REDUCING VENTILATOR DAYS IN THE TRAUMA ICU PATIENT:

A QUALITY IMPROVEMENT PROJECT

by

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ABSTRACT

Mechanical ventilation saves many lives in the Intensive Care Unit (ICU) but can also pose a substantial risk. Prolonged mechanical ventilation is associated with ventilator-associated adverse events, leading to increased hospital stays and mortality. To lower risks for patients, healthcare teams must implement evidence-based measures to decrease ventilator-associated adverse events. The use of an ICU liberation bundle reduces ventilator-associated complications, is associated with less risk for patients, and improves overall outcomes. At a level I trauma center in the northwestern United States, average ventilator days of trauma patients were twice the national average. This facility encourages the use of a liberation bundle, but not all elements of the bundle are consistently implemented.

Based on a review of the literature, all aspects of the Society of Critical Care Medicine's ICU liberation bundle along with daily rounding to standardize care. Education on the ICU liberation bundle and interdisciplinary rounding was given to staff members. Daily interdisciplinary rounding with a standardized checklist was implemented over a six-week period. Frequency of rounds and documentation compliance were recorded. Average ventilator days was compared to the average from the same time in the previous year.

Rounding occurred 90.20% of the time and trauma ICU patients were discussed in rounds daily. Documentation of the ICU Liberation bundle only occurred 14.71% of the time during the study. The average ventilator days were 3.8 days, compared to 4.8 days the previous year.

Implementation of the interdisciplinary rounding process was successful and average ventilator days were reduced, although the unit saw a low number of trauma patients. Documentation compliance of the ICU Liberation bundle was low, potentially related to the lack of in person education prior to the intervention. This demonstrates that the documentation process needs significant improvement.

CHAPTER ONE

REVIEW OF THE LITERATURE

Introduction

Trauma patients in the Intensive Care Unit (ICU) are prone to complications associated with their hospitalization, including ventilator-associated pneumonia (VAP) (Younan et al., 2020). VAP is the most prevalent hospital-acquired infection amongst trauma patients, resulting in increased lengths of stays and mortality. Prolonged mechanical ventilation is a significant risk factor for VAP (Younan et al., 2020). To combat the potential harm that this life-saving intervention brings, healthcare personnel must develop and implement evidence-based solutions into practice that aim to reduce patients' time on mechanical ventilation.

Evidence-Based Solution

The Society of Critical Care Medicine (SCCM) published clinical practice guidelines for critical care professionals to follow to manage and prevent pain, agitation, delirium, immobility, and sleep disruption of ICU patients. These guidelines outline best practice for management of ICU patients and aim to reduce complications associated with ICU admission and ventilator use. These practice guidelines together compose the ICU liberation bundle (Figure 1). Both SCCM and Institute for Healthcare Improvement (IHI) recommend utilization of the ICU liberation bundle (Institute for Healthcare Improvement, 2012; Society of Critical Care Medicine, n.d.).

All elements of this bundle aim to address common ICU adverse events. Such events include delirium, ICU acquired weakness, and prolonged mechanical ventilation (Marra et al.,

2017). Full utilization of such a bundle is in turn just as important as the implementation of each individual component.

