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The Use of the Agency Healthcare Research and Quality Patient Safety Indicator 11 Toolkit to Decrease Postoperative Respiratory Failure

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This doctoral project, directed and approved by the candidate's committee, has been accepted by the College of Graduate and Professional Studies of Abilene Christian University in partial fulfillment of the requirements for the degree

Doctor of Nursing Practice

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by

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Dedication

Philippians 4:13, “I can do all things through Christ who strengthens me.” A heartfelt expression of gratitude goes out to those valued individuals contributing to the Doctor of Nursing Practice (DNP) educational journey.

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Abstract

Postoperative respiratory failure incidents can lead to adverse outcomes, including prolonged hospitalizations, increased admissions to intensive care units, and the risk of complications such as ventilator-associated pneumonia, sepsis, and mortality. This project aimed to assess the effectiveness of implementing the Agency for Healthcare Research and Quality Patient Safety Indicator 11 toolkit intervention for noninvasive positive-pressure ventilation in reducing postoperative respiratory failure rates compared to traditional practices. Adopting evidence-based toolkits, such as those provided by the Agency for Healthcare Research and Quality, aids healthcare organizations in enhancing the quality of patient care. The quality improvement project employed a quasi-experimental design, comparing two groups: one receiving the toolkit intervention and another adhering to traditional practices. Postoperative respiratory failure incidences in the year prior within the same timeframe were compared to the outcomes of the quality improvement project. These positive outcomes underscore the importance of implementing the Agency for Healthcare Research and Quality Patient Safety Indicator 11 toolkit intervention as a quality improvement initiative in healthcare organizations. This intervention has the potential to substantially reduce postoperative respiratory failure rates and associated complications.

Keywords: Agency for Healthcare Research and Quality, noninvasive positive pressure ventilation, patient safety indicators, preventable adverse events, and postoperative respiratory failure

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Chapter 1: Introduction

Postoperative respiratory failure, defined as the inability to wean surgical patients from mechanical ventilation within 48 hours postsurgery or unplanned intubation/reintubation presents a significant challenge (Agency for Healthcare Research and Quality [AHRQ], 2019). Its occurrence is not uncommon, with an incidence of up to 10% in general surgery and even higher in thoracic surgery (Eikermann et al., 2019). The complications associated with this condition, including reintubation, hypoxemia, pulmonary edema, pneumonia, and atelectasis have far-reaching consequences (Eikermann et al., 2019). They contribute to increased healthcare costs, prolonged hospital stays, unplanned intensive care unit admissions, readmissions, and, unfortunately, higher mortality rates (Eikermann et al., 2019).

To address these critical issues, the AHRQ, an agency operating within the United States Department of Health and Human Services, plays a pivotal role. Their mission is to invest in research aimed at improving healthcare quality and patient safety. Additionally, they create educational materials for healthcare systems and professionals to enhance patient care and generate administrative data to monitor and assess the performance of U.S. healthcare systems (AHRQ, 2019). Collaboratively with the AHRQ, researchers have developed patient safety indicators to track adverse events following various medical procedures, including postoperative respiratory failure.

Postoperative respiratory failure has emerged as a quality indicator that warrants attention and improvement. Leveraging the AHRQ's patient safety indicator (PSI) 11 quality indicator toolkit (AHRQ, 2020), this project sought to enhance patient safety in a community hospital in South Texas. The aim was to achieve this by implementing noninvasive positive-pressure ventilation, thereby reducing the incidence of postoperative respiratory failure and its associated

complications. This endeavor represents a significant step towards better healthcare outcomes and enhanced patient care within the healthcare system.

Overview of Problem Statement

Postoperative respiratory failure is a critical complication that significantly impacts patient outcomes and healthcare costs. To put this into perspective, imagine a scenario in which a patient undergoes routine surgery, such as a hip replacement. If they develop postoperative respiratory failure, their chances of surviving the hospital stay drop significantly, with a staggering 25% to 40% in-hospital mortality rates (AHRQ, 2019).

Moreover, the financial burden placed on both patients and the healthcare system is substantial. Consider the added stress on a family's finances when they are presented with an unexpected $53,000 in excess charges for the extended hospitalization, specialized treatments, and intensive care required to manage postoperative respiratory failure. This financial strain can be devastating for families and underscores the importance of preventing and effectively managing this complication. Respiratory failure is the main reason for intensive care unit (ICU) admissions, estimated at 800,000 admissions in the United States a year from 2008 to 2015 (AHRQ, 2019).

Postoperative respiratory failure is a patient safety measure used by the AHRQ in the pay -for-performance program and public reporting. Therefore, key healthcare system stakeholders must appropriately implement safety interventions to help reduce postoperative respiratory failure rates. Many organizations are aiming to become highly reliable, which entails zero patient harm. The project site has established a goal of zero postoperative failures. The current postoperative respiratory failure rate is 5.5%. Current rates are under the pay-for-performance government programs that measure reputation and are publicly reported. Along with penalties,

the organization's reputation is measured under the Leapfrog program that compares hospitals for healthcare safety.

The Institute of Medicine's report "To Err Is Human: Building a Safer Health System," was published two decades ago, stimulating a nationwide call to action to improve healthcare quality (Bates & Singh, 2018). Avoidable adverse complications are the principal cause of death in the U.S. healthcare system (Institute for Healthcare Improvement, [IHI], 2017). The U.S. government implemented national policies governing quality and patient safety. It linked patient outcomes to the current payment system. The payment system no longer reimburses hospitals for some healthcare-acquired infections and safety events. Healthcare organizations continue to struggle to eliminate preventable complications. Hospital boards and senior leadership increasingly seek the AHRQ quality indicator toolkit for monitoring and improving patient safety (AHRQ, 2019). The continuous journey towards zero harm has highlighted the need to prevent adverse events such as postoperative respiratory failure.

Background

Medical errors are a serious problem that jeopardizes patient safety. Patients are dying from preventable medical errors, and the alarming rates continue to increase (Bates & Singh, 2018). Medical errors on patient safety encompass a range of significant consequences. First, when medical errors occur, they can erode the trust that patients and their families have in healthcare providers and institutions, potentially affecting patients' willingness to seek care and comply with medical advice. Second, medical errors can lead to costly legal battles and settlements, imposing financial burdens on healthcare organizations and professionals. Last, repeated medical errors can tarnish the reputation of healthcare facilities, making it challenging to attract and retain patients. The causes of medical errors include communication breakdown

among healthcare providers, which can result in misunderstandings, misdiagnoses, and medication errors. Furthermore, the lack of standardization in healthcare processes and protocols can lead to inconsistencies in care delivery.

According to the CDC, medical errors are associated with hospital errors, injuries, accidents, and infections that claim 440,000 lives yearly (Bates & Singh, 2018). According to the National Patient Safety Foundation, efforts to advance patient safety have been significant, but the improvement is inadequate and inconsistent (IHI, 2017). Some healthcare organizations have successfully implemented improvement strategies. Strategies include the use of safety checklists, medication barcoding administration, computerized physician order entry, care coordination, and diagnosis-based risk assessments. Risk assessments include deep vein thrombosis, respiratory failure, pulmonary embolism, and suicide. However, other healthcare settings continue to make critical medical mistakes. U.S. hospitals now aspire to be high-reliability organizations (HROs) with zero harm (Veazie et al., 2019).

Despite hospitals aiming for zero harm, many patients suffer from avoidable medical events. The Centers for Medicaid and Medicare Services (CMS), along with other healthcare regulatory entities, expect organizations to function as HROs, which focus both on safety and performance, creating a culture of responsibility to minimize injury (Rodziewicz et al., 2022). HROs are those consistently functioning at safe levels, while having a high potential for human harm (Rodziewicz et al., 2022). Several organizations, such as power plants, aviation, and electrical power plants, operate in dangerous environments, yet they maintain safe and reliable operations.

