sized units, organizational characteristics, and practice perception between nurses and providers (Barr et al., 2020). If an organization's culture does not embrace safety and collaboration for patient care, this negates the successful implementation of the Liberation Bundle (Barr et al., 2020). Various reasons cited for inconsistent use include the complexity of the Liberation Bundle, missed EHR support, and lack of staff comprehension of Liberation Bundle elements (Brown et al., 2022). The lack of support for electronic health records (EHRs) regarding performance metrics created another obstacle to bundling use (Brown et al., 2022).

Adopting the Liberation Bundle into daily practice was further affected by the provider and staff's confidence level and knowledge of delirium scales (Moraes et al., 2022). Other challenges included inadequate care coordination, lack of resources, poor leadership, and no identified performance measures (Barr et al., 2020). The Moraes (2022) article cited a lack of communication within the multidisciplinary team, poor planning of Liberation Bundle implementation, concern for patient harm with Liberation Bundle adoption, and resistance to change. The same article mentioned how collaboration between team members was a positive influence (DaSilva Moraes et al., 2022).

Successful Implementation

The Barr et al. (2020) article listed units with high Liberation Bundle use compliance characteristics. These included low nursing-to-patient ratios, collaborative work environments, safety-based culture, daily goals for care included with a checklist, and increased presence of ICU providers on units. One single center participated in a randomized control trial to determine the effect of literacy training and Liberation Bundle performance rates (Brown et al., 2022). Liberation Bundle compliance increased by 7%, and staff literacy increased by 5%. Enhanced knowledge and literacy of Liberation Bundle components increased Liberation Bundle compliance. The Brown et al. (2022) article provided increased compliance, focusing on a single aspect of the Liberation Bundle rather than complex or multiple aspects. DaSilva Moraes et al. (2022) advised distributing educational material on the Liberation Bundle to crucial stakeholders for best results. Mikkelsen and Devlin (2021) discussed the need for a minimum of four of the six elements to be addressed for effective use of the Liberation Bundle.

Strengths of Evidence

Much of the literature concluded that the Liberation Bundle effectively decreased ICU LOS and time on a mechanical ventilator (Wyler et al., 2018). One meta-analysis was performed by Zhang (2021), and the effectiveness of the Liberation Bundle on ICU delirium was reviewed. Three other pieces of literature consisted of systematic reviews, and much of the literature consisted of quality and narrative reviews of Liberation Bundle use. One randomized control trial provided a small sample to compare literacy training and Liberation Bundle performance reports between treatment and control groups (Brown et al., 2022).

Weaknesses, Gaps, and Limitations of Evidence

Much of the literature described the benefits of portions of the Liberation Bundle. The literature lacked documentation of the consistent use of the Liberation Bundle to include all six elements. Though literature supported the positive effect of various Liberation Bundle elements to liberate patients from the ICU setting effectively, examining its six elements has yet to be accomplished (DaSilva Moraes, 2022; Stollings, 2019). There was a lack of extensive clinically significant studies, such as randomized control trials (RCT), regarding the benefit of the Liberation Bundle's safety and effectiveness. Barnes Daly's (2018) article recommended more evidence-based practices to support the Liberation Bundle.

There was a lack of robust clinical trials to assess the Liberation Bundle objectively rather than the subjective accounts given in qualitative and narrative articles. Only one RCT was performed at a single center (Brown, 2022). Other studies lacked randomization among populations; many ICUs were specialty-specific with dedicated staff (Pun, 2019).

METHODS

Project Design

The project leader conducted information sessions with critical care medicine (CCM), nursing leadership, and education staff regarding the purpose and design of the project before performing educational sessions for the two groups of participants. A pretest and posttest design was employed to evaluate and measure the QI project's impact on participants. Participants included CCM APPs and RNs in the ICU who completed their unit education for the quarter.

Each participant was given a letter about the presentation's purpose and testing before commencing the presentation. Those unwilling to take the tests viewed the presentation but did not complete the testing.

The participants took the pretest to capture baseline knowledge and attitudes regarding Liberation Bundle use. After the education session, a posttest was administered to assess the change in attitude and knowledge of Liberation Bundle elements. For this QI project, attitudes toward adopting the Liberation Bundle were primarily measured. Providing quality metrics aided the staff in sustaining the importance of the Liberation Bundles with smaller visible benchmarks and reinforcement.

Model for Implementation

Plan-Do-Study-Act (PDSA) Cycle

The Plan-Do-Study-Act (PDSA) cycle was used to assess and plan the QI project. The tool allowed for planning, performing, reviewing, and adjusting the project. Quality indicators of the change's success included the average length of stay in the ICU and ventilator days; through monitoring and analyzing, data provided a method to observe trends. The Plan-Do-Study-Act (PDSA) cycle tool was appropriate for analyzing and determining if the project required alteration or changes.

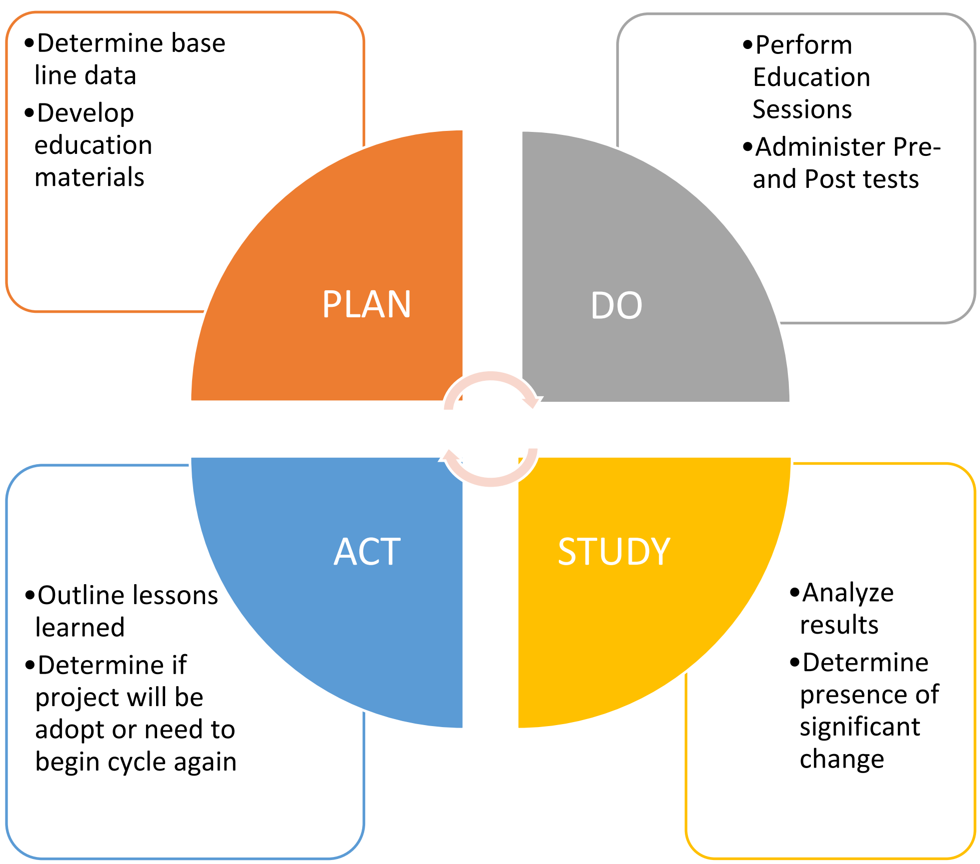
Plan

The Plan Phase developed the foundation to test the question and determine a plan to capture data. By educating participants, APPs, and RNs on the Liberation Bundle, the hypothesis stated that education led to increased use of the Liberation Bundle in daily practice. The prediction was that providing education would increase the likelihood of Liberation Bundle use among participants of the QI project. Based on the literature review, educating and informing staff of the required changes increased the likelihood of adopting the practice. Providing knowledge and importance through educational sessions increased rates of adoption.