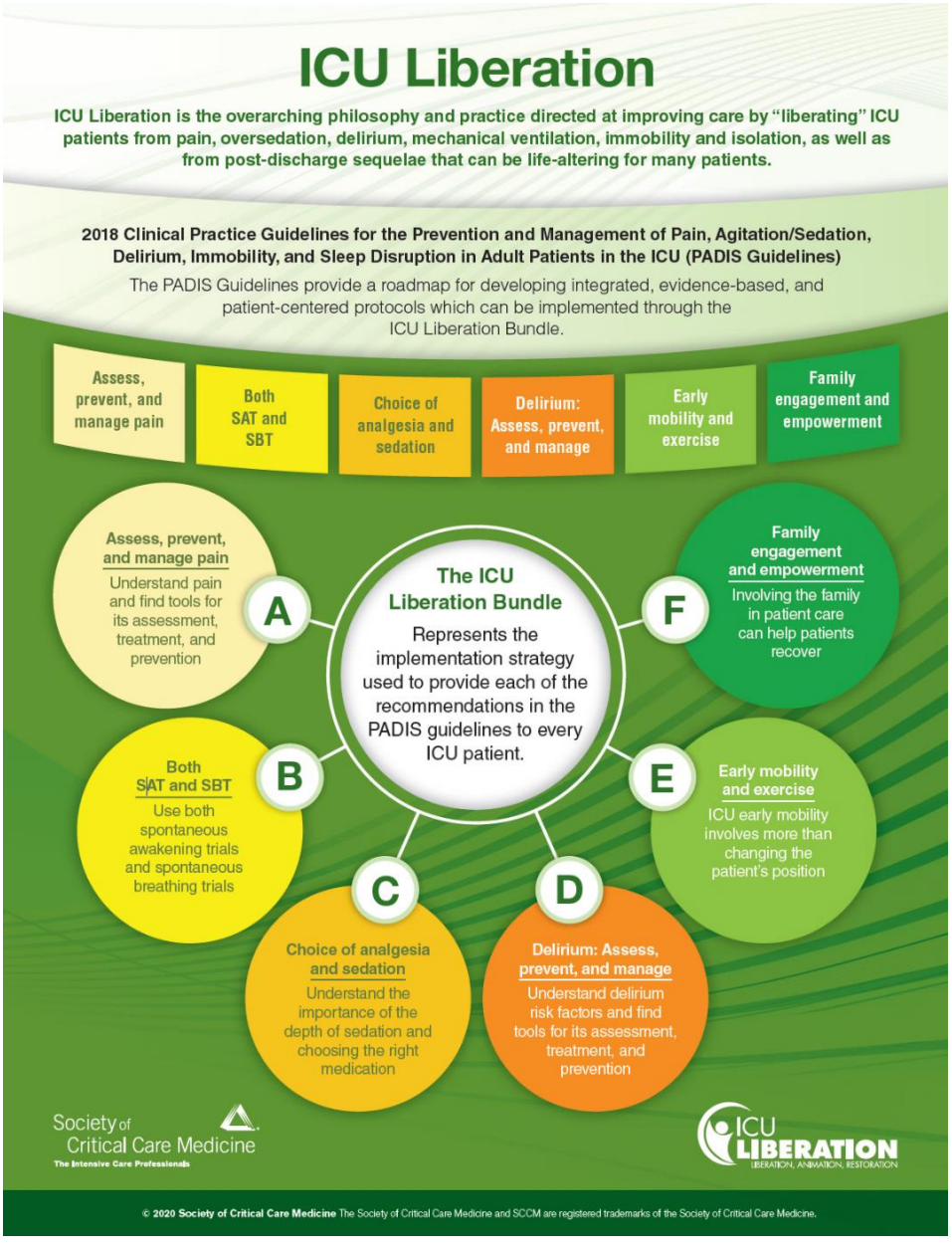

Figure 1. SCCM ICU Liberation Bundle

A regional Level One Trauma Center in central Montana cares for a wide variety of trauma patients. This center has an average of six ventilator days per trauma patient, compared to a national average of three days (Orr & Petersen, personal communication, May 30, 2023). Currently, ventilator weaning bundles are integrated into the facility's usual care for ventilated ICU patients as well as nursing and respiratory standards of practice. However, not all elements of the ICU liberation bundle are being consistently used, and ventilator days are increasing. A strategy to improve staff utilization of an ICU liberation must be developed and put into practice to address the recent higher number of average ventilator days for the trauma ICU patient.

Methods

Overview of Literature Search

To further understand the impact of ICU liberation bundle implementation in an ICU, a review of the literature was conducted in September 2023. The primary goal of the literature search was to find literature that investigated the relationship between liberation bundles and ventilator days as well as strategies to best implement the ICU liberation bundle.

Search Strategy

The Web of Science database was initially searched using the following keywords: ventilator bundle, compliance, ABCDEF bundle, and implementation. Further searching was done at the American Association of Critical Care Nurses (AACN), SCCM, and IHI websites using the same keywords. Potentially relevant articles were saved and uploaded into EndNote.

Inclusion Criteria

Studies were included if they focused on either ventilator associated events (VAE), VAP, or liberation bundles; were peer reviewed; and written in English. After inclusion of one older study, studies were further narrowed down to studies published within the last 5 years. Figure 2 illustrates this screening process as a Preferred Reporting Items for Systematic Reviews and Meta-Analyses flowchart (PRISMA).

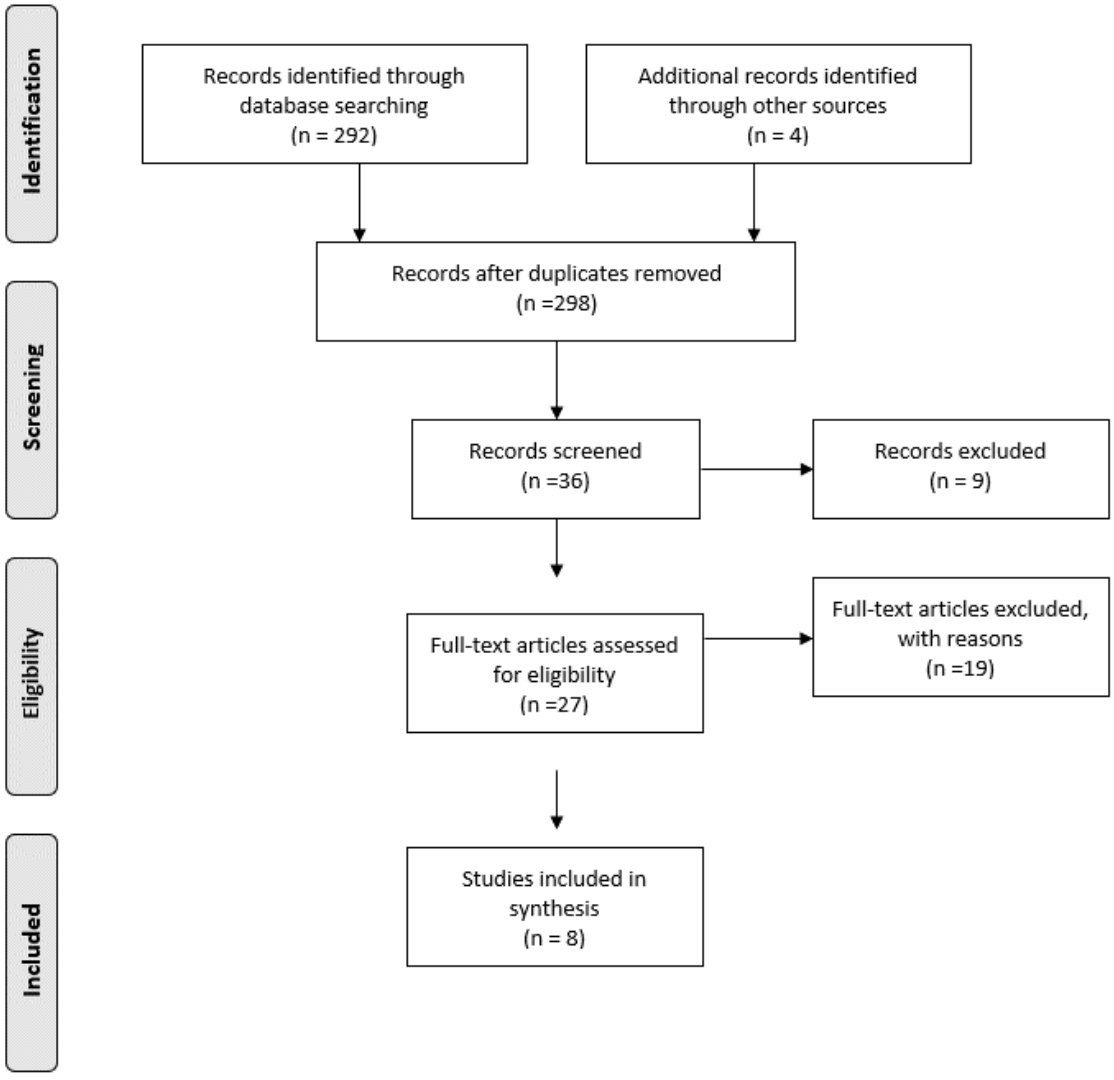

Figure 2. PRISMA Flowchart

Results

Quantitative Findings

The initial record search on Web of Science resulted in 292 results. Along with the four articles found on the AACN website, 36 were selected and screened. A total of 27 of the articles were reviewed in full text form. The results yielded 8 articles published between 2007 and 2023. These 8 were included in this review. Two were prospective observational studies while three were quality improvement studies. The other three studies were a retrospective study, a quasi-experimental two-group study, and a mixed-methods observational study. Two clinical practice guidelines published by SCCM and IHI were included in the review as well.