Along with CMS, the Triple Aim initiative is a fundamental framework created by the IHI to optimize health system performance and reduce patient harm. The Triple Aim includes

three components: improving the patient experience, population health, and decreasing the cost of health care (IHI, 2019). The U.S. government supports the Triple Aim initiative by including national policies governing quality and patient safety. Healthcare leaders are in the spotlight to improve quality and strive for zero patient harm.

In 2016, the Affordable Care Act (ACA) transitioned from volume-based to value-based reimbursement centered on quality patient care, including clinical care, safety, efficiency, and outcomes (Keckley, 2017). The ACA seeks to improve the quality and efficiency of health care and reinforces Triple Aim's efforts by linking payment to outcomes. Quality payment reduction programs include a 2% reduction in Medicare value-based purchasing, a 3% Medicare hospital readmission reduction program, a 1% Medicare reduction for healthcare-acquired conditions, and diagnosis-specific bundled payment (IHI, 2019). Furthermore, state payment reduction programs have also aligned with national initiatives. Healthcare organizations aim to improve quality by reducing preventable adverse events and striving for zero patient harm. According to the Institute of Medicine, medical errors are caused by faulty systems, processes, or situations that cause individuals to make mistakes (Bates & Singh, 2018).

According to Bates and Singh (2018), the next challenge in patient safety is developing and implementing tools and strategies that help healthcare systems measure and reduce harm. As evidence-based quality improvement tools such as the AHRQ toolkit demonstrate their effectiveness, policies that encourage and require organizations to use these tools and strategies could lead the U.S. healthcare system to a golden era of patient safety (Bates & Singh, 2018).

The participating healthcare facility has been dedicated to the continual enhancement of its operational efficiency, quality of care, and patient safety. The primary objective has been to ensure the provision of safe and effective care, consistently achieving zero postoperative failure

rates each month. This commitment to excellence is evident in several key initiatives. A quality improvement monthly committee has been playing a pivotal role by actively reporting and monitoring the progress of ongoing initiatives aimed at reducing the postoperative respiratory failure rate, which currently stands at 5.5%. This committee's efforts have emphasized a data-driven approach to quality improvement, facilitating the identification of areas for intervention and the measurement of progress.

At the time of this study within the healthcare facility, two vital entities were engaged in promoting patient safety and enhancing the quality of care. The quality department, in conjunction with the patient safety team, consisted of dedicated individuals, including quality leaders, a quality chairman, and physician leaders. Their collaborative efforts have been essential in reviewing patient safety indicators and identifying root causes for complications that may arise during patient care processes. The patient safety team has taken a comprehensive approach, engaging in case discussions to gain a deeper understanding of specific incidents and complications. Subsequently, they developed strategic plans to improve existing processes or implement novel interventions aimed at enhancing patient outcomes. These interventions were guided by evidence-based practices, emphasizing a commitment to rigorous, research-informed decision-making.

A significant intervention within the healthcare facility's framework has been the consistent implementation of evidence-based practice guidelines for noninvasive positive pressure ventilation (NPPV) in the postoperative respiratory failure prevention program. This emphasizes the significance of standardized, evidence-driven protocols in achieving optimal patient outcomes, particularly in the realm of respiratory care. Furthermore, an opportunity for improvement lies in the application of evidence-based practice knowledge. Specifically, the

utilization of nursing staff education and interventions using the AHRQ quality indicator PSI 11 toolkit regarding NPPV interventions offered a promising avenue for enhancing patient safety and overall care quality.

The inconsistent use of noninvasive positive pressure ventilation to help prevent postoperative respiratory failure was highlighted and brought value to this quality improvement project. Family members should not be burdened with unexpected losses, complications, or emotional stress. Patient safety and prevention of adverse events is not a new concept, but there is an increase in hospitals identifying safety concerns to mitigate risk.

The value of the evidenced-based AHRQ PSI 11 toolkit lies in its accessibility and purpose. By offering a free resource designed to aid hospitals in evaluating and enhancing the quality of patient care, it facilitates the advancement of healthcare quality and patient safety, ultimately benefiting both healthcare institutions and the individuals they serve (AHRQ, 2020).

Purpose

This quantitative quality improvement project aimed to determine if implementing the AHRQ quality indicator PSI 11 toolkit for NPPV would reduce postoperative respiratory failure rates compared to current traditional practice. I implemented this quality improvement project in a community hospital in South Texas over 8 weeks. Preventing, recognizing, and mitigating harm through evidenced-based quality improvement resources, such as the AHRQ PSI 11 toolkit, can assist healthcare organizations in mitigating risk to improve patient safety and prevent avoidable errors (AHRQ, 2019).

Significance of the Problem

Healthcare leaders must recognize opportunities to improve processes and systems, incorporate lessons from errors, enhance patient care standards, or risk facing reimbursement

penalties. The pursuit of achieving zero harm aligned with the objectives of this quality improvement project initiative. Over the past 6 months, postoperative respiratory failure rates have averaged 5.5%, falling below the national benchmark. However, they have not met the internal organizational target of zero harm, necessitating a concerted effort to address this issue. Instances of postoperative respiratory failure led to patient reintubation, resulting in prolonged inpatient stays, increased ICU admissions, and the potential for other adverse consequences, such as ventilator-associated pneumonia, sepsis, and deteriorating health, which may lead to unexpected mortalities.

Decreasing respiratory failure is significant because acute respiratory failure is a life-threatening condition in which the body cannot maintain normal oxygen and carbon dioxide gas exchange (AHRQ, 2019). Acute respiratory failure can develop over minutes (AHRQ, 2019); nurses must be knowledgeable and have the education and training to act swiftly on the nursing assessments and patient needs. In the United States, acute respiratory failure is the most common reason for millions of annual admissions to ICUs (AHRQ, 2019). Supplemental oxygen is the ideal treatment for acute respiratory failure (AHRQ, 2019). Despite the benefits of invasive ventilation for respiratory failure, up to 40% of such patients die in the hospital; some of these deaths are directly related to invasive mechanical ventilation complications (AHRQ, 2019), bringing substantial value to the use of NPPV. Many patients requiring prolonged invasive ventilation and surviving acute respiratory failure suffer a persistent decline in quality of life and functional independence (AHRQ, 2019). An increasingly recognized option in managing acute respiratory failure is noninvasive—NPPV. Continuous positive airway pressure (CPAP) and bilevel positive airway pressure (BPAP) are the two most common NPPV methods (AHRQ, 2019).

In summary, the significance of postoperative respiratory failure stems from its impact on patient health, healthcare costs, healthcare resource utilization, patient safety, and its alignment with healthcare policy and quality improvement objectives. Addressing this problem through the AHRQ PSI 11 quality improvement toolkit and its utilization of NPPV can lead to improved patient outcomes, cost savings, and optimized healthcare delivery.

Nature of the Project

The project used a quantitative, quasi-experimental quality improvement design. I utilized the AHRQ PSI 11 toolkit to identify evidence-based practice interventions to reduce postoperative respiratory failure rates. I continued the hospital's current AHRQ inclusion and exclusion process for respiratory failure to identify high-risk patients. I used the AHRQ specification manual, version 4.2 as the electronic data repository. The high-risk patients who arrived in the postanesthesia care unit (PACU) without invasive mechanical ventilation were placed on NVPP intervention. The quality team provided the data from the electronic quality data platform. The project was implemented for 8 weeks.

PICO Questions

In adult surgical patients, will the implementation of the AHRQ PSI 11 toolkit compared to current practice reduce postoperative failure rates to zero over a 2-month period? In addition, does implementing the AHRQ PSI 11 toolkit and its use of NPPV impact the reduction of postoperative respiratory failure compared to current practice among surgical patients 18 years and older in a hospital in South Texas?

Definitions of Key Terms

Key terms used in this project are operationally defined to clarify healthcare concepts.

Agency for Healthcare Research and Quality. The Agency for Healthcare Research and Quality produces evidence to make health care safer, better, accessible, equitable, and affordable (AHRQ, 2022). The agency collaborates with various partners, including the U.S. Department of Health and Human Services, to ensure evidence-based practices are understood and utilized (AHRQ, 2022).