The project's lead developed the educational material and the pretest and posttest. The sessions' content included the Liberation Bundle's origin, purpose, elements, and benefits. The education lasted two weeks, which was the duration of the QI project. Once the test results were obtained, the data was analyzed for an additional two weeks.

Figure 2

Model for Improvement, Adapted from the IHI's Plan-Do-Study-Act Model



Do

Educational sessions were conducted in person among each group of participants led by the QI lead. A pretest was administered to the groups at the beginning of the education sessions. The test assessed the attitudes and knowledge of the Liberation Bundle. The test consisted of five brief questions using a Likert Scale (Appendix D). Upon completion of the session, the posttest was administered. The pretests and posttests were administered using Qualtrics software. This software was accessible to participants via personal cell phones or available devices during testing. Qualtrics allowed for the confidentiality and safety of participants' responses.

The two sessions were held within two weeks. The first session participants were the APPs as a pilot to determine if areas require adjustments. Any problems or unexpected observations were documented during this time to aid future projects. The second session participants were the RNs during their monthly unit-based training. Each session was 30 minutes long, and the material was presented in person via a PowerPoint presentation (Appendix E).

Study

Analysis of the pretest and posttest provided insight into participants' willingness to change their practice by incorporating the Liberation Bundle. The data analysis was performed by key stakeholders: the QI lead, the quality physician champion, the medical director of the ICU, the quality analyst, and the ICU nurse manager. The results were analyzed as a team to compare against the prediction that education will increase the use of the Liberation Bundle in daily practice. During this time, summarizing and reflecting on the progress and process of undertaking the projects occurred.

If a change was detected, the degree was further determined. The positive outcome was defined by the increased desire of participants to follow the Liberation Bundle in daily practice. The negative outcome was the participant's lack of desire to use the Liberation Bundle. If the participant results of the survey noted an adverse or unwillingness to support the Liberation Bundle use, an additional survey would be developed to assess attitudes.

Act

Based on the results, the stakeholders determined the next steps for implementing the Liberation Bundle. Rather than abandoning this project, the decision was to adopt education sessions to increase Liberation Bundle use in daily practice. However, if abandonment had been chosen, returning to the first phase of the PDSA cycle would have been required. The group elected to adopt the implementation of the Liberation Bundle and allowed for expanding education.

Setting and Stakeholders

The QI project occurred in the multidisciplinary ICU at Mayo Clinic Arizona, a 318-bed facility located in Phoenix, Arizona. The ICU operated a 48-bed department with one medical and two multidisciplinary units. The patient population was eighteen and older and supported various specialty and surgical services. The services included medical, hematological, solid organ transplants, heart failure, neurosurgical, and cardiothoracic surgery. It was categorized as a level two trauma facility; therefore, trauma patients were transferred to a level one trauma facility within the city.

Identifying key stakeholders was essential for the success of the QI project. Stakeholders were individuals with an interest and role in a QI project (Silver et al., 2016). Stakeholders were interprofessional providers from the same profession, such as nursing and APP, or interprofessional professionals from two separate disciplines collaborating towards a common goal (Roussell et al., 2022). Representation from the bedside staff, particularly the RNs, was vital for the project's success, as well as the APPs who collaborated with other services and helped with direct patient care. No one professional could manage all aspects and needs of a patient. A multidisciplinary team can provide safer and better-quality healthcare (Palanisamy et al., 2021). The knowledge shared and provided within the team was in the patient's best interest. Perception and expectations implied that the common goal was providing quality care. All of these were possible with a knowledge of defined roles within the team and open and effective lines of communication.

Influential leaders demonstrated that collaboration required trust, interdependence, perception, expectations, skill, role definition, and communication (Bollen et al., 2019). These traits were understood and defined to provide adequate care. The support and leadership from the ICU nursing and physician leadership presented a united front and demonstrated to staff and other departments the importance of the project. Key leadership members identified as stakeholders included the supervisor for APPs, the ICU nursing manager, the ICU Medical Director, and the physician champion for ICU quality.

Planning the Intervention

Collaboration with the department quality analyst demonstrated a need for baseline benchmark data for Libration Bundle use. An inquiry into Nursing and APP education further noted the need for formal education on LIbertaion Bundle use. The PI developed educational material as a PowerPoint presentation for education. The educational materials were created based on current recommendations from SCCM Liberation Program materials and a literature search.

The aspects of the educational topics focused on the origin, benefits, and elements of the Liberation Bundle. The educational program presentation was planned with the approval of the APP supervisor, ICU medical director, departmental nursing leadership, and education staff.

Participants and Recruitment

Participants for the project included all the APPs assigned to the Department of Critical Care Medicine and all the bedside RN staff assigned to the ICU. Including all shifts, day and night, varied years of experience, and education levels provided a broader evaluation of the current culture of the unit. Many participants had been employed in other institutions that may or may not have had formal methods of assessing Liberation Bundle elements. Further, those employed at Mayo may or may not have formally been exposed to the Liberation Bundle use. For many staff new to the unit and nursing, exposure or education may have been lacking due to the recent COVID-19 pandemic. Exclusion criteria for RNs were those assigned to float pool, travelers, and no direct patient care duties.

Consent and Ethical Considerations

The nature of the QI project was to measure the attitudes and knowledge of the staff caring for ICU-level patients. Patient information was not required, and the participant's confidentiality was maintained through anonymous surveys. The lead on the QI project reviewed the Qualtrics software survey results. Verbal consent was obtained from participants, and if the participants wished not to participate in the project, they could withdraw from enrollment, which was considered a voluntary enrollment process.

Data Collection

Gathering the data and analyzing its results determined the impact of the Liberation Bundle's use in the ICU. Various levels of data were gathered, including the pretests and posttests of the APPs and RNs. Data variables included the likelihood of adopting the use of Liberation Bundle in daily practice (ordinal), gender (categorical), years of ICU practice (continuous), and age (continuous). Demographic data included gender, age, and years of ICU practice. In contrast, the likelihood of adopting the Liberation Bundle into daily practice answered the aim of the quality improvement (QI) projects question and served as an endpoint. Qualtrics software was used to collect and analyze the responses of the participants.

Data Analysis

The project analysis for pre-post outcome quantified the participant attitude change throughout the project's educational sessions. Testing the null hypothesis of educating staff on the Liberation Bundle would increase the likelihood of adopting it into daily practice. The null hypothesis determined the p-value for the significance level. If the p-value was more significant, the null is rejected; if it was less than the significance value, the null hypothesis was accepted. Paired t-tests provided a basis for calculating the p-value (Vu & Harrington, 2020).