Synthesis

Current clinical practice guidelines published by both SCCM and IHI outline recommended standard measures that ICUs must implement to improve outcomes for ventilated patients. SCCM recommends multimodal pain management therapy, which must include both pharmacological and non-pharmacological elements (Devlin et al., 2018). Pain management ties into sedation; opioids can alter level of consciousness, impacting sedation needs. Therefore, a daily sedation interruption, also known as a sedation holiday, should be performed. SCCM also suggests early mobilization and rehabilitation of ventilated patients. These suggestions from SCCM correlated with elements of the SCCM ICU liberation bundle as well as IHI's guidelines for the prevention of VAP. Along with daily sedation holidays, IHI recommends elevation of the head of the bed to 30-45 degrees, peptic ulcer disease prophylaxis, deep vein thrombosis prophylaxis, and frequent oral care with chlorhexidine gluconate (Institute for Healthcare

Improvement, 2012). The ICU liberation bundle follows current clinical practice guidelines for care of ventilated patients.

Implementation of an ICU liberation bundle leads to better outcomes for intubated ICU patients. ICU liberation bundle implementation and compliance is associated with a decrease in VAP (Hassan & Elsaman, 2022; Lansford et al., 2007). Total number of days requiring ventilator assistance decreased for ICU patients if an ICU liberation bundle was consistently utilized on the unit compared to when it was not (Heimes et al., 2011; Khalil et al., 2018).

An implementation strategy for ICU liberation bundles to assist in compliance involves incorporating bundle elements in daily rounds (Institute for Healthcare Improvement, 2015; Lancaster et al., 2022; Sherburne et al., 2022). Utilization of a standardized rounding tool, such as a bundle checklist, was associated with a decrease in ventilator days as well as total length of stay in the ICU (Institute for Healthcare Improvement, 2015; Lancaster et al., 2022). Although universal adherence to an ICU liberation bundle can be challenging, strategies such as inclusion of the multidisciplinary team in rounds, development of a clear documentation process, and frequent staff education may prove to be effective ways to increase compliance (Sherburne et al., 2022; Sweeney 2018).

Discussion

ICU liberation bundles have the potential to positively impact patient outcomes in a trauma ICU. As it is essential for caregivers to reduce the risk of harm caused by VAP, implementing a successful liberation bundle should be the main goal of any ICU looking to decrease ventilator days. Use of ICU liberation bundles is directly associated with reduction of VAP and ventilator days (Hassan & Elsaman, 2022; Heimes et al., 2011; Khalil et al., 2018;

Lansford et al., 2007). However, staff must consistently follow liberation bundles for outcomes to improve (Heimes et al., 2011; Khalil et al., 2018).

ICU staff could utilize daily interdisciplinary rounds to aid in improvement of compliance of ICU liberation bundles (Lancaster et al., 2022; Sherburne et al., 2022). A standardized checklist that incorporates all elements of the ICU liberation bundle would allow the full interdisciplinary team to consistently be reevaluating factors that contribute to VAEs and increased ventilator days. Reeducation of staff on the ICU liberation bundle would have to occur as well to promote buy in and compliance (Sherburne et al., 2022). By involving staff in the enforcement of an ICU liberation bundle, increased compliance and better patient outcomes are certainly possible.

CHAPTER TWO

QUALITY IMPROVEMENT PROPOSAL

Introduction

Mechanical ventilation saves the lives of trauma patients but can also pose substantial risk. VAP related to prolonged mechanical ventilation is one of the most common adverse events related to mechanical ventilation and is associated with other adverse events for patients, including increased mortality rates (Younan et al., 2020). To improve overall care and lower risks for ventilated patients, healthcare teams must implement evidence-based strategies to decrease VAEs.

Background

Problem Statement

Average ventilator days for trauma patients at a level I trauma center in the northwestern United States are twice the national average (L. Orr & A. Peterson, personal communication, May 30, 2023). Both the IHI and SCCM recommend utilization of the ICU liberation bundle to reduce ventilator-associated complications (Institute for Healthcare Improvement, 2012; Society of Critical Care Medicine, n.d.). Full utilization and compliance with an ICU liberation bundle is associated with less risk for patients (Hassan & Elsaman, 2022; Heimes et al., 2011; Khalil et al., 2018; Marra et al., 2017). This facility's ICU encourages the use of a liberation bundle, but elements of the bundle are inconsistently implemented. Literature suggests that daily rounding with checklists improves bundle compliance and subsequently improves outcomes for patients (Dosher et al., 2014; Lancaster et al., 2022). This project aims to improve adherence to the ICU

liberation bundle protocol utilizing staff education and implementation of an interdisciplinary rounding checklist for daily rounds.

Organizational Microsystem Assessment

The site's trauma coordinator identified trauma ventilator days as a priority quality improvement focus. According to data collected by the trauma department, the facility's average ventilator days was 6, while the National Trauma Data Bank reported an average of 3. This author conducted observation at the site, a 28-bed mixed medical and surgical ICU. Daily rounding occurs at 1100 with the intensivists, the Critical Care Nurse Practitioners, care management, respiratory therapists, the ICU pharmacist, the ICU dietician, the ICU charge nurse, the primary nurse, physical therapist, and occupational therapist. The group only rounds on medical ICU patients, and the process for rounding is not standardized. Rounds are physician-led, and the rounding process varied based on physician preferences. At 1145, the trauma surgeon and the surgical intensive care unit (SICU) physician assistant then meet and round on the trauma patients with care management. The primary nurse and the rest of the multidisciplinary team were often not involved in these rounds, either because they were still rounding on the medical patients or because they were unaware of the rounds occurring. Nursing, respiratory, and other disciplines expressed a desire for rounding to be more standardized and occur at the same time for all patients.