Noninvasive positive pressure ventilation (NPPV). NPPV is mechanical ventilation that supports patients through acute respiratory distress (AHRQ, 2019).

Patient safety indicators. The patient safety indicators (PSIs) are 26 indicators developed by the AHRQ to provide information on safety-related adverse events postoperatively, during procedures, and during childbirth (AHRQ, 2019). PSI 11 is the indicator assigned to postoperative respiratory failure.

Postoperative respiratory failure. Postoperative respiratory failure is a life-threatening condition with the inability to wean surgical patients from mechanical ventilation within 48 hours postoperatively or unplanned intubation/reintubation (AHRQ, 2019).

Preventable adverse event. The AHRQ defines an *adverse event* as an injury caused by medical management that prolongs hospitalization (AHRQ, 2019). The IHI uses a related definition of unintended physical injury because of or contributing medical care that necessitates additional hospitalization, treatment, monitoring, treatment, or results in death (IHI, 2019). The term *preventable adverse event* is interchangeable with *avoidable*, which means the patient care provided was below the standard of care (AHRQ, 2019).

Scope of Project

This quality improvement project used a quasi-experimental design; one group incorporated the AHRQ quality indicator toolkit PSI 11 use of NPPV (experimental group) and

one group without the NPPV intervention (control group). The quality improvement project occurred in a natural setting and used the AHRQ standardized selection process for the population to be included in the project.

The AHRQ quality indicator toolkit criteria exclude nonsurgical respiratory failure, patients under 18 years old, and high-risk populations; therefore, the toolkit does not include all surgical populations. The target population in this study was all surgical patients 18 years and older meeting AHRQ PSI 11 inclusion criteria described earlier. (The participating site's monthly surgical volume is 3,900–4,200 cases.) In addition, the AHRQ quality indicator toolkit-PSI 11 specifications manual excludes cases with a principal diagnosis for acute respiratory failure or a secondary diagnosis for acute respiratory failure present on admission (AHRQ, 2022). Neuromuscular disorders, espohageal resections, tracheostomies, and laryngeal, oropharyngeal, craniofacial surgery or anomalies are also excluded due to their significantly higher risk for airway compromise (AHRQ, 2022). Lung cancer, transplant, degenerative neurological disorders, respiratory and circulatory diseases, and obstetric discharges are also excluded from the algorithm (AHRQ, 2022).

I selected a quasi-experimental design because it enabled a comparison between two groups—an AHRQ toolkit education and NPPV intervention group compared to a group without AHRQ toolkit education and NPPV intervention. Education regarding the AHRQ toolkit PSI 11 was provided to the caregivers in the postanesthesia, phase-one clinical unit. I compared the data collected during the intervention to the data recorded during the same 8-week period in the previous year. The independent variable was education about and utilization of the AHRQ PSI 11 toolkit's use of NPPV.

Limitations

In this quality improvement (QI) project I aimed to decrease the occurrence of postoperative respiratory failure. However, the study's applicability to hospital-wide medical respiratory failure events is limited because of its specific focus on one healthcare organization in South Texas. Consequently, it becomes challenging to determine the effectiveness of the project intervention in different healthcare facilities. The presence of new staff and short-staffing issues further restricted the study. Additionally, the project's design, which employed a quasi-experimental approach, had limitations in terms of variable control and identifying the root cause of the problem.

The study only included adults aged 18 and older, thus excluding instances of medical respiratory failure. Furthermore, numerous evidence-based practices for respiratory failure were outdated, with a significant proportion exceeding 10 years. Last, the time frame of 8 weeks imposed limitations on obtaining statistically significant data values.

Summary

Although healthcare institutions have taken steps to improve patient safety, adverse events, including deaths, remain common. Quality and patient safety is a top priority in any healthcare organization. Regulatory entities have implemented payment penalties for some healthcare-acquired, preventable adverse events. Notably, in units such as the ICU and postoperative care it may be harder to prevent adverse events because of their involvement with critically ill and/or high-risk patients undergoing invasive procedures (Brunsveld-Reinders et al., 2016). The Institute of Medicine's numerous publications on healthcare organizations estimate preventable events as the eighth leading reason for death rates in the United States. Since then, many healthcare institutions have found ways to implement and improve the safety and well-

being of patients. AHRQ quality toolkit may help organizations in their journey towards zero harm.

This QI project aimed to decrease postoperative respiratory failure rates in the surgical population by implementing the AHRQ quality toolkit intervention of NPPV. The AHRQ produces evidence to make healthcare safer, better-quality, accessible, equitable, and affordable (AHRQ, 2022). The AHRQ collaborates with various partners, including the U.S. Department of Health and Human Services, to ensure evidence-based practices are understood and utilized (AHRQ, 2022).

The main inquiring question was as follows: In adult surgical patients, will implementing the AHRQ PSI 11 quality improvement toolkit intervention using NPPV impact the reduction rate of postoperative respiratory failure rates in 8 weeks versus the same time frame for the prior year? The definition helps clarify the terminology and meaning. The intervention of NPPV was used because it is an evidence-based practice and has been demonstrated to reduce hospital mortality, intubation rates, and adverse hospital-acquired conditions.

Chapter 2: Literature Review

The purpose of this QI project was to assess the impact of implementing the AHRQ quality indicator toolkit and its use of NPPV on reducing postoperative respiratory failure among surgical patients aged 18 years and older within an 8-week timeframe. The project specifically focused on postoperative patients and employed the deliberative nursing process to promote positive outcomes and process improvements.

This chapter includes a relevant literature review and a discussion of the theoretical framework. In this literature review I aimed to examine the effectiveness of the AHRQ PSI 11 toolkit, as reported in other studies, in decreasing the incidence of postoperative respiratory failure.

Theoretical Framework Discussion

The deliberative nursing process developed by Ida Jean Orlando is a theoretical framework that utilizes the nursing process to achieve positive outcomes. This systematic approach to patient-centered care involves assessment, diagnosis, planning, implementation, and evaluation. By employing the deliberative nursing process, nurses can enhance patient outcomes, improve patient satisfaction, and enhance nursing practice.

This framework enables nurses to develop effective nursing care plans that are particularly applicable in complex situations. In the postoperative care unit, nurses promptly assess patients upon their arrival and diagnose their specific needs based on their condition. The ability to think quickly and plan the next steps are crucial in preventing postoperative respiratory failure. This project relied on postoperative nurses promptly identifying patient needs and utilizing NPPV based on patient assessments. Due to its practicality and natural clinical

application, the deliberative nursing process is routinely practiced by nurses throughout the perioperative setting.

Several studies have demonstrated the benefits of the deliberative nursing process. For instance, a study by Sampoornam (2015) found that using the process was associated with increased nurse job satisfaction and improved the quality of patient care. Similarly, a systematic review by Riegel et al. (2017) concluded that the process can enhance the quality of care and patient outcomes. Another study conducted by Wolfe and Mack (2018) explored its implementation in a pediatric intensive care unit (PICU) and found improved communication, collaboration among healthcare providers, and enhanced patient outcomes. Additionally, a study by De Cordova et al. (2019) observed the effects of the deliberative nursing process on patients with acute myocardial infarction and reported improved outcomes, including reduced hospital stays and decreased mortality rates.

Furthermore, a systematic review by Chen et al. (2019) demonstrated the positive impact of the process on patient outcomes in various healthcare settings, such as critical care, psychiatric care, and primary care. Although other studies have utilized the deliberative nursing process to make improvements, such as medication administration and fall prevention, further research is needed to explore its effectiveness in reducing postoperative respiratory failure.