Capturing data before exposure or education allowed the measurement of participants' attitudes towards adopting Liberation Bundle use. The advantages of this design included multiple data points for measuring and the ability to capture changes in skill or attitude towards the intervention. Limitations included time constraints to perform and capture data. The participants who did not participate in both pretest and posttest limited the ability to determine the impact of an intervention due to the lack of data points.

Once the surveys were completed, the data was analyzed through Qualtrics. The Qualtrics software contained embedded formulas and filters enabling the PI to perform analysis. A review of pretest and post-est survey questions was essential to assess respondents' change in knowledge of Liberation Bundle elements. Each of the survey questions underwent analysis Stats iQ and Crosstabs iQ. The pre- and post-survey questions underwent comparison.

The results of knowledge levels of the Liberation Bundle elements were placed into a table to demonstrate a change in knowledge levels after the education was attended. The likelihood of adopting it into daily practice was determined and analyzed by Qualtrics STATS iQ. A comparison was made between the pre- and post-survey data on whether or not the Liberation Bundle use was an ideal match for the unit.

RESULTS

Outcomes

The educational program was presented to 25 individuals with a 100% response rate: 11 APPs and 14 RNs. All the respondents were assigned to the critical care medicine department at Mayo Clinic Arizona. The education was completed in two weeks. The pretest and posttest surveys were collected at the time of the education. A 100% response was achieved, and all results were utilized.

The study's outcome was the likelihood of respondents utilizing the Liberation Bundle in daily practice. The outcome was assessed by pretest and posttest results, which consisted of various data methods. Three Likert-scale questions assessed knowledge of the Liberation Bundle elements, likelihood of use, and familiarity with the bundle use. The Likert-scale questions included four and five-item scales, ranging from '1' to '4' and the other '1' to '5.' The posttest survey was completed upon the conclusion of the education sessions and presented in PowerPoint format. Nominal data was collected for roles in the department, APP, or RN; Ordinal data was collected for participation in formal education on Liberation Bundle.

Results for Objective 1: Educational Program

The first objective was to "provide an education session on the Liberation Bundle for APP and RNs about its use and benefits." The education intervention included a PowerPoint presentation titled "ICU Liberation," which described the origin, importance, and elements of the Liberation Bundle regarding patient care. It also reviewed each of the six elements of the Liberation Bundle, with examples of their use in daily practice.

The pre- and post-survey was distributed via a QR code connected to the Qualtrics program. It consisted of six questions. Question 4 assessed if the respondent received formal training on the Liberation Bundle. Question 6 assessed the preexisting knowledge of the Liberation Bundle and its elements. The frequency table below (Figure 3), included responses for formal training. Table 1 includes the results of individual knowledge of Liberation Bundle elements. Table 1 represents the increased knowledge of participants from pre-education to post-education. Figure 3 demonstrated a need for formal training on the Liberation Bundle's elements; only 24% of participants had formal training.

A one-tailed pair t-test was performed to compare pre- and post-survey results for the likelihood of use in daily practice. The p-value of 0.05, with a confidence interval established at 0.05, indicated the null hypothesis.