Nurses and respiratory therapists expressed frustration at the bundle documentation process, noting a lack of one single place to document bundle elements. Some elements of the liberation bundle, such as spontaneous breathing trials, were documented by one discipline in different sections of the electronic medical record but were not viewable by other disciplines.

Upon chart review, this author identified a specific section for ICU liberation bundle charting, but it was not viewable by nursing or respiratory therapy staff. Relevant charted items that would be included in the bundle under other documentation sections did not carry over into this liberation bundle section.

Quality Improvement Model

This quality improvement project will use the IHI Model for Improvement (Figure 3). This model involves Plan-Do-Study-Act (PDSA) cycles to implement and evaluate process changes (Institute for Healthcare Improvement, 2017). The plan cycle involves evaluating the problem and formulating a plan to implement and test a change, putting the plan into action, evaluating the results of the previous cycle, and then modifying the plan for another cycle. Due to time constraints, this quality improvement project will only include one PDSA cycle. For the plan cycle, this author, as the project coordinator, researched current literature and observed current practice to develop interventions. The project coordinator then worked with stakeholders, including the site's Trauma Department and ICU Policy, Procedure, and Research Committee, to develop a plan of action to implement into practice. The do cycle will involve all of the stakeholders (project coordinator, the Trauma Department, ICU staff, and the ICU interdisciplinary team) to implement the interventions. The study cycle will include evaluation of data and chart review to determine if the previous cycle was effective in reaching the project's goals.

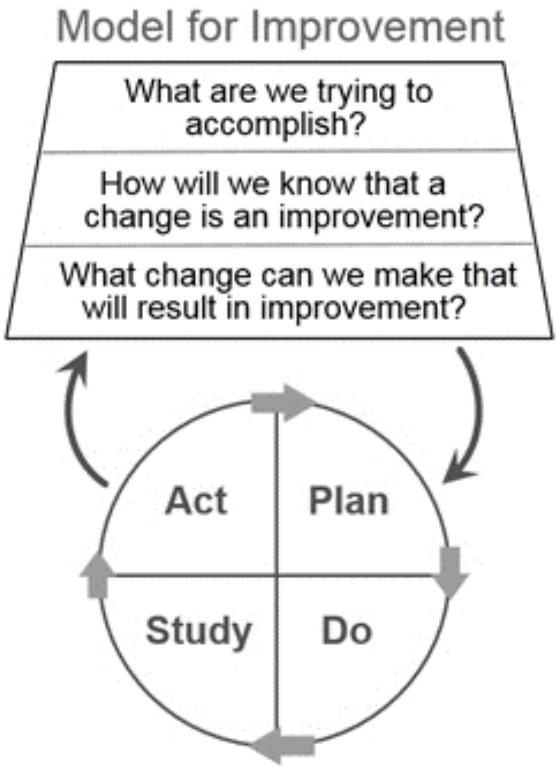

Figure 3. IHI Model for Improvement

Specific Aims

To reduce the risk of VAE occurring to trauma patients, interventions must be put into place to lower average ventilator days. The purpose of this quality improvement project is to improve adherence to the ICU liberation bundle, improve documentation of bundle care actions, and to reduce average ventilator days.

Methods

Interventions and Implementation

Implementation Summary. At a level I trauma center in the northwestern United States, standardized multidisciplinary rounding on trauma patients with checklists will be implemented

along with staff education on the SCCM's ICU liberation bundle and documentation. These measures will be implemented with the goal of reducing average trauma ventilator days by 25%.

Intervention and Implementation. Before implementation, ICU staff education will b at the December quarterly mandatory staff meeting. This education will be on SCCM's ICU liberation bundle as well as a demonstration of documentation of the ICU liberation bundle. An email summarizing education from the meeting will also be sent afterwards to staff for reference. Starting the Monday after the quarterly meetings, all trauma patients will be included in 1100 multidisciplinary rounds. For all ICU patients, a rounding checklist (Appendix A) will be used as a guide by the interdisciplinary team to ensure that all components of the SCCM ICU liberation bundle and other key care items are discussed. The patient's primary nurse will start rounds by introducing the patient and giving a summary of their hospital admission reason and events over the previous 24 hours. The care manager will then read off items of the checklist and allow each corresponding team member to provide their update. The ICU care manager will indicate on the project tracking sheet (Appendix B) which trauma patients were rounded on each day. This tracking sheet will be placed in the project coordinator's mailbox every Friday afternoon. At this same time, staff will be expected to start documenting bundle components daily as part of their assessments. Documentation frequency will be recorded in weekly chart audits by the project coordinator.

As per request from the ICU Policy, Procedure, and Research Committee, all the above interventions will be applied to all ICU patients. Data collection will only be done on trauma patients, however. Because this is a mixed medical-surgical ICU, it would be too complicated for nursing to change their documentation practices for the two different populations when all other

documentation standards are the same. Similarly, since rounding will involve all ICU patients, it would be feasible to utilize the rounding checklist with all patients. If there is a benefit to outcomes for trauma patients, it could be inferred that the ventilated medical patients would benefit from the standardized rounding as well.

Some nursing staff have expressed their dislike of the idea of rounding. This could be a potential barrier, as not all staff will be pleased with the change to practice. Another potential barrier is the differing preferences of each intensivist. Some physicians prefer to present the patient in rounds themselves, while others prefer to not participate in rounds at all. With clear communication and relevant education, these barriers may potentially be addressed prior to the start of implementation.

Evaluation and Analysis

The project coordinator will evaluate rounding frequency and documentation weekly. The ICU care manager will check off daily rounds on a weekly data collection sheet for the project coordinator. The trauma coordinator will continue to collect ventilator day means and report to the project coordinator at the end of the first PDSA cycle. Average ventilator days will be compared to baseline average ventilator days. Tables 1, 2, and 3 further detail the evaluation and analysis process. As the project coordinator, this DNP student will perform weekly documentation review to assess if bundle documentation occurred.

SMART Goal #1: Trauma patients will be included in 1100 weekday rounds 100% of the time. This goal is set at 100% since rounds are already occurring at this time Mondays-Fridays, so it should be feasible to include the SICU patients as well.		
• Trauma physicians and advanced practice providers will join in on daily rounds with the interdisciplinary team.		
Data to be collected	Method of collection	Planned data analysis
• Did trauma rounds occur? • Number of trauma patients • Number of trauma patients rounded on	• ICU care manager will keep track of when interdisciplinary team rounds on each trauma patient. • Project lead will enter deidentified information into an excel spreadsheet stored on site's secure server.	Percentage of trauma patients rounded weekly (Monday through Friday).