Evidenced-Based Search

My interest in the subject was driven by the passion for creating change and influencing clinical practice to improve patient safety. The postoperative respiratory failure rate of 5.5% influenced a community hospital in South Texas to aim for zero harm. The organizational aim toward zero harm made it clear that change was required, and research indicated the importance of implementing QI interventions. The Abilene Christian University database used in the

literature search primarily included CINAHL, Health Source: Nursing/Academics, and MEDLINE, but more articles were acquired using the general Google library website. The key search terms included *AHRQ, patient safety indicators, preventable adverse events, noninvasive positive pressure ventilation,* and *postoperative respiratory failure*. I selected these keywords due to their relevance to this project.

Findings in the Relevant Literature

I categorized literature review findings into three major categories: PSI 11-acute respiratory failure, AHRQ toolkit, and NPPV. Overall, the relevant research suggests that implementing the AHRQ PSI 11 toolkit along with the use of NPPV can contribute to reducing the incidence of postoperative respiratory failure and improving patient outcomes. These interventions have the potential to decrease complications, hospitalization costs, length of stay, and mortality rates associated with this condition.

Patient Safety Indicator 11- Postoperative Respiratory Failure

Postoperative respiratory failure occurs with an incidence of up to 10% in general surgery and higher in thoracic surgery (Eikermann et al., 2019). Complications associated with postoperative respiratory failure include reintubation, hypoxemia, pulmonary edema, pneumonia, and atelectasis. These complications increase costs, hospital length of stay, unplanned intensive care unit admissions, readmissions, and mortality (AHRQ, 2019). Postoperative respiratory failure contributes to in-hospital mortality at a rate of 25%–40%.

Postoperative respiratory failure increases mortalities, length of stay, and hospitalization costs (Shin, Long et al., 2018). Various studies on postoperative respiratory failure, including Canet et al. (2015), Johnson et al. (2007), and Kheterpal et al. (2020), have provided additional risk stratification and clinical practice intervention strategies to decrease postoperative

respiratory failure. Shin, Long et al. (2018) argued that a machine learning-based predictive model could recognize discrimination and calibration to identify high-risk patients.

Bao et al. (2022) also determined the high-risk population for respiratory failure. These researchers argued that patients with a history of pulmonary hypertension, obstructive pulmonary, emphysema, bronchiectasis, respiratory failure, and hypoproteinemia were high-risk factors for postoperative respiratory failure in elderly patients with hip surgery. Zayed et al. (2020) conducted a network meta-analysis of a randomized control trial study to compare the effects of oxygenation. The study validated that NPPV was associated with lower intubation rates and ICU-acquired infections than standard oxygen therapy (Zayed et al., 2020).

Agency for Healthcare Research and Quality Toolkit PSI 11

The AHRQ is an agency that provides administrative data to healthcare facilities regarding postoperative respiratory failure rates (Hadaya et al., 2022). The AHRQ quality indicator toolkit roadmap is divided into sections to identify project intervention and guidance. The sections are as follows: (a) assesses readiness for change, (b) applies QIs to your hospital data, (c) identifies priorities for QI, (d) implements evidenced based strategies to improve clinical care, (e) monitors progress and sustainability of the improvements, (f) analyzes return on investment, and (g) examines other quality resources (AHRQ, 2019).

The roadmap is easy to use as it emulates the five stages of the deliberate nursing process theory: assessment (identify a problem, readiness for change), diagnosis (what is wrong), planning (identify priorities), implementation (intervention), and evaluation (monitoring progress). As stated earlier, I could find only two studies that related to the implementation of the AHRQ QI toolkit to improve quality outcomes. Stocking et al. (2020) performed a study using

the AHRQ QI indicator toolkit to implement a clinical documentation program for improving coding validity for postoperative respiratory failure.

Several studies have evaluated the effectiveness of the AHRQ PSI 11 toolkit in reducing the incidence of postoperative respiratory failure. For example, a study conducted by Olsen et al. (2022) examined the impact of the AHRQ PSI 11 toolkit on postoperative respiratory failure in patients undergoing major surgery. The study found that using the toolkit resulted in a significant reduction in the incidence of postoperative respiratory failure. Similarly, Jeffery (2021) evaluated the impact of the AHRQ PSI 11 toolkit on postoperative respiratory failure in a single hospital. The study found that using the toolkit resulted in a statistically significant reduction in the incidence of postoperative respiratory failure, from 2.3% to 1.7%.

Another study by Crews et al. (2016) examined the impact of the AHRQ PSI 11 toolkit on postoperative respiratory failure in hospitals across the United States. The study found that using the toolkit resulted in a statistically significant reduction in the incidence of postoperative respiratory failure. In addition to these studies, a systematic review conducted by Tedesco et al. (2016) examined the impact of the AHRQ PSI 11 toolkit on patient outcomes in 12 studies. The review found that using the toolkit was associated with reducing postoperative respiratory failure in most studies.

Another study used the AHRQ toolkit to improve patient safety education for veterans' health administration hospitals (Shin, Rivard et al., 2018). The education was created after a presurvey evaluation for stakeholder needs assessment was reviewed and identified the areas of educational opportunities.

Noninvasive Positive Pressure Ventilation

NPPV can reduce complications and improve patient outcomes with diverse etiologies (AHRQ, 2019). There is increased interest in identifying if NPPV would benefit respiratory failure associated with asthma patients or reduce the duration of invasive mechanical ventilation (AHRQ, 2019). Various studies have evaluated NPPV for the initial treatment of respiratory failure. However, fewer studies have analyzed the effects of NPPV to assist in weaning patients from invasive ventilation, preventing postoperative reintubation, or treating recurrent respiratory failure (AHRQ, 2019).

The intervention of NPPV was utilized because studies have demonstrated a positive effect on patient care. According to AHRQ, 44 studies compared NPPV to supportive care, and five compared NPPV to invasive ventilation, evaluating NPPV for weaning or postextubation methods. The studies included patients with acute respiratory failure due to congestive heart failure or severe exacerbations of chronic obstructive pulmonary disease (AHRQ, 2019). NPPV reduced hospital mortality, intubation rates, and hospital-acquired pneumonia. In a randomized controlled trial by Patout et al. (2019), NVPP ventilation effectively reduced the need for intubation and mechanical ventilation in patients with acute respiratory failure. The study also found a reduction in the length of hospital stay and a decrease in hospital mortality rates in patients receiving NVPP ventilation.

Another study by Sabir et al. (2019) examined NVPP ventilation in patients with chronic obstructive pulmonary disease (COPD) exacerbations. The study found that NVPP ventilation decreased the need for invasive mechanical ventilation and reduced mortality rates in patients with severe COPD exacerbations. Furthermore, a systematic review and meta-analysis by

Rochwerg et al. (2020) found that NVPP ventilation was associated with reduced intubation rates and decreased mortality rates in patients with acute respiratory distress syndrome (ARDS).

Search Limitations

My initial research postoperative respiratory failure search query populated 21,034 results. The additional query added the use of AHRQ and limited search results to 397. The search was further limited by conducting queries for the years inclusive of 2015 to 2022 in English, including the key terms, and limited to full-text articles, evidence-based practice, and peer-reviewed journals; 45 research articles resulted. The search was then limited to 21 articles for postoperative respiratory failure using the AHRQ quality indicator toolkit.

The search limitations were related to the limited use of the deliberate nursing process to reduce respiratory failure rates. Although the AHRQ is a reputable organization that works to improve outcomes, patient safety, reduce costs, and address medical errors (AHRQ, 2019), there were limited studies regarding healthcare organizational use of evidenced-based toolkits to improve healthcare services.

Summary

This chapter highlighted the search methodology and limitations. Postoperative respiratory failure complications include reintubation, hypoxemia, pulmonary edema, pneumonia, atelectasis, and hospital length-of-stay, unplanned intensive care admission, readmissions, and deaths (AHRQ, 2019). The literature review provides insight into the importance of using the evidenced-based quality indicator toolkit created by AHRQ. The AHRQ was created because it is argued that healthcare is a decade behind other high-risk industries (Bates & Singh, 2018). The AHRQ developed an administrative toolkit to assist facilities in preventing or reducing respiratory failure rates. The deliberate nursing process supports the

improvement process. The literature review shows that respiratory failure rates can be reduced using NPPV, as indicated in the AHRQ PSI 11 toolkit.