Figure 3

Respondents with Formal Training

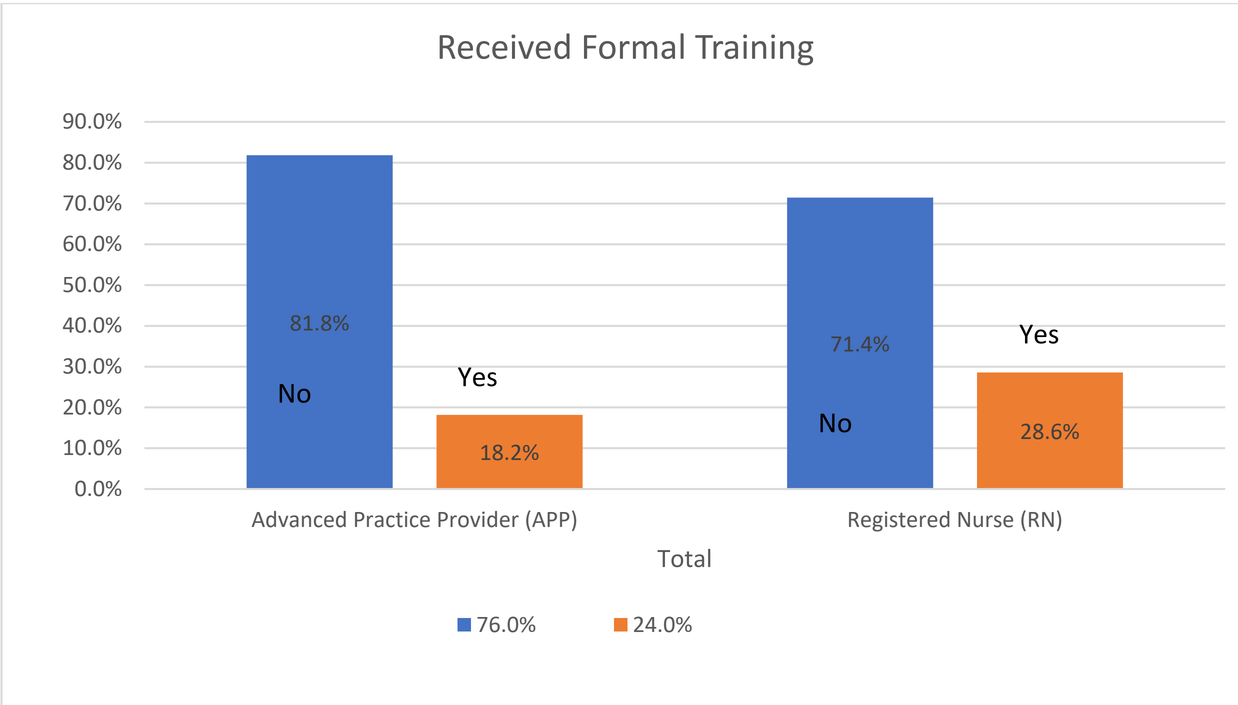


Table 1

Results of Knowledge Level of Bundle's Elements

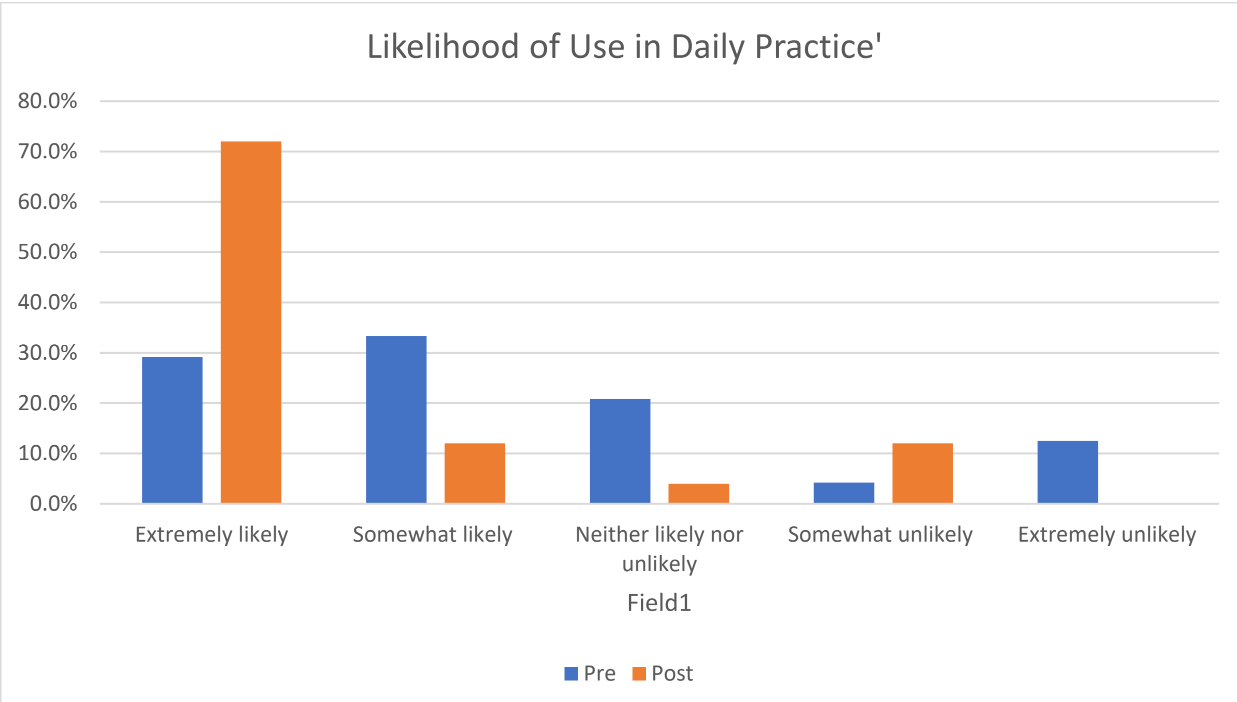
Sedation	**Pre**		**Post**	
Extremely knowledgeable	1	4.2%	9	36.0%
Very knowledgeable	3	8.3%	11	44.0%
Moderate	7	29.2%	0	16.0%
Little knowledge	8	33.3%	4	4.0%
No knowledge	6	25.0%	1	0.0%
Delirium	**Pre**		**Post**	
Extremely knowledgeable	1	4.2%	9	36.0%
Very knowledgeable	1	4.2%	13	52.0%
Moderate	10	37.5%	3	12.0%
Little knowledge	9	37.5%	0	0.0%
No knowledge	4	16.7%	0	0.0%
Mobility	**Pre**		**Post**	
Extremely knowledgeable	1	4.2%	11	44.0%
Very knowledgeable	1	4.2%	11	44.0%
Moderate	8	33.3%	3	12.0%
Little knowledge	9	33.3%	0	0.0%
No knowledge	6	25.0%	0	0.0%
Spontaneous Breathing Trial	**Pre**		**Post**	
Extremely knowledgeable	3	12.5%	11	44.0%
Very knowledgeable	1	4.2%	12	48.0%
Moderately knowledgeable	5	20.8%	2	8.0%
Slightly knowledgeable	9	33.3%	0	0.0%
No Knowledge	7	29.2%	0	0.0%
Family Engagement	**Pre**		**Post**	
Extremely knowledgeable	2	8.3%	10	40.0%
Very knowledgeable	1	4.2%	13	52.0%
Moderate	8	33.3%	2	8.0%
Little knowledge	4	16.7%	0	0.0%
No knowledge	10	37.5%	0	0.0%

Results for Objective 2: Likelihood of Incorporating into Practice

The second objective was to "assess advanced practice providers (APPs) and RNs' likelihood of incorporating the Liberation Bundle into daily practice after educational sessions." Question 5 assessed participants' likelihood to adopt the Liberation Bundle into daily practice using a Likert-type scale. For this question, 62.5% responded favorably, either extremely or somewhat likely to adopt the Liberation Bundle into their daily practice. The remaining 37.5% of participants were neutral, somewhat, or extremely unlikely to adopt the Liberation Bundle into daily practice. Figure 4 represents a graphical depiction of the survey questions results.

Figure 4

Likelihood of Use in Daily Practice



DISCUSSION

Summary

The elements of the Liberation Bundle were addressed daily in the ICUs; however, they were not performed in a streamlined manner, which led to a lack of consistent use (Balas et al., 2019; Barr et al., 2020). Incorporating the Liberation Bundle into daily practice allowed providers and staff a tool to liberate patients from the ICU in an organized manner. Utilizing the Liberation Bundle reduced delirium, coma days, restraint use, and ICU readmissions (Dirkes & Kozlowski, 2019; Pun et al., 2019). However, many in the critical care setting lacked formal education on the Liberation Bundle elements and benefits. This caused the potential for increased rates of delirium, coma days, restraint use, and readmissions.

Interpretation

There was a notable trend regarding the staff's increased knowledge and readiness to adopt practices following the intervention. A rate of 74% of staff lacked formal education on the Liberation Bundle use and elements as assessed in the pre-survey. The pre- and post-survey questions inquired about the likelihood of respondents using the Liberation Bundle in daily practice. The rate of those likely (extremely and somewhat likely) to use the Liberation Bundle in daily practice was 62.5 % in the pre-survey and increased to 84% in the post-survey. An encouraging finding suggests that the intervention effectively bridged knowledge gaps among staff members and influenced attitudes toward adopting the Liberation Bundle elements into daily practice.

Implications

Practice

At the time of the project, consistent use and knowledge of the Liberation Bundle in the critical care medicine department was extremely low or absent, as demonstrated in Figures 3, 4, and Table 1. The Liberation Bundle had significant implications for patient outcomes and healthcare delivery. The knowledge gap of knowledge and use of the Liberation Bundle posed an obstacle to its widespread adoption and hindered its integration into daily practice routines.

Efforts were required to integrate the Liberation Bundle seamlessly into clinical practice workflows. Clear protocols, checklists, and decision-support tools aided healthcare providers in adhering to bundle recommendations and overcoming barriers to implementation.

Education

Addressing the knowledge deficit concerning the Liberation Bundle was a crucial step. Healthcare providers required formal and further education about the rationale behind the Liberation Bundle and the evidence supporting its efficacy for improving patient outcomes, such as reducing the duration of mechanical ventilation, preventing delirium, and minimizing sedation-related complications. Healthcare professionals can be empowered to prioritize its implementation into their daily practice by increasing awareness of the benefits of the Liberation Bundle. A formal departmental education program will be held for all current staff to discuss the various benefits and elements of the Liberation Bundle. Education and training sessions must be developed and integrated into onboarding new staff.

Research

Future research opportunities can be developed by acknowledging any limitations or gaps in the existing research literature. Conducting research demonstrated a critical appraisal of evidence and identified areas where further research is needed to strengthen the evidence base. Based on the gaps identified within the literature, proposed future research directions that can contribute to advancing knowledge of Liberation Bundle implementation may include studies examining the effectiveness of specific Liberation Bundle components, evaluating implementation strategies and diverse healthcare settings, or exploring patient-centered outcomes.

Policy

Critical Care Medicine implemented a new policy requiring all new staff in the critical care department to receive education on the Liberation Bundle as part of their orientation and onboarding process. The creation of the education policy ensured that new staff were introduced to the principles and components of the Liberation Bundle from the onset of their time in the department and enabled them to integrate these practices seamlessly into their daily routines.