Table 1. SMART Goal #1

SMART Goal #2: Nursing documentation of complete ICU liberation bundle components for trauma patients will increase to at least 50%.		
• The project coordinator will present education on the SCCM ICU liberation bundle and documentation at mandatory December staff meetings.		
Data to be collected	Method of collection	Planned data analysis
• Frequency of complete bundle documentation per trauma patient	• Trauma coordinator will send a weekly list of trauma patients to the project coordinator via secure email. • Project coordinator will complete weekly chart audits of those patients to evaluate bundle documentation.	Frequency and percent of complete ABCDE documentation

Table 2. SMART Goal #2

SMART Goal #3: Average ventilator days for trauma patients will decrease by 25 %. The current ventilator days at this site is 6, while the national average is 3. We will aim for 4.5, a modest decrease to accommodate the site's population. Patients in this clinic often present with drug and alcohol withdrawal, complicating sedation weaning and prolonging ventilator days.		
Data to be collected	Method of collection	Planned data analysis
• Average ventilator days prior to intervention • Average ventilator days after intervention	• Trauma coordinator will collect ventilator day data and store on a secure server. • Trauma coordinator will send data spreadsheet via encrypted email to the project coordinator.	Average ventilator days compared to baseline average ventilator days

Table 3. SMART Goal #3

Safety and Confidentiality

To ensure patient confidentiality, all documentation that contains protected health information will be kept on a secure server maintained by the site. The trauma coordinator will collect data and store it in an excel spreadsheet on the site's secure server. The project coordinator will collect only average ventilator days from this data and will not need to collect protected health information.

CHAPTER THREE

QUALITY IMPROVEMENT MANUSCRIPT

Contribution of Authors and Co-Authors

Manuscript(s) in Chapter(s): 1

Author: Rette Olsen

Contributions: Primary author, primary investigator

Co-Author: Lindsay Benes

Contributions: Faculty chair, first reader, editor

Co-Author: Molly Secor

Contributions: Second reader, editor

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Clinical Problem

Patients admitted to the Intensive Care Unit (ICU) after a traumatic injury are vulnerable to significant complications associated with their hospitalization (Younan et al., 2020). For those patients on mechanical ventilation, complications include increased mortality, length of stays, and rates of ventilator-associated pneumonia (VAP). Prolonged mechanical ventilation is a significant but modifiable risk factor for VAP. At a regional level I trauma center in the Northwestern United States, average ventilator days were found to be up to twice the national average.

The Society of Critical Care Medicine (SCCM) and the Institute for Healthcare Improvement (IHI) both recommend the use of an ICU Liberation bundle. This bundle is a set of guidelines to manage and prevent pain, agitation, delirium, immobility, and sleep disruption of critically ill patients (Institute for Healthcare Improvement, 2012; Society of Critical Care Medicine, n.d.). Use of such a bundle has been shown to reduce complications associated with ICU admissions and ventilator use. This level I trauma center currently integrates this bundle into the usual care of ventilated patients, but not all elements of the bundle are being consistently implemented in all ventilated patients. To reduce the average number of ventilator days for trauma ICU patients at this facility, an intervention to improve staff utilization of the ICU liberation bundle needed was implemented.

Review of Literature

The primary investigator conducted a review of the literature with the goal of investigating strategies to improve the utilization of the ICU liberation bundle. The literature

search was conducted on the Web of Science database, the American Association of Critical Care Nurses (AACN) website, the SCCM medicine website, and the IHI website. The following keywords were included: ventilator bundle, compliance, ABCDEF bundle, and implementation. Eight peer reviewed articles published between 2007 and 2023 were included in the review.

There is strong support in the literature for the use of an ICU liberation bundle for the care of ventilated patients. Addressing pain management, sedation strategies, aggressive ventilator liberation, and early mobility strategies are all part of current clinical practice guidelines for care of ventilated patients and are built into the ICU liberation bundle (Devlin et al., 2018; Institute for Healthcare Improvement, 2018). Implementation of the ICU liberation bundle leads to better outcomes for intubated ICU patients and is associated with a decrease in VAP rates (Hassan & Elsamann, 2022; Lansford et al., 2007). Discussing the ICU liberation bundle in daily interdisciplinary rounds using a standardized rounding tool coincided with a decrease in ventilator days (Institute for Healthcare Improvement, 2015; Lancaster et al., 2022; Sherburne et al., 2022). Strategies such as inclusion of the multidisciplinary team in rounds, development of a clear documentation process, and frequent staff education on the ICU liberation bundle may prove to be effective ways to increase compliance (Sherburne et al., 2022; Sweeney 2018).

Conceptual Framework

This quality improvement project used the IHI Model for Improvement as a framework for the project design. This model presents three main questions: what is trying to be accomplished, how is the change considered an improvement, and what change can be made to lead to improvement (Institute for Healthcare Improvement, 2017). For this quality improvement

project, the goal was to increase ICU liberation bundle compliance. This is measured by a reduction in overall ventilator days. Implemented changes leading to improvement were the following: include trauma patients in daily ICU multidisciplinary rounds, educate staff on the liberation bundle, and clarify ICU liberation bundle documentation. Due to time constraints, only one Plan-Do-Study-Act (PDSA) cycle was completed. The primary investigator researched current literature and observed current practice to develop the intervention. Then, working with the site's Trauma department and the ICU Policy, Procedure, and Research committee, the primary investigator developed a plan to put the intervention into practice. The intervention was implemented, and data collected for six weeks. The primary investigator collated the data and discussed possible changes for future PDSA cycles with the stakeholders.

Aims and Purpose

The purpose of this quality improvement project was to reduce average ventilator days by at least 25%. To accomplish this, we aimed to increase ICU liberation bundle use (demonstrated by documentation in the electronic medical record) in 50% of cases and implement a standardized rounding process in all trauma patients.