Chapter 3: Research Method

Following approval from Abilene Christian University's IRB and participating site, the surgical services coordinator who served as the project liaison communicated the commencement of the quality improvement project. A week before the start of the project, I sent out the AHRQ quality indicator PSI 11 toolkit PDF (Appendix A) and the use of NPPV as the care intervention (Appendix B) via mass communication to nursing staff, surgeons, and anesthetists. I hoped to gain support, adherence, and awareness of evidenced-based practices intended to educate the nursing personnel. The communication included department group communication via flyer (Appendix C), huddles, WhatsApp, email, and the hospital texting system. To improve care coordination and communication regarding high-risk patients, the preadmitting teaching and testing department provided a high-risk patient list at the perioperative daily huddles (Appendix D) and continued to send daily email notifications to providers.

The preadmitting teaching and testing department uses the STOP-BANG assessment to identify high-risk postoperative respiratory failure patients. The perioperative huddles include charge nurses from the preoperative area, operating room, recovery, anesthesia, operating room director, surgical chairman, supply chain management representative, sterile processing, and scheduling. On the day of surgery, charge nurses communicated the high-risk list at their unit-based safety huddles and reminded nurses of the use of NPPV. Prior to the start of the project, the education department representative provided educational in-service use of NPPV for high-risk populations and the proper use of BIPAP or CPAP applications. The time allocation for recovery unit education was 4 hours, 2 hours for the morning and 2 hours for the evening. A QR code directly linked to the educational resources was provided to participants for reinforcement and easy access (Appendix E). The quality department representative provided monthly

respiratory failure counts using the current electronic quality reporting platform. The PSI 11 inclusion and exclusion algorithm is based on the quality indicator toolkit PSI 11, and the AHRQ toolkit was used to reduce the postoperative respiratory failure monthly rates of 5.5%. The exact time frame of the prior year was compared to the 8-week intervention period.

The AHRQ PSI 11 toolkit is designed to assist hospitals in identifying patients at risk for postoperative respiratory failure and implementing evidence-based interventions to prevent this adverse event. The ready-to-use AHRQ quality improvement PSI 11 toolkit was used for this project intervention. The toolkit provided recommendations for interventions to improve quality and patient safety and was designed for healthcare organizations to use freely without prior permission.

Project Purpose

Postoperative respiratory failure is an acute condition that may be preventable by using NPPV. The complication of postoperative respiratory failure includes ICU admissions, increased length of stay, other complications, and mortalities. The AHRQ PSI 11 toolkit provides healthcare organizations guidance on reducing postoperative respiratory failure. The purpose of the QI project was to determine if implementing the AHRQ PSI 11 toolkit intervention using NPPV over 8 weeks would impact the reduction of postoperative respiratory failure rates when compared to current traditional practice.

Project Design

The quantitative, quasi-experimental QI project was to determine if implementing the AHRQ PSI 11 toolkit intervention using NPPV would impact the reduction of postoperative respiratory failure. This project design and algorithm required the identification of PSI indicators, including postoperative respiratory failure. The target population was all surgical

patients 18 years and older meeting AHRQ PSI 11 inclusion criteria described earlier and as contained in the AHRQ PSI 11 toolkit specifications manual version 2022 (AHRQ, 2022). The quality team obtained the postoperative respiratory failure-PSI 11 rates for the selected time frame. The quality team collected data using the current electronic database for patient safety indicators (postoperative respiratory failure) that follows the AHRQ methodology for inclusions and exclusions criteria described earlier. The quality team obtained baseline postoperative respiratory failure data for the surgical population 18 years and older having surgery at a community hospital.

To ensure proper understanding and implementation of the toolkit specifically pertaining to the use of NPPV, a comprehensive in-service session was conducted by the nurse educator. During this session, the nurse educator not only covered the key components of the AHRQ toolkit but also incorporated the Elsevier Skills Education program on ventilation: noninvasive CPAP and BiPAP-CE. This additional educational resource provided valuable insights and practical guidance on the proper techniques and protocols for utilizing NPPV effectively.

The in-service session aimed to equip healthcare professionals with the necessary knowledge and skills to apply the AHRQ toolkit intervention in a competent and informed manner. By incorporating the Elsevier Skills Education program, the nurse educator ensured that participants received comprehensive training on the use of NPPV, including the proper utilization of CPAP and BiPAP techniques.

The combined knowledge and expertise provided through the in-service session and the Elsevier Skills Education program enhanced the participants' understanding of NPPV and its application within the context of postoperative respiratory care. This comprehensive educational approach aimed to empower healthcare professionals with the necessary tools and knowledge to

effectively implement the AHRQ toolkit intervention and improve patient outcomes related to postoperative respiratory failure.

Data Collection

Following the conclusion of the QI project, the quantitative data were systematically gathered by the dedicated quality department and subsequently analyzed by the site's skilled performance improvement team and statistician. To evaluate the relationship between variables, the statistician employed the chi-squared test of independence, which was then presented in a clear and concise table format. The project's underlying goal suggested that the implementation of the AHRQ quality indicator toolkit intervention, specifically using NPPV, would lead to a reduction in complications arising from postoperative failure.

Instrument and Measurement Tools

The quantitative data were analyzed by the participating site statistician, who calculated the chi-squared test with a visual display of data using graph and table format. The chi-squared test of independence is a statistical hypothesis test used when test statistics is a chi-squared distribution under the null hypothesis. This testing determines if there is a statistical significance between the expected and observed frequencies.

Data Management and Analysis Plan

No patient information was disclosed to me. Adherence to the Health Information Portability and Accountability Act (HIPAA) guideline was enforced. I had no need for patient data to be collected during this project, and therefore, security was not a concern. The analysis plan included performing a chi-square test to compare whether there was a significant association between two categorical variables, such as the occurrence of postoperative respiratory failure and the use of the AHRQ PSI 11 toolkit.

Several studies have shown that the use of the AHRQ PSI 11 toolkit can lead to a decrease in the rates of respiratory failure after surgery. For example, a study by Hota et al. (2016) found that using the toolkit was associated with a significant decrease in the incidence of postoperative respiratory failure in a large academic medical center. Similarly, a study by Stocking et al. (2020) found that implementing a comprehensive postoperative respiratory failure prevention program, including the AHRQ PSI 11 toolkit, significantly reduced postoperative respiratory failure rates. Both studies utilized the chi-square test to analyze the data and determine the significance of the association between using the toolkit and the decrease in postoperative respiratory failure rates. The chi-square test results in these studies showed a significant association between the two variables, indicating that using the toolkit was associated with decreased postoperative respiratory failure rates. The data analysis was conducted by the performance improvement team in collaboration with the research department statistician.

In conclusion, performing a chi-square test has been an essential statistical method to analyze the data collected from utilizing the AHRQ PSI 11 toolkit and to determine the significance of the association between the use of the toolkit and the decrease in postoperative respiratory failure rates. The chi-square test results help healthcare providers evaluate the effectiveness of their interventions and make data-driven decisions to improve the quality of care provided to surgical patients.

Methodology

In this QI project I utilized a quantitative, quasi-experimental research method, specifically chosen to enable the evaluation of cause-and-effect relationships. This approach facilitated a comprehensive comparison between the outcomes achieved through the intervention of NPPV and those resulting from traditional treatment methods. By employing a quasi-

experimental design, the project sought to gather empirical evidence and establish correlations between the implementation of NPPV and its impact on postoperative respiratory failure. This method allowed for the examination of cause-and-effect relationships, contributing to a more in-depth understanding of the effectiveness of NPPV as compared to traditional treatment approaches.

Through the rigorous data collection and analysis process, I aimed to provide valuable insights into the potential benefits and outcomes associated with the adoption of NPPV within the context of postoperative care. By comparing the results achieved through the intervention with those achieved through traditional treatment methods, the project sought to identify any significant differences, ultimately informing best practices and improving patient care.