Another policy directive mandated continuing education opportunities tailored for APPs and RNs regarding the Liberation Bundle. This initiative ensured that healthcare professionals remain updated on the latest evidence-based practices and guidelines for implementing the Liberation Bundle, fostering continuous learning and professional development in critical care medicine.

Limitations

There were several limitations to the project. The first was limited participation due to a need for more participants, with only 25 individuals involved, comprising 11 APPs and 14 RNs. The sample size needed to adequately represent the department, potentially impacting the general generalization of the findings. A further limitation stemmed from the inability to attend the RN professional practice days during which staff received new training and education on essential aspects of their critical care department. This absence may have resulted in a lack of insight into the specific practices and protocols relevant to the project.

Furthermore, this could have yielded more extensive staff input and limited attendance at APP meetings. There was a lack of attendance for the APP meetings, resulting in only 50% of APP staff participating in the project. This limited participation may have affected the comprehensiveness of the data collected and the representation of APP perspectives. This QI project aimed to increase the likelihood of adopting the Liberation Bundle into daily practice. The surveys and educational sessions were administered to APPs and RNs, not to the CCM attending physicians. The exclusion of the physician group led to a lack of insight into the physician's knowledge and attitudes toward using the Liberation Bundle in their daily practices. Often, the attending physician sets the tone and attitude of the multidisciplinary rounds.

DNP Essentials Addressed

The American Association of Colleges of Nursing (AACN) outlined a set of DNP essentials to guide Doctor of Nursing Practice programs. The essentials delineated the competencies and core areas of knowledge that a DNP graduate should possess before entering practice. There were eight essentials; this project addressed five of the essentials.

The first essential addressed was the “organizational and systems leadership for quality improvement (QI) and systems thinking.” This QI project focused on staff knowledge of the SCCMs Liberation Bundle and developed and sustained change at a departmental level. The principal investigator utilized skills and analytical methods to evaluate current literature and survey data to develop the QI project. Conducting the literature review and analysis of surgery data exhibited the use of “clinical scholarship and analytical methods for evidence-based practice” essential.

Two other essentials addressed included “information systems/technology and patient care technology for the improvement and transformation of healthcare” and “healthcare policy for advocacy in healthcare.” The project’s educational materials introduced the staff to two methods of documenting the Liberation Bundle use within an EHR. The project aimed to increase advocacy for patients in a critical care unit to gain independence from their treatments and improve their health. Lastly, essential VIII, “advanced nursing practice,” was addressed in this project by the principal investigator (PI), an advanced practice provider who evaluated the knowledge level of fellow APPs and RNs.

Conclusions

Plan for Sustainability

The project's sustainability was dependent on the commitment of the critical care leadership to fostering the Liberation Bundle elements into the department's culture. An investment of resources was necessary to sustain further collaboration amongst the multidisciplinary teams for consistent implementation within the CCM department. The Liberation Bundle implementation ensured consistency and reduced variation in practice. At the time of the project, a Liberation Bundle workgroup was formed with multidisciplinary team members who incorporated the Liberation Bundle into daily clinical practice. The workgroup met every two weeks to plan the implementation of the Liberation Bundle and capture documentation of its use.

Plan for Dissemination

The Liberation Bundle's dissemination plan involved targeted communication to inform stakeholders about its benefits, followed by tailored training sessions for healthcare teams. Collaboration with professional associations and using technology-enabled platforms helped reach a wider audience. Ongoing monitoring and evaluation ensured the effectiveness of dissemination efforts, fostering sustained bundle implementation across critical care settings.

APPENDIX A

SITE APPROVAL/AUTHORIZATION LETTER

MAYO
CLINIC

5777 East Mayo Boulevard
Phoenix, Arizona 85054
480-515-6296
mayoclinic.org

November 3, 2023

Human Subjects Protection Program
The University of Arizona
845 N Park Ave., Suite 537A
Tucson, AZ 85719

To Whom It May Concern:

Please note that Ms. Marjorie Amity, a University of Arizona Doctor of Nursing Practice student, has permission from the Mayo Clinic to conduct a quality improvement project at our facility for her project, "Liberation Bundle Use in Intensive Care Unit."

Ms. Amity will conduct a survey of healthcare providers at Mayo Clinic. She will recruit participants via email and staff education sessions. The email will provide a description of the project, what they will be asked to do, the time involved, and a link to the online survey. Ms. Amity's activities will be completed by March 5, 2024.

Ms. Amity has agreed to provide my office with a copy of the University of Arizona Determination before she recruits participants. She will also present aggregate results to the providers at their monthly staff meeting.

If there are any questions, please contact my office.

Sincerely,

Ayan Sen, M.D.
Chair, Department of Critical Care Medicine
Mayo Clinic Hospital
5777 East Mayo Blvd.
Phoenix, AZ 85054
480-342-1386

APPENDIX B

CONSENT DOCUMENT (DISCLOSURE AND CONSENT FORM)

DNP Quality Improvement Project Consent Form
Liberation Bundle Use in an Intensive Care Unit
Principal Investigator: Marjorie Amity

You are invited to participate in a Quality Improvement (QI) project conducted by Marjorie Amity, a Doctor of Nursing Practice (DNP) student at the University of Arizona. This project aims to determine the likelihood of clinicians utilizing the ICU Liberation Bundle in daily practice.

Procedures:
If you agree to participate, you will be asked to:
- Complete a survey/questionnaire.
- Attend a brief educational session regarding the ICU Liberation Bundle.

Confidentiality:
Your responses will be kept confidential to the extent permitted by law. The information collected will only be accessible to me, and any data shared externally will be de-identified to protect your privacy.

Benefits:
There may not be direct benefits to you as a participant. However, your participation will contribute to advancing knowledge in the field of quality improvement and may have broader implications for patient care.

Risks:
There are minimal risks associated with this project. You may experience discomfort or inconvenience from answering survey questions. If you feel uncomfortable at any point, you have the right to withdraw from the study without penalty.

Voluntary Participation:
Your participation in this project is entirely voluntary. You are not obligated to participate, and your decision will not affect your relationship with Mayo Clinic Arizona or your access to care.

Informed Consent:
You are giving informed consent to participate in this project by completing and submitting the survey.

Contact Information:
If you have any questions or concerns about the project, you may contact:
- Marjorie Amity amity.margie@mayo.edu

Participant's Agreement:
I have read and understood the information provided in this consent/disclosure form. I understand that my participation is voluntary, and I can withdraw at any time without consequences. I agree to participate in this Quality Improvement project and provide the requested information.

- Participant's Name (printed): ______________________________
- Participant's Signature: ______________________________
- Date: ___________________

APPENDIX C

RECRUITMENT MATERIAL (RECRUITMENT EMAIL)

Dear Participants,

I hope this message finds you well. We are excited to announce the adoption of the Liberation Bundle in our Intensive Care Unit (ICU) and invite you to an upcoming education session to learn more about its significance and benefits for our patients.

What is the Liberation Bundle? The Liberation Bundle is a set of evidence-based practices designed to improve critically ill patients' outcomes and overall experience. It encompasses a series of interventions that aim to reduce the impact of immobility, delirium, and other adverse effects of critical illness. By implementing the Liberation Bundle, we intend to enhance the quality of care we provide to our patients while improving their long-term well-being.