Methods

Context

The ICU at this facility is a 28-bed mixed medical-surgical unit with nurses caring for both populations of patients. The medical providers for the medical ICU are intensivists and nurse practitioners, whereas the medical providers for the surgical ICU patients are critical care trauma surgeons and physician assistants. The interdisciplinary team consists of either the

intensivist or the trauma surgeon, physician assistants, nurse practitioners, the nurse care managers, critical care pharmacists, respiratory therapists, dieticians, physical therapists, occupational therapists, the ICU charge nurse, and each patient's primary nurse. Interdisciplinary rounds formally occurred Monday through Friday at 11:00 am with the Medical ICU patients and at 11:45 am with the Surgical ICU patients. Trauma patients are under the care of the Surgical ICU team. Nurses and other members of the interdisciplinary team were not participating in the Surgical ICU patient rounding consistently. The rounding process itself and topics discussed was not standardized.

Intervention

The primary investigator, along with the site's Trauma department and the unit's Policy, Procedure, and Research committee, developed a checklist that included all components of the ICU liberation bundle to use during interdisciplinary rounds. The primary nurse was to use the checklist to lead the rounds on their respective patients. Because the unit cared for both medical and surgical ICU patients, the committee decided to implement the rounding checklist on all ICU patients for standardization purposes. Both teams identified key topics related to the ICU liberation bundle that they wished to include in staff education. The Policy, Procedure, and Research committee identified where the documentation of the liberation bundle components should occur in the electronic medical record.

Initially, the primary investigator planned to present education on the ICU liberation bundle, documentation of the bundle, and interdisciplinary rounding at a mandatory staff meeting. That meeting was cancelled, however, so an educational presentation was sent to the ICU staff email list one week prior to implementation. Nursing staff were asked to read the

presentation and respond to a Microsoft Forms survey indicating that they read the presentation. Out of a total of 90 nursing staff members, 9 responded to the survey indicating that they had read the presentation. Paper copies of the presentation were printed and placed at the five nurses' stations on the unit, as well as the charge nurse desk, conference room, and break room. The physicians, advanced practice providers, and the rest of the interdisciplinary team were also emailed education on the proposed rounding checklist.

Measures

During the six-week PDSA cycle, the primary investigator conducted chart reviews on each ventilated trauma patient and recorded the presence or absence of ICU liberation bundle documentation on each shift they remained intubated. The ICU care manager tracked the number of trauma patients in the ICU and the number of trauma patients that were discussed in daily rounds throughout the cycle as well. At the end of the PDSA cycle, the Trauma Performance Improvement Coordinator calculated the average ventilator days for the study period and the average ventilator days for the same time period in the previous year. This data was given to the primary investigator.

Analysis

After collecting documentation rates per shift, the primary investigator used that data to calculate the weekly average for each week of the cycle. The total documentation rate during the entire cycle was also calculated. The rounding frequency data was used to calculate the percentage of trauma patients rounded on. The average ventilator day data from the study period was compared to the previous year's data from the same period. The incidence of VAPs occurring during the study period was compared to the previous year.

Results

Overall ICU liberation bundle documentation averaged 14.71% (Figure 4). There were no trauma patients in the first or third week of the study, so no data was available during those weeks. Weeks 2, 4, and 5 had a documentation rate of 0%. Week six, the final week, had a 31.25% documentation rate. The interdisciplinary team rounded on 90.20 % of the unit's trauma patients (Figure 5). The only time patients were not rounded on during the study was if they were on comfort care or if they had transfer orders out of the ICU. One day's rounds did not occur as the trauma surgeon and physician assistants were in a procedure at that time. The total number of trauma patients on mechanical ventilation during the PDSA cycle was 5 patients and the average number of ventilator days 3.8 days (Table 4). This six-week period from the previous year, 2023, had a total of 15 ventilated trauma patients and an average number of ventilator days of 4.8 days. One incidence of VAP was recorded in 2023. No VAPs occurred during this PDSA cycle.