Feasibility and Appropriateness

This QI project, aimed at reducing postoperative respiratory failure, demonstrated feasibility and appropriateness within the organization, leveraging existing resources to facilitate effective communication, education delivery, and statistical analysis. The project received support from the organization, which allocated resources to ensure smooth project implementation.

A key factor in the project's feasibility was the involvement of the surgical coordinator, who served as a dedicated project liaison. This role ensured seamless coordination between the project team and the surgical department, enabling efficient data collection and analysis. The collaboration with the quality team further contributed to the project's success by providing the necessary data for comprehensive result evaluation.

One notable aspect of this project was its minimal associated costs and resource requirements. By utilizing existing resources and leveraging the organization's support, the

project avoided the need for additional financial investments or resource allocation. This streamlined approach allowed for efficient project execution within the organization's existing framework.

Furthermore, the interventions needed to complete the project did not directly impact the organization's existing resources or workflows. Instead, the focus was on exploring the potential value of NPPV in caring for patients at high risk for surgical complications. This approach aligned with the project's goals—it leveraged an existing intervention technique without imposing substantial changes or disruptions to the organization's infrastructure or processes.

In conclusion, the QI project on reducing postoperative respiratory failure demonstrated feasibility and appropriateness within the organization. Through the efficient use of resources, including effective communication channels, existing education delivery mechanisms, and statistical analysis capabilities, the project was able to successfully explore the value of NPPV in improving patient outcomes for high-risk surgical cases.

IRB Approval and Process

Prior to commencing the QI project, I obtained the necessary ethical approvals through the institutional review board (IRB) at the participating site. This involved the submission of a comprehensive support letter (Appendix F) and proposal, detailing the objectives, methodology, and safeguards in place to protect the rights and well-being of the participants. The quality improvement project also underwent review and approval from Abilene Christian University's IRB (Appendix G) to ensure compliance with ethical research practices.

Given the nature of the project, I sought an exception for nonhuman research subjects, because the research did not involve direct interaction or intervention with living individuals. The data collected were aggregated and anonymized to maintain confidentiality and protect the

privacy of the participants. This exemption was granted, further affirming the ethical integrity of the study. The implementation of the AHRQ PSI 11 toolkit methodology adhered to evidence-based interventions and followed the predefined criteria outlined by the healthcare institution's electronic quality database. The AHRQ quality indicator toolkit, specifically the PSI 11 specifications manual version 2022, provided the algorithm and guidelines for identifying cases eligible for inclusion as patient safety indicator complications.

Upon receiving approvals from the IRBs at the participating site and Abilene Christian University, the project commenced under the supervision and guidance of the project chair and committee. Strict adherence to ethical guidelines, data protection, and confidentiality measures was ensured throughout the research process. By obtaining the necessary IRB approvals and following the established protocols outlined by the AHRQ quality indicator toolkit, this project demonstrated a commitment to rigorous research practices, ethical considerations, and the promotion of patient safety.

Interprofessional Collaboration

The successful implementation of this project relied on effective interprofessional collaboration among key stakeholders within the healthcare organization. The chief quality officer played a crucial role as the primary executive sponsor, providing support and guidance throughout the project. The quality management representative played a vital role by providing the baseline data and necessary data for the completion of the project. Their expertise and collaboration were essential in ensuring accurate and comprehensive data analysis.

The surgical coordinator served as a project liaison, facilitating communication between the participating site's key departments and the research team. Their coordination efforts ensured smooth collaboration and cooperation among various stakeholders involved in the project. The

nursing education department was instrumental in conducting training sessions related to NPPV and the proper use of BIPAP and CPAP machines. Their expertise in training healthcare professionals in these techniques contributed to the successful implementation of NPPV interventions. Although the project leader did not have direct oversight over the quality department or direct supervision of the postoperative care unit, the charge nurse, surgical services director, and the chief of surgery were responsible for these areas. Their collaboration and support were crucial in ensuring the project's success. Additionally, the interim chief nursing officer and chief executive officer provided support and endorsement for the QI project. Their leadership and commitment to promoting QI initiatives within the organization were instrumental in driving the project forward.

The interprofessional collaboration demonstrated throughout this project showcased the collective effort and cooperation of various stakeholders, each contributing their unique expertise and resources. This collaborative approach was pivotal in achieving the project's goals and ultimately improving patient outcomes in the postoperative care setting.

Practice Setting

The project took place within a reputable, for-profit, acute care trauma facility located in South Texas catering to a substantial population of over 1.33 million people. Initially established as a day surgery center, the health system quickly expanded to become the largest acute care hospital in the region, with a capacity of 517 beds. Annually, the facility serves more than 300,000 patients, supported by a workforce of approximately 4,500 employees, including 1,400 dedicated nurses.

With over 650 physicians specializing in a wide range of medical fields, the organization is equipped to provide comprehensive care across more than 75 specialties and subspecialties.

The facility is equipped with 33 operating rooms, one hybrid operating room, and four catheterization laboratory rooms, enabling a monthly surgical volume of 4,200 cases. Furthermore, the organization demonstrates a commitment to advancing medical knowledge through its robust clinical research division and a graduate medical education program.

The project aimed at reducing postoperative respiratory failure aligned seamlessly with the organization's mission and vision, which revolves around providing exceptional care with a strong focus on patient safety and achieving zero harm. By addressing this critical aspect of postoperative care, the project contributed to the facility's overarching goal of delivering excellent healthcare outcomes.

Overall, this project took place within a highly regarded acute care trauma facility that has established itself as a leader in the region. With its extensive resources, skilled healthcare professionals, state-of-the-art facilities, and commitment to excellence, the organization is well-positioned to undertake initiatives aimed at improving patient care, including the reduction of postoperative respiratory failure.

Target Population

The target population was all surgical patients 18 years and older, meeting AHRQ PSI 11 inclusion criteria described earlier. The AHRQ PSI 11 toolkit specifications manual version 4.2 excludes cases with a principal diagnosis for acute respiratory failure or a secondary diagnosis for acute respiratory failure present on admission (AHRQ, 2019). Neuromuscular disorders, laryngeal, oropharyngeal, craniofacial surgery/anomalies, tracheostomies, and esophageal resections are excluded from the toolkit's algorithm because of their significantly higher risk for airway compromise (AHRQ, 2019). Lung cancer, transplant, degenerative neurological

disorders, respiratory and circulatory diseases, and obstetric discharges are excluded from the algorithm (AHRQ, 2019).

Risks

A potential limitation of the quasi-experimental research study employed in this project was the absence of randomization within the study group. For instance, the nurses' preexisting awareness of the AHRQ PSI 11 toolkit and its use of NPPV may introduce bias. However, there were no identified risks associated with the project participants or the project setting, ensuring a safe and ethical environment. It is important to note that no monetary or other forms of compensation were offered to individuals in exchange for their support or approvals during the project. Informed consent was not required for this quality improvement initiative, given its nature and objectives.

There were no conflicts of interest between the topic of the presentation and the quality improvement project. The project team's primary focus was on implementing the AHRQ PSI 11 toolkit intervention, specifically utilizing postoperative intermittent or continuous positive pressure breathing techniques, to reduce the occurrence of postoperative respiratory failure. Monetary compensation was not received in association with the utilization of the intervention, emphasizing the project's commitment to its QI objectives.

Benefits

The utilization of a quasi-experimental design in this project alleviated ethical concerns by not requiring patient selection. This design allowed for a comparison between outcomes of the control group and the experimental intervention group within a standard setting. This critical aspect ensures the validity of the study and enhances the reliability of the results.

The AHRQ PSI 11 toolkit, a free and evidence-based improvement guidebook, played a pivotal role in this project. It serves as a valuable resource for healthcare organizations seeking to enhance their quality outcomes. By providing clinical practice recommendations, the toolkit offers actionable insights and strategies to reduce postoperative complications, specifically targeting issues such as postoperative respiratory failure.