Goals of the education session: The primary goal of this educational session is to provide you with a comprehensive overview of the Liberation Bundle and its relevance to our ICU. We believe that informed and engaged healthcare professionals are essential for successful implementation. During this session, you can expect the following:

1. **Introduction to the Liberation Bundle**: We will explain the core competence of the Liberation Bundle and why it is vital for our patients.
2. **Evidence-Based Practice:** We will share the scientific evidence supporting the use of the liberation bundle, helping you understand its effectiveness.
3. **Benefits for our patients**: You will learn how the liberation bundle can improve outcomes, reduce complications, and improve patient experiences.
4. **Practical implementation:** We will discuss how we plan to integrate the liberation bundle into our daily practice and provide opportunities for your input and questions.
5. **Next steps**: You will leave the session with a clear understanding of what comes next and how you can actively participate in this initiative.

I appreciate your dedication to providing exceptional care to our patients. I look forward to your participation in this essential education session as we work together to enhance the quality of care we deliver in our ICU. Please feel free to contact me with any questions regarding the education session.

Sincerely,

Marjorie Amity, MSN, ACNP-BC
CCM APP
Amity.margie@mayo.edu

APPENDIX D

EVALUATION INSTRUMENTS (SURVEYS)

Instructions: Please complete this survey regarding implementing the ICU Liberation Bundle. Your responses will help us understand your current knowledge and practices related to the bundle.

1. Role:
 - [ ] Advanced Practice Provider (APP)
 - [ ] Registered Nurse (RN)
2. Years of Experience in the ICU:
 - [ ] Less than 1 year
 - [ ] 1-5 years
 - [ ] 6-10 years
 - [ ] More than 10 years
3. How familiar are you with the ICU Liberation Bundle?
 - [ ] Very familiar
 - [ ] Somewhat familiar
 - [ ] Not very familiar
 - [ ] Not familiar at all
4. Have you received formal training or education on the ICU Liberation Bundle?
 - [ ] Yes
 - [ ] No
5. How likely will you implement the ICU Liberation Bundle in your daily practice?
 - [ ] Very likely
 - [ ] Somewhat likely
 - [ ] Neutral
 - [ ] Not very likely
 - [ ] Not likely
6. Please rate your understanding of the individual components of the ICU Liberation Bundle (e.g., sedation, delirium management, early mobility, etc.) on a scale of 1 to 5, with 1 being very poor and five being excellent.

- Sedation:	(1)	(2)	(3)	(4)	(5)
- Delirium Management:	(1)	(2)	(3)	(4)	(5)
- Early Mobility:	(1)	(2)	(3)	(4)	(5)
- Spontaneous Breathing Trials:	(1)	(2)	(3)	(4)	(5)
- Family Engagement and Communication:	(1)	(2)	(3)	(4)	(5)

Thank you for participating in this survey. Your feedback is valuable in helping us evaluate the impact of the ICU Liberation Bundle and make any necessary improvements in its implementation.

APPENDIX E

PARTICIPANT MATERIAL (EDUCATIONAL POWERPOINT)

Implementing ICU Liberation Bundle

Margie Amity, MSN, ANP/ACNP-BC
DNP candidate
CCM APP

1

Origins of the Bundle

- Concept
  - 2013, Society of Critical Care Medicine created Pain, Agitation, and Delirium (PAD) Guidelines
  - 2018 the guidelines are updated to include immobility and sleep (PADIS)
  - PADIS transitioned into Liberation Bundle
- About ICU Liberation | SCCM

2

Benefits of the Bundles Use

- Reduction of delirium and coma days by 25 – 50 %
- Reduce physical restraint use by 60%
- Decrease in ICU readmissions
- Reducing discharges to rehab or nursing facilities by 40%
- Decrease the chance of hospital death within seven days by 68%
- Decrease practice variation
- Improve communication among ICU members
- Standardize care processes

3

What is the Liberation Bundle

4

How to use the Bundle

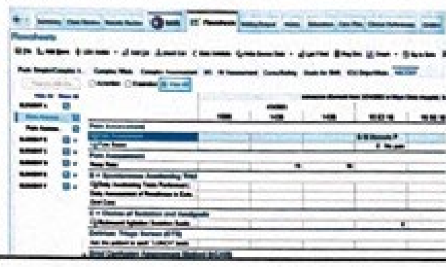
- Assess Daily
- Discuss in CCM rounds
- Document in EPIC or progress notes daily

5

Sample view of the navigator:

6

Sample view of the flowsheet:



7

A: Assess, prevent & manage pain

- Assess behavior trend throughout shift
- How does the patient handle pain?
- Nonpharmacological interventions utilized?

8

Both spontaneous awakening trial (SAT) and spontaneous breathing trial (SBT).

- SAT – scheduled sedative interruption – "sedation vacation"
- SBT – assessment of patient's ability to breath without mechanical ventilator support

9

Richmond Agitation Sedation Scale (RASS)

Scale	Label	Description
+4	Combative	Violent, immediate danger to staff
+3	Very agitated	Pulls or removes tube(s) or catheter(s); aggressive
+2	Agitated	Frequent non-purposeful movement, fights ventilator
+1	Restless	Anxious but movements not aggressive, vigorous
0	Alert and calm	Spontaneously pays attention to care giver
-1	Drowsy	Not fully alert, but has sustained awakening (eye-opening/contact) to voice (>10 seconds)
-2	Light sedation	Briefly awakens with eye contact to voice (< 10 seconds)
-3	Moderate sedation	Movement or eye opening to voice (but no eye contact)
-4	Deep sedation	No response to voice, but movement or eye opening to physical stimulation
-5	Unarousable	No response to voice or physical stimulation

10

C: Choice of analgesia & sedtion

- What is their pain score?
- Are they attaining adequate relief of pain or discomfort?
- What is the targeted level of sedation?
- What is the current level of sedation?

11

D: Delirium – assess, prevent & manage

- Encourage sleep hygiene
- Cluster care at night
- Use natural light and keep room well lit during the day
- Allow for rest periods

12

E: Early mobility & exercise

- Encourage early activity
- Dangle the patient at the bedside
- ROM – passive and active

13

F: Family engagement & empowerment

- Include family in rounds
- Update family and patient on plans of care

14

References

- [illegible]
- [illegible]
- [illegible]
- [illegible]
- [illegible]

15

APPENDIX F

PROJECT TIMELINE

Task	Due Date
Create survey for pre and post test	August 21, 2023
Create Educational PPT	August 23, 2023
Finalize Proposal Draft	October 20, 2023
Apply to Defend Proposal	November 15, 2023
Submit an application for U of A IRB for IRB exception.	December 5, 2023
Submit an application for Mayo IRB for IRB exception	December 6, 2023
Education Session with APP	December 15, 2023
Education Session with RNs	December 22, 2023
Analyze Results	March 10, 2024
Complete Project	March 18, 2024
Apply for Intent to Defend	March 15, 2024
Defend	April 3, 2024

APPENDIX G

LITERATURE REVIEW GRID

Project Question: Would an educational session on ICU Liberation Bundle guidelines and recommendations be useful for adult intensive care unit staff?