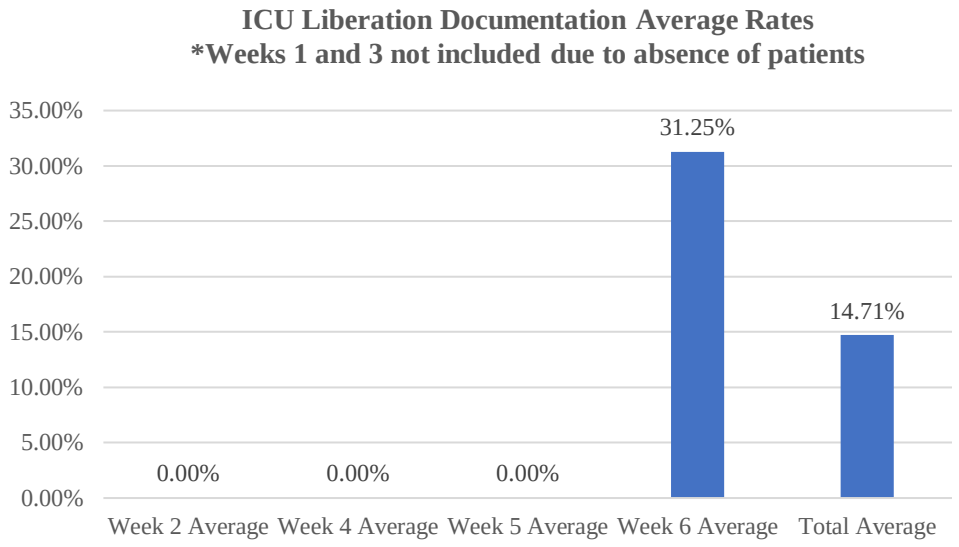

Figure 4. ICU Liberation Documentation Average Rates

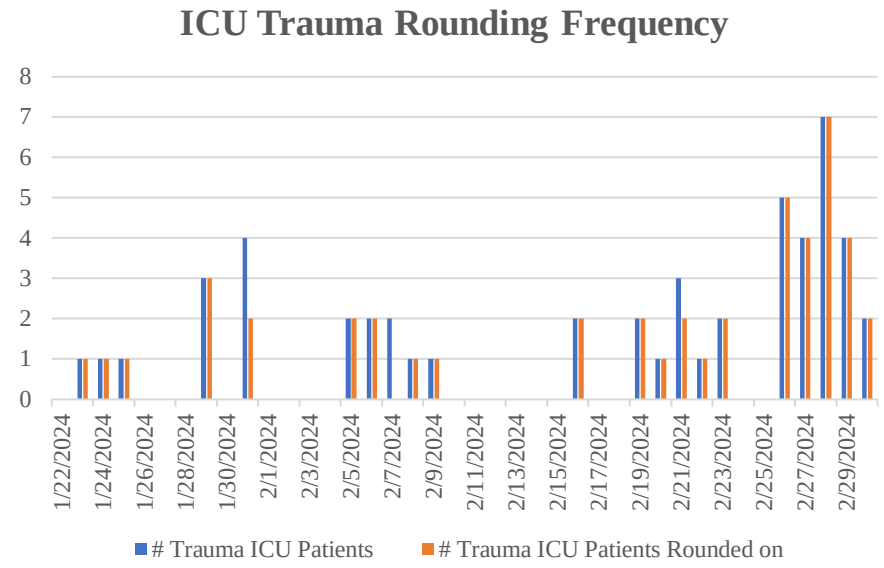

Figure 5. ICU Trauma Rounding Frequency

	2023	**2024**
Ventilated Patients	15	5
Average	4.8	3.8
VAP Occurrence	1	0

Table 4. Average Ventilator Days

Discussion

This PDSA cycle's 3.8 average ventilator days was 20% less than the previous year's average of 4.8. Although this reduction did not meet the goal of a decrease of 25 %, it is promising that there was a reduction overall in the average ventilator days. The absence of VAP during the cycle is also encouraging. This coincides with what the review of literature found: interdisciplinary rounding processes can potentially reduce ventilator days and thereby reduce ventilator-associated complications such as VAP.

The second goal was to improve compliance to the ICU liberation bundle by 50%, as evidenced by documentation. Previously, documentation of the full bundle components was not being done. The average documentation rate of 14.71% did not meet this goal. No documentation occurred at all in the first 5 weeks of the study. The low documentation rates may be attributed to the education provided at the beginning of the study. Education was not done in person, and only 9 nurses responded that they had read the education material provided. One barrier in the documentation process was the electronic medical record. The ICU liberation bundle flowsheet is not set to be automatically visible to nurses, so nurses must modify their individual settings to be able to see and chart on the ICU liberation bundle. The ICU liberation bundle flowsheet is also in a separate part of the chart than the regular ICU flowsheet that the nurses chart their other cares in. If the flowsheet was incorporated into the ICU flowsheet and was made automatically visible to all ICU nurses, documentation rates might improve.

Implementation of the standardized rounding process was successful; the majority of trauma patients were involved in daily rounds. The only patients who were not involved in the rounding process were those on comfort care or those preparing to transfer out of the unit. Only one day's rounds were disrupted by unavailability of the physicians and advanced practice providers.

Limitations

The number of trauma patients during this PDSA cycle was low; only 5 trauma patients needed mechanical ventilation, whereas 15 patients were intubated at the same time in the previous year. This does make comparing the results difficult. More PDSA cycles would be necessary to collect more data on potentially more patients.

With the resulting low documentation rates and poor response to the education sent via email, the inability to present the information in person was a significant limitation in the implementation process. With 90 nursing staff members, presentation at a mandatory staff meeting would be the ideal way to educate staff on documentation.

Recommendations

In future PDSA cycles, involving the facility's Information and Technology department may be beneficial. The ICU liberation bundle must be made visible automatically to all ICU nurses, and ideally should be placed within the ICU flowsheet. This would remove barriers to documentation and remove the burden of adjusting their EMR settings themselves.

Informal feedback from the physicians and advanced practice providers was positive. Overall, the group felt that the rounding process was improved, but requested that the checklist be simplified. Several of the group noted that having successful nurse-led rounds was dependent on the comfort level of the nurse presenting the rounds. Some physicians stated they would prefer physician or advanced practice provider-led rounds, which would standardize the rounds further with less people leading the rounds. Informal feedback from nursing staff regarding rounds was mixed; some enjoyed the standardized process, some were uncomfortable leading rounds, and others did not find rounds beneficial at all. Some suggested rounding earlier in the day as by midday, much of the patient's plan of care had already been put into place. Some suggested revising the rounding checklist to be a document that both night shift and day shift nurses could contribute to before the morning rounds.

Before another PDSA cycle can be started, in-person education of staff should be a priority. It was clear that the lack of in-person education was a barrier in the implementation of

this project. Education could be conducted at another mandatory staff meeting or as part of the unit's annual skills education. Including the ICU liberation bundle and rounding could be included in those skills days for further reinforcement of concepts.

Conclusion

For any ICU that cares for the intubated trauma patient, the reduction of ventilator days must be a top priority. The link between prolonged mechanical ventilation and ventilator-associated complications is irrefutable. This quality improvement project aimed to reduce the average ventilator days in the trauma ICU patient by implementing a standardized interdisciplinary rounding process and highlight the importance of the ICU liberation bundle in the care of the ICU patient through education and focusing on documentation compliance. Although the goal to increase documentation rates was not met, the interdisciplinary rounding process was successfully implemented and a decrease in average ventilator days was observed. In addition, there was no observed incidence of VAP in the trauma patients. Further PDSA cycles should focus on improving the documentation process and providing in person education to nursing staff. Further improvements to the rounding process could also be considered, whether that be editing the checklist to not only simplify it but also allow night shift to contribute or transitioning to provider-led rounds earlier in the day.

CHAPTER FOUR

ADVANCED NURSING ESSENTIALS REFLECTION

The DNP Essentials

As a graduate student in the Montana State University Mark and Robyn Jones College of Nursing, I had the opportunity over the past eight semesters to advance my nursing knowledge and practice. The American Association of Colleges of Nursing's Core Competencies for Professional Nursing Education outlines ten different domains of advanced-level nursing education. My coursework and clinical experience during my time as a graduate student has exposed me to all ten different domains. While reflecting on my coursework, four specific domains of nursing practice stand out to me as significant components of my education as an advanced practice provider.