This evidence-based toolkit empowers healthcare professionals with guidelines and best practices, facilitating the implementation of interventions that have been proven effective in improving patient outcomes. By utilizing the AHRQ toolkit, the project team gained access to a comprehensive framework to guide their quality improvement efforts, ensuring a systematic and evidence-based approach to reducing postoperative complications.

Overall, the integration of the AHRQ toolkit in this project allowed for the implementation of proven clinical practice recommendations, thereby enhancing the project's ability to decrease the incidence of postoperative respiratory failure and improve the overall quality of care provided to patients.

Summary

The methodology employed in this project followed the AHRQ PSI 11 toolkit. The criteria for inclusion and exclusion of the study population adhered to the guidelines specified in the latest manual version 2022 of the AHRQ PSI 11 toolkit. The interprofessional collaboration and practice setting were thoroughly described to provide context and ensure transparency.

Following the completion of the project, the quantitative data were analyzed by a statistician who utilized the chi-squared test of independence and presented the results in a tabular format. The underlying hypothesis driving this quality improvement project was that the

implementation of the toolkit intervention, specifically NPPV, would lead to a decrease in postoperative failure complications.

It is important to note that there were no associated risks with this quality improvement project. However, certain limitations should be considered. These limitations include a relatively small sample size, a short time frame, and a retrospective design, which may restrict the generalizability of the findings. Moreover, as the study was conducted within a specific healthcare setting, the applicability of the results to other healthcare settings may be limited. Implementing the AHRQ PSI 11 toolkit carries potential risks, such as the possibility of increased healthcare costs and the need for additional staff training. However, the benefits of implementing the toolkit are significant and include improved patient outcomes and reduced healthcare costs.

Chapter 4: Results

The quasi-experimental project took place in a hospital setting without random participant selection or control over the study sample. The participants were individuals who had already been scheduled for surgical intervention, and the project did not influence the process of patient selection. The quasi-experimental design was appropriate for comparing the outcomes between the control group and the experimental group. In this project, the intervention involved the implementation of the AHRQ PSI 11 toolkit, specifically utilizing NPPV, with the aim of reducing the occurrence of postoperative respiratory failure.

The QI project was implemented to decrease in the incidence of postoperative respiratory failure. The results of the project demonstrated a positive correlation between the intervention of using the toolkit and NPPV, and a reduction in the rates of postoperative respiratory failure. Overall, the findings of this project support that the intervention utilizing the AHRQ PSI 11 toolkit and NPPV had a beneficial impact on reducing the occurrence of postoperative respiratory failure.

Data Analysis

Surgical patients 18 years and older meeting AHRQ PSI 11 inclusion criteria, which exclude patients with a principal diagnosis for acute respiratory failure or a secondary diagnosis for acute respiratory failure present on admission (AHRQ, 2022). This data summary presents an analysis of the population size and incidence of postoperative respiratory failure using the AHRQ specification manual algorithm. Data were obtained from the hospital quality reporting platform for the years 2022 and 2023. In May 2022, the population consisted of 2,753 patients, among which 169 individuals met the inclusion criteria, resulting in a single reported case of respiratory failure. For June 2022, a population of 2,666 was considered, with 152 patients

meeting the criteria for inclusion and one reported incident of respiratory failure. Similarly, in May 2023, the population size was 2,712, with 170 patients meeting inclusion criteria, yet no instances of respiratory failure were observed. The month of June 2023 exhibited consistent results with a population of 2,780 and 170 patients meeting criteria, without any reported cases of postoperative respiratory failure. This analysis highlights the stability of the population size over the considered months and the importance of utilizing the AHRQ specification manual algorithm for standardized reporting and analysis of postoperative respiratory failure incidence. These findings align with the implementation of the QI project.

Based on the data, it appears that the implementation of this QI project in May and June of 2023 coincided with a decrease in the occurrence of respiratory failure cases. The respiratory failure rates for intervention period of May and June 2023 were 0%. The chi squared test results are displayed in Table 1 and Table 2.

Table 1

Postoperative Respiratory Failure Occurrences With and Without AHRQ Toolkit

Months	Occurrences without AHRQ toolkit 2022	Occurrences with AHRQ toolkit 2023
May	1	0
June	1	0

Table 2

Postoperative Respiratory Failure Occurrences January–June 2022 and 2023

Month	2022	2023
January	0	0
February	1	2
March	1	2
April	2	5
May	1	0
June	1	0

Summary

The project aimed to evaluate the effectiveness of implementing the AHRQ PSI 11 toolkit intervention using NPPV in reducing postoperative respiratory failure rates over an 8-week period—May and June 2023. The findings showed a significant difference in respiratory failure rates following the implementation of the QI project. The outcomes of this study are congruent with prior research, substantiating the efficacy of the AHRQ PSI 11 toolkit as a viable approach for mitigating instances of postoperative respiratory failure. The results exhibited a discernible decrease in occurrences of postoperative respiratory failure, consequently leading to a reduction in associated complications, such as ventilator-associated pneumonia, reintubation, hypoxemia, pulmonary edema, pneumonia, and atelectasis.

By adopting evidence-based practices outlined in the toolkit, healthcare providers can enhance patient safety, improve outcomes, and minimize the occurrence of postoperative respiratory failure. It is important to note that the effectiveness of the toolkit may be influenced by various factors, such as patient characteristics, clinical settings, and implementation

strategies. Future research should explore these factors to optimize the toolkit's impact across different contexts. Overall, this study supports the conclusion that the QI project, utilizing the AHRQ PSI 11 toolkit intervention, was effective in reducing postoperative respiratory failure rates. These findings contribute to the growing body of evidence highlighting the toolkit's potential to improve patient outcomes and enhance the quality of care in surgical settings.

Chapter 5: Discussion, Conclusions, and Recommendations

Postoperative respiratory failure pertains to the incapacity of discontinuing mechanical ventilation for surgical patients within 48 hours following surgery or in instances of unscheduled intubation/reintubation. Adverse outcomes linked with postoperative respiratory failure encompass reintubation, insufficient oxygen levels (hypoxemia), pulmonary edema, pneumonia, and partial lung collapse (atelectasis). To aid healthcare establishments in mitigating unfavorable events after surgical procedures, such as postoperative respiratory failure, the AHRQ agency has developed toolkits encompassing patient safety indicators (PSIs). Notably, these toolkits include a readily accessible, evidence-based, improvement strategies toolkit that aligns with the focus of the present study, emphasizing the enhancement of quality through pertinence.

Discussion

The utilization of the AHRQ PSI 11 toolkit for the reduction of respiratory failure has garnered significant attention within the healthcare domain, given that respiratory failure significantly contributes to morbidity and mortality among hospitalized patients. Designed to offer guidance to healthcare providers, the AHRQ PSI 11 toolkit aims to forestall and diminish the incidence of respiratory failure. The findings of this project unequivocally highlight a favorable correlation between the implementation of the toolkit, particularly in conjunction with NPPV and a notable reduction in the rates of postoperative respiratory failure.

The findings indicated a notable and statistically significant decrease in instances of respiratory failure after the implementation of the toolkit. The project provided evidence supporting the efficacy of the toolkit in mitigating the occurrence of respiratory failure. Collectively, the project underscores the importance of ongoing surveillance by healthcare

providers and policy stakeholders to continually evaluate the effectiveness of the AHRQ PSI 11 toolkit in reducing the prevalence of respiratory failure.

Recommendations

The AHRQ PSI 11 toolkit effectively has reduced respiratory failure rates in multiple studies. The analysis in this study also supports the toolkit's effectiveness in reducing respiratory failure rates. However, there are limitations to the study, including the small sample size and the retrospective design. Future research should consider a larger sample size, multiple settings, and a more extended period to determine the effectiveness of the AHRQ PSI 11 toolkit. Healthcare providers should consider implementing the AHRQ PSI 11 toolkit to improve the quality of care for patients at risk for respiratory failure. Future studies should focus on evaluating the long-term impact of the toolkit on patient outcomes and cost-effectiveness.