Pub. Year; Author's Last Name	Title of Publication	Type of Study	Main Outcomes of Findings	Support for and or Link to Project
Balas, M.C. et al, 2019	Common challenges to effective ABCDEF Liberation Bundle implementation: The ICU campaign experience *Critical Care Nurse,* (February 2019) Volume 39(1), pp. 46–60 *American Association of Critical-Care Nurses* DOI: 10.4037/CCN2019927 ISSN: 0279-5442		Article discusses barriers for implementation of Liberation Bundle regarding each element of Liberation Bundle Struggles include consistent use of Liberation Bundle on daily basis. Lists benefits of Liberation Bundle use Standardization of practice Reduce provider variability. Increase communication among team members. Ensure daily use to improve overall benefits to institution and patients	Lists benefits of Liberation Bundle use Standardization of practice Reduce provider variability. Increase communication among team members. Ensure daily use to improve overall benefits to institution and patients
Balas, M. C., Tan, A., Pun, B. T., Ely, E. W., Carson, S. S., Mion, L. & Vasilevskis, E. E. (2022).	Effects of a national quality improvement collaborative on ABCDEF Liberation Bundle implementation. *American Journal of Critical Care*, *31*(1), 54-64	Interrupted time series analysis of 20 months of Liberation Bundle data (pre and post)	Objective of QI project collaboration assesses Liberation Bundle's performance. Low at baseline improved with collaboration participation. Small gains Areas in need of further improvement: sedation, mechanical ventilation, and early mobility initiatives	

Pub. Year; Author's Last Name	Title of Publication	Type of Study	Main Outcomes of Findings	Support for and or Link to Project
			Though evidence exists of the benefits, actual use in practice is underutilized. This leads to increased morbidity and mortality with increased healthcare expenditures. Lacking QI collaborations to demonstrate adoption and continued use of care practices for PADIS.	
Barr, J., Ghaferi, A. A., Costa, D. K., Hedlin, H. K., Ding, V. Y., Ross, C., Pun, B. T., Watson, S. R., & Asch, S. M. (2020).	Organizational Characteristics Associated With ICU Liberation (ABCDEF) Bundle Implementation by Adult ICUs in Michigan. *Crit Care Explor*, *2*(8), e0169. https://doi.org/10.1097/CCE.0000000000000169	Survey of Michigan Hospitals	Variation in size of ICU and hospitals as well as organization characteristics Variation in RN and MD perceptions of bundle use If the culture is steeped in safety and collaboration, they tended to embrace checklist use and team communication. Those that did the above used the bundle more.	Variations in facilities and units If culture of unit is that of safety and collaboration, more use of bundle
Brown, J. C., Querubin, J. A., Ding, L., Mack, W. J., Chen-Chan, K., Perez, F., Barr, J., Peden, C.J., & Cobb, J. P. (2022).	Improving ABCDEF Liberation Bundle Compliance and Clinical Outcomes in the ICU: Randomized Control Trial to Assess the Impact of Performance Measurement, Feedback, and Data Literacy Training.	RCT single center	Effect of literacy training and performance reports of the Liberation Bundle Single center, over 12. Months in 8 ICU (4 intervention and 4 control)	Barriers for use

Pub. Year; Author's Last Name	Title of Publication	Type of Study	Main Outcomes of Findings	Support for and or Link to Project
	Critical care explorations, *4*(4).		Increase of Liberation Bundle compliance from staff education 9 >> 16% Increase from staff literacy 16 >> 21% Success of Liberation Bundle implementation is best with a single issue; decreased success when more complex. Barriers: complexity of Liberation Bundle, and lack of EHR support (Liberation Bundle-related performance metrics, staff comprehension) Theory to test: education on Liberation Bundle, data literacy, and compliance reporting will increase Liberation Bundle compliance.	
Dirkes, S. M., & Kozlowski, C. (2019).	Early Mobility in the Intensive Care Unit: Evidence, Barriers, and Future Directions. *Crit Care Nurse*, *39*(3), 33-42. https://doi.org/10.4037/ccn2019654	Article	Early mobility can aid in decreasing vent time and ICU LOS Adherence to Bundle decreases the rate of delirium and LOS Article ID'ed Barriers Acuity level Provider Practice Staffing	Barriers

Pub. Year; Author's Last Name	**Title of Publication**	**Type of Study**	**Main Outcomes of Findings**	**Support for and or Link to Project**
			Rec: Need for interdisciplinary team	
Ely E. W. (2017).	The ABCDEF Liberation Bundle: Science and Philosophy of How ICU Liberation Serves Patients and Families. *Critical Care Medicine*, *45*(2), 321–330. https://doi.org/10.1097/CCM.0000000000002175		Importance of Liberation Bundle to liberate pts and families from harm of admission to ICU. Threat to "sense of self-worth, identity and" dignity. Maintaining dignity occurs in the ICU. Liberation was a QI project to implement PADIS guidelines. Adoption needs to be incorporated into the culture	Explains science and philosophy of Liberation Bundle
Gou, R. Y., Hshieh, T. T., Marcantonio, E. R., Cooper, Z., Jones, R. N., Travison, T. G., Fong, T. G., Abdeen, A., Lange, J., Earp, B., Schmitt, E. M., Leslie, D. L., Inouye, S. K., & Group, S. S. (2021).	One-Year Medicare Costs Associated With Delirium in Older Patients Undergoing Major Elective Surgery. *JAMA Surg*, *156*(5), 430-442. https://doi.org/10.1001/jamasurg.2020.7260	Prospective Cohort Study N = 497	Assess the effects of delirium with healthcare costs. Older adults having elective surgeries were studied. Based on delirium and severity, thus increased healthcare costs	Benefits of use__. Healthcare costs
Holle, C. L., & Rudolph, J. L. (2018).	Management of delirium across an integrated health system. *Nurs Manage*, *49*(3), 24-34. https://doi.org/10.1097/01.NUMA.0000530420.86700.48			

Pub. Year; Author's Last Name	Title of Publication	Type of Study	Main Outcomes of Findings	Support for and or Link to Project
Liu, K., Nakamura, K., Katsukawa, H., Nydahl, P., Ely, E. W., Kudchadkar, S. R., Takahashi, K., Elhadi, M., Gurjar, M., Leong, B. K., Chung, C. R., Balachandran, J., Inoue, S., Lefor, A. K., & Nishida, O. (2021).	Implementation of the ABCDEF Bundle for critically ill ICU patients during the COVID-19 pandemic: A multi-national 1-day point prevalence study. *Front Med (Lausanne)*, *8*, 735860. https://doi.org/10.3389/fmed.2021.735860	Prevalence Study	Assess the Delivery of Bundle among international ICUs via questionnaire. Findings 54 countries, 135 ICU Less than 1 % used the entire bundle. Elements: A, C, D addressed most often Factors decreasing use Low-income countries have less family engagement Higher RN to Pt ratio lower rates of A, C, & D	
Marcarian, T. et al. 2018	The interdisciplinary process of implementing the ABCDEF liberation bundle in a surgical ICU.	Article	Implementing Liberation Bundle increased communication, collaboration, and decision-making amongst interdisciplinary teams. Incorporated into daily practice	Benefits
Mikkelsen, M.E. et al. 2021	The liberation bundle: Quantity and quality matter		Based off of Zhang meta-analysis Effect on delirium dependent on quantity and quality of interventions To decrease delirium 4-6 elements required	Benefits and barriers