The first essential, Knowledge for Nursing Practice, is described by the American Associate of Colleges of Nursing (AACN) as involving the translation of evidence from science into practice. My coursework in pathophysiology, pharmacology, health promotion, and advanced nursing care of different populations have all prepared me to take knowledge from nursing science and other sciences and apply them to practice. I then took that knowledge and used it to guide my decision making in clinicals. For example, in my coursework, I studied the pathophysiology of hypertension and heart disease as well as pharmacological treatments of such conditions. In my clinical rotations, I encountered many patients with hypertension. Using my knowledge from my coursework, I was able to educate patients on lifestyle modifications they could make to reduce their risk of cardiovascular disease and formulate treatment plans for their

hypertension using medications and clinical practice guidelines. In my Evidence-Based Practice courses and Scholarly Writing courses, I performed literature reviews to investigate current best practices on several topics. Using what I had found in my review of the literature, I was able to synthesize the research to develop a quality improvement initiative.

The second essential involves person-centered care. Person-centered care requires that I as an advanced practice nurse actively seek to establish caring relationships. This essential also involves assessing patients, diagnosing health conditions or needs, and developing individualized plans of care. My coursework in Advanced Assessment, Diagnostic Reasoning, and Advanced Primary Care Diagnostics gave me the skills to effectively assess, diagnose, and plan patients' care while remembering that the patient is at the center of all clinical practice. My experiences in clinicals have allowed me to grow in this role as an advanced practice nurse. For example, in my early clinical semesters, I first started assessing and taking down patient histories. As I progressed in the program, I then began to develop the plan of care with my preceptors. In my final semester, I would assess, diagnose, and present a plan of care to my preceptors and my patients. Throughout my clinical experience, I was able to use individualized information to guide my plan of care. For example, one patient I saw in clinic had pharmacogenetic testing done. I used these results to formulate a treatment plan with the patient for her attention deficit disorder. I was able to find a medication that would work best for the patient based on their individualized pharmacogenetic profile.

The fourth essential, Scholarship for the Nursing Discipline, was best demonstrated by my work on my quality improvement project. Throughout my project's duration, I attempted to integrate best practice into nursing practice. My review of literature was one example of this, but

the development of the intervention was another. I collaborated with other members of the team to form a research-driven, evidence-based rounding tool to implement in the Intensive Care Unit. By participating in such a project, I was able to both advance nursing scholarship and implement best practice.

The sixth essential, Interprofessional Partnerships, was met by my involvement in group projects throughout my course work, my work on my quality improvement project, and my time at clinical sites. Delivering patient-centered care involves the interdisciplinary team. The multiple group assignments throughout the program helped me grow as a team collaborator and effective communicator. These projects mirrored what I would see in clinicals and what I will see in future practice. At clinical, I was often collaborating not only with my preceptor, but with other providers involved in the patient's care, including physicians, advance practitioners, nurses, and therapists. It was essential, therefore, that I was able to communicate with others effectively and professionally in the clinical setting. While planning and implementing my quality improvement project, I met with different stakeholders often. I quickly learned that organizing a project that involved many different people from many different departments was challenging. I relied heavily on what I had learned from my experiences in group projects to guide my communication strategies.

Reflection of the QI Project

As I got deeper into working on the Quality Improvement Project, I was surprised at how much of my coursework thus far applied to the process of planning, developing, implementing, and evaluating my project. I felt prepared to take this project on with all of the knowledge and tools that my graduate coursework had provided me. The challenges I encountered during this

project taught me much about collaboration with others and the new role I will be taking on as an advanced practice nurse.

The biggest challenge throughout the project was maintaining effective communication with not only the staff involved, but also the management of the ICU and the Trauma Department. Both the ICU and the Trauma Department had their own wishes and recommendations for the project, and finding out ways to effectively include all those wishes while meeting the project's deadlines was challenging. Furthermore, reaching all the almost 100 members of the ICU's nursing staff was close to impossible. Facilitating change in such a large group is difficult, especially when confounding variables such as documentation burden, inadequate staffing, and lack of resources exist. I learned that individualized conversations with stakeholders was the best way to promote my project.

I look towards my future career as a doctoral prepared nurse practitioner with excitement. My project aimed to improve patient outcomes; my future practice will as well. Although I may not be part of another quality improvement project for quite some time, I will without a doubt work in a setting that will require the communication skills I refined during this project. Although I will not be the sole member of my future patients' healthcare team, my role as the advanced practice nurse will require effective leadership and collaboration with others. My time working on the quality improvement project both challenged me and cultivated an experience to grow as a leader and enhance my communication skills.

Conclusion

After reflecting on my coursework and how my education met the DNP core competencies, I am proud of my doctoral education and how it has prepared me to enter practice.

As the essentials outline, advanced nursing practice involves much more than the assessment and diagnosis of health problems. Advanced nursing practice also involves leadership, stewardship, professionalism, and collaboration with the healthcare team. My graduate coursework, clinical experience, and work on a quality improvement project all prepared me for the advanced practice role and what it entails. I look forward to seeing how I will grow in my future practice.

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APPENDICES

APPENDIX A

INTERDISCIPLINARY ROUNDING CHECKLIST

ICU Interdisciplinary Rounds

Room:
Date(s):

Background: One sentence summary/small summary by RN

- Trauma patients:
  - Mechanism of injury
  - Summary of injuries
- Admission Date:
- How are they doing today: any acute changes/concerning assessment findings by RN?

Tubes- #days, still needed?

- Central lines
  - Insertion Date(s):
- Foley Management
  - Insertion Date:
- Other lines/tubes/devices:
- Ventilator:
  - Date intubated:
  - SBT
- Sedation:
- Pain Management:

Numbers

- Vital sign trends
  - Drips:
- I & O:
- Concerning recent labs:

Plan

- Placement, transfer, surgeries/trach/PEG, etc.

Do any of the following need to be discussed during rounds?

- Skin/wound care
- VTE prophylaxis
- PPI prophylaxis
- Delirium Prevention and/or management
- Mobility plan
- Nutrition/Bowel management
- Code status
- Coroner case?
- Life Center consult
- Palliative care consult
- Any other needs/concerns/Family

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Figure A1. ICU Interdisciplinary Rounding Checklist

APPENDIX B

TRAUMA ROUNDING TRACKING SHEET

Trauma Rounding Tracking Sheet

Week of:

	Monday	Tuesday	Wednesday	Thursday	Friday
Did 1100 rounds occur?					
# of trauma patients					
# of trauma patients included in rounds					
Notes					

Figure B1. Trauma rounding tracking sheet