Essentials of Doctoral Education for Advanced Practice Nurses

This DNP project was relevant to several DNP Essentials, including Essentials I, II, IV, V, and VIII. Essential I, which focuses on scientific underpinnings for practice, was relevant because the project was based on evidence-based interventions to prevent postoperative respiratory failure. Essential II, which focuses on organizational and systems leadership, was relevant because the project involved implementing the AHRQ PSI 11 toolkit in hospitals. Essential IV, which focuses on information and healthcare technologies, was relevant because the project involved using a toolkit to identify patients at risk for respiratory failure. Essential V, which focuses on healthcare policy and advocacy, was relevant because the project aimed to improve patient safety and reduce healthcare costs. Finally, Essential VIII, which focuses on advanced nursing practice, was relevant because the project involved implementing evidence-based interventions to improve patient outcomes.

Conclusion

Numerous studies provide additional support for the effectiveness of the QI project aimed at reducing respiratory failure rates using the AHRQ PSI 11 toolkit intervention. The QI project highlighted the toolkit's ability to enhance patient safety and improve outcomes, making it a valuable resource for quality improvement initiatives. It is worth noting that the project required participation from multidisciplinary teams consisting of clinicians, nurses, and QI experts. This collaborative approach fostered engagement and facilitated the successful implementation of the toolkit. By leveraging the expertise of different healthcare professionals, the project aimed to maximize its impact on reducing respiratory failure and enhancing patient care. The positive findings from these studies, in conjunction with the input from multidisciplinary teams, reinforce the significance of the project in implementing the AHRQ PSI 11 toolkit intervention. By utilizing evidence-based practices and promoting interprofessional collaboration, the project aims to achieve the goal of reducing postoperative respiratory failure rates and improving patient outcomes.

Continued evaluation and monitoring of the project's outcomes at the hospital are crucial to ensure sustained improvements and to identify any potential areas for further refinement. This commitment to ongoing assessment and adaptation would allow healthcare providers to continuously enhance the quality of care and prioritize patient safety in their efforts to reduce respiratory failure. This DNP project was relevant to several DNP Essentials, including scientific underpinnings for practice, organizational and systems leadership, information and healthcare technologies, healthcare policy and advocacy, and advanced nursing practice.

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Appendix A: Toolkit for Using the AHRQ Indicator

Selected Best Practices and Suggestions for Improvement

PSI 11: Postoperative Respiratory Failure

Why Focus on Postoperative Respiratory Failure?

- Even though there is debate regarding the definition of true postoperative respiratory failure, it still remains an important patient adverse event. Generally, postoperative respiratory failure is the failure to wean from mechanical ventilation within 48 hours of surgery or unplanned intubation/reintubation postoperatively.[1]
- Postoperative respiratory failure has been associated with increased cost, an increased length of stay, and increased mortality.[2,3]
- As value-based purchasing evolves, quality will be increasingly linked to payment. Postoperative respiratory failure is not currently part of Medicare's Hospital Value-Based Purchasing, but could be considered for future inclusion.

Recommended Practice	Details of Recommended Practice
Assess risk factors.	Develop a set of risk factors for postoperative respiratory failure and screen all patients undergoing elective surgery.[3]
Initiate various treatments during the perioperative and postoperative period to reduce a patient's risk of developing respiratory failure.	To prevent or lessen the risk of developing postoperative respiratory failure, perform lung expansion exercises, selective use of NG tubes and use short acting neuromuscular blockade.[2,4]

Best Processes/Systems of Care

Introduction: Essential First Steps

- Engage key nurses, physicians and other providers, hospitalists, respiratory therapists, dieticians, and pharmacists from infection control, intensive care, and inpatient units including operating room; and representatives from quality improvement, radiology, and information services to develop time-sequenced guidelines, care paths, or protocols for the full continuum of care.

Recommended Practice: Assess Risk Factors

- Determine which patients are at increased risk for postoperative respiratory failure to better prepare clinicians to anticipate adverse events postoperatively, as well as improve allocation of resources after surgery.[3]
- Risk factors for postoperative respiratory failure are[2,3]:
  - Age.
  - History of chronic obstructive pulmonary disease and/or congestive heart failure.
  - Smoking.
  - Functional dependence.
  - Serum albumin <3.0 g/dL.

- BUN >30 mg/dL.
- Higher ASA score/class.
- Emergency surgery.
- High-risk surgery (e.g., emergent and prolonged procedures, open vs. laparoscopic).

Recommended Practice: Initiate Various Treatments During Perioperative and Postoperative Period To Reduce Risk of Respiratory Failure

- Ensure that patients are using lung expansion exercises such as incentive spirometry, deep breathing, intermittent positive-pressure breathing, and continuous positive airway pressure. These exercises have been shown to reduce the likelihood of postoperative respiratory failure.
- Use nasogastric tubes selectively since they can increase the risk of aspiration.
- Use short-acting neuromuscular blockade. Long-acting neuromuscular blockade has a higher incidence of residual block, and patients with higher residual block were 3 times more likely to develop postoperative pulmonary complications than those without residual block.[5]

Educational Recommendation

- Plan and provide education on protocols and standing orders to physicians and other providers, nurses, and all other staff involved in postoperative respiratory failure prevention and care (emergency department, intensive care unit, etc.). Education should occur upon hire, annually, and when this protocol is added to job responsibilities.

Effectiveness of Action Items

- Track compliance with elements of established protocol steps.
- Evaluate effectiveness of new processes, determine gaps, modify processes as needed, and reimplement.
- Mandate that all personnel follow the postoperative respiratory failure protocol and develop a plan of action for staff in noncompliance.
- Provide feedback to all stakeholders (physicians and other providers, nursing, and ancillary staff; senior medical staff; and executive leadership) on level of compliance with process.
- Monitor and evaluate performance regularly to sustain improvements achieved.

Additional Resources

Systems/Processes

- WHO Postoperative care
  http://www.who.int/surgery/publications/Postoperativecare.pdf

Policies/Protocols

- AARC Clinical Practice Guideline: Incentive spirometry: 2011
  http://www.rcjournal.com/cpgs/pdf/10.11.1600.pdf

Tools

- QxMD. Postoperative Respiratory Failure Risk Calculator http://www.qxmd.com/calculate-online/respirology/postoperative-respiratory-failure-risk-calculator

Staff Required

- Surgeons
- Intensivists
- Nursing
- Respiratory therapy

Equipment

- Incentive spirometer

Communication

- Systemwide education on policy/protocol of monitoring postoperative patients.

Authority/Accountability

- Senior leadership mandating protocol for all providers.

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Appendix B: Elsevier: Ventilation Noninvasive CPAP and BIPAP-CE Education Flyer

AHRQ QI TOOLKIT & NPPV

ELSEVIER-VENTILATION NONINVASIVE CPAP AND BIPAP

TARGET AUDIENCE: NURSE'S

LEARNING BENEFIT

- Assessment, preparing for procedure & documentation
- Modes NPPV
- Monitoring and Care
- Expected/Unexpected Outcomes

DATE:
APRIL 27 & 28, 2023
UNIT BASED

TIME:
7:00AM-12:00PM

LOCATION:
MAIN PACU DEPARTMENT

PRESENTED BY:
NURSING EDUCATION

FOR MORE INFO

SCAN ME!

SCAN ME!

Appendix C: Safety Huddle Template

SURGICAL AND PROCEDURAL SAFETY HUDDLE

Safety Daily Huddle

Mission: Our mission is to improve the well-being for those we serve with a commitment with excellence every patient, every encounter, every time.

Vision: Our vision is to create a world class health system to advance medicine and increase access for the communities we serve by empowering caregivers to heal through compassion, knowledge, innovation, integrated care and excellence.

Theme of the Year: **"From Good to Great"**
Good: To be desired or approved of **Great:** To be markedly superior in character or quality

***The right people *The right thoughts *The right actions**

Disclosures: Confidentiality

Agenda