Pub. Year; Author's Last Name	Title of Publication	Type of Study	Main Outcomes of Findings	Support for and or Link to Project
			Not decrease mech vent times or ICU LOS But 3 + elements did affect decreasing development of coma, shorter LOS in ICU by 1.5 days, and decreased 28-day mortality by 18% For the Liberation Bundle to be effective for delirium and decrease ICU LOS, Use and compliance of the Liberation Bundle can increase in-hospital survival by 7-15%	
Moraes, F et al, 2022	ABCDE and ABCDEF care Liberation Bundles Medicine (Baltimore). 2022 Jun 24; 101(25): Published online 2022 Jun24. doi: 10.1097/MD.0000000000029499	Systematic Review	-20 Studies (13 qual & 7 quant) 31,604 pt -80 strategies identified -Results reduced LOS in ICU, mechanical vent time, delirium, ICU, and hospital mortality & early mobilization of critically ill Conclusion: The article can help with planning and execution, but more is needed for effectiveness and safety with greater methodological rigor and studies Goal of the study: 15 of the study is based here in the US.	Supports best practice Not able to make strong conclusions about the effectiveness and safety of Liberation Bundle More research and bigger sample sizes

Pub. Year; Author's Last Name	Title of Publication	Type of Study	Main Outcomes of Findings	Support for and or Link to Project
			Implementation of Liberation Bundle included distribution of educational materials Barriers: providers low levels of confidence with delirium scales Communication Poor planning Concern for patient harm Resistance to change Collaboration between team members is a positive influence Risk of Bias: moderate quality of study's methodology Limit: sample size	
Pun, B. T., Balas, M. C., Barnes-Daly, M. A., Thompson, J. L., Aldrich, J. M., Barr, J., Byrum, D., Carson, S. S., Devlin, J. W., Engel, H. J., Esbrook, C. L., Hargett, K. D., Harmon, L., Hielsberg, C., Jackson, J. C., Kelly, T. L., Kumar, V., Millner, L., Morse, A., Perme, C. S., … Ely, E. W. (2019).	Caring for Critically Ill Patients with the ABCDEF Liberation Bundle: Results of the ICU Liberation Collaborative in Over 15,000 Adults. *Critical Care Medicine*, *47*(1), 3–14. https://doi.org/10.1097/CCM.0000000000003482	Prospective, cohort study	Defined Liberation Bundle performance: complete & proportional performance Lower incidence of hospital death w/in 7 days Coma, delirium, physical restraint use, ICU readmission	Use of Liberation Bundle regularly stronger association with improved patient outcomes Great sets of statistical data

Pub. Year; Author's Last Name	Title of Publication	Type of Study	Main Outcomes of Findings	Support for and or Link to Project
			Limits of study: lack of randomization, this study's more specialized setting (neuro, cardiac & trauma), need for large follow-up data & Lack of funds to support data. Lastly the data from the larger QI project	
Shay, A. 2018	Optimizing the ABCDEF Liberation Bundle: Tips for Overcoming Challenges	Report	Complexity makes the challenge Discusses in regards to PICS LIBERATION BUNDLE break cycle of oversedation and prolonged vent times Liberation Bundle improves interdisciplinary communication and enhances teamwork Recs for success: Multidisciplinary involvement and champions Use a performance dashboard to monitor compliance and outcomes Start with one patient, assess for unexpected outcomes Nurses	
Sosnowski, K et al. (2023)	The effect of the ABCDE/ABCDEF Liberation Bundle of delirium, functional	Systematic Review and meta-analysis	Determine the effectiveness of Liberation Bundle addressing the following outcomes: delirium,	

Pub. Year; Author's Last Name	Title of Publication	Type of Study	Main Outcomes of Findings	Support for and or Link to Project
	outcomes, and quality of life in critically ill patients: A systematic review and meta-analysis ** International -Australian International Journal of Nursing Studies 138(2023)		functional status, and QOL for adult ICU pts Studies reviewed: 2000- Dec 2021 Total 18 studies for descriptive synthesis and 6 for meta-analysis (29,576 pts). CI and RR listed in the article Compared to standard practice, statistical evidence of Liberation Bundles' ability to decrease the duration of ICU delirium and 1 study supported QOL assessment, 2 supported functional The meta-analysis is supported with evidence of how the Liberation Bundle in its entirety has a small positive effect on delirium outcomes, larger studies are needed.	
Stollings, J. L., Devlin, J. W., Lin, J. C., Pun, B. T., Byrum, D., & Barr, J. (2020).	Best Practices for Conducting Interprofessional Team Rounds to Facilitate Performance of the ICU Liberation (ABCDEF) Bundle. *Crit Care Med*, *48*(4), 562-570. https://doi.org/10.1097/CCM.0000000000004197	Article – Best Practice Synthesis	Describe EBP for interdisciplinary rounds Perform at the bedside Include essential members of the team Include Family Best when Bundle built into EHR	Benefits of use

Pub. Year; Author's Last Name	Title of Publication	Type of Study	Main Outcomes of Findings	Support for and or Link to Project
			Communication should be all-inclusive and supportive	
Stollings, J. L., Kotfis, K., Chanques, G., Pun, B. T., Pandharipande, P. P., & Ely, E. W. (2021).	Delirium in critical illness: clinical manifestations, outcomes, and management. *Intensive Care Med*, *47*(10), 1089-1103. https://doi.org/10.1007/s00134-021-06503-1	Article	Delirium and its effects on the system and patients Need for validated tool (CAM) Use of bundle and increased compliance aided in decreasing LOS, time in delirium, costs, ICU bounce backs, and admissions to Rehab and Nursing facilities All while increasing overall survival	
Wyler, D, Esterlis, M., Dennis, BB., Ng, A., & Lele, A. (2018)	Challenges of pain management in neurologically injured patients: systematic review protocol of analgesia and sedation strategies for early recovery from neurointensive care *Syst Rev,* 7, 104 (2018). https://doi.org/10.1186/s13643-018-0756-z	Systematic Review	Small amount of literature on the neurological critically ill patients' use of the Liberation Bundle. The abundance of evidence supporting the use of SAT and SBT Strong support for early mobility HD, oxygenation, improved Decreased MM, ICU LOS, delirium, mech vent time Low use (57%) use Liberation Bundle in units	

Pub. Year; Author's Last Name	Title of Publication	Type of Study	Main Outcomes of Findings	Support for and or Link to Project
			OBJ: identify challenges for analgesia and sedation in regards to Liberation Bundle. The sample size was too small (173) to provide quality evidence.	
hang, S. et al., 2021	Effectiveness of Liberation Bundle Interventions on ICU Delirium: A Meta-Analysis	Meta-Analysis	RCT, SMR, or cohort studies ICU delirium prevalence & duration Proportion of patient-days w coma Mortality Vent free days Mech vent days ICU or hospital LOS ICU delirium prevalence & duration (Liberation Bundle not shortened) Vent free days Mech vent days (Decrease mech vent times) ICU LOS LIBERATION BUNDLE DID DECREASE Proportion of patient-days w coma Mortality Hospital LOS Need for larger RCT	

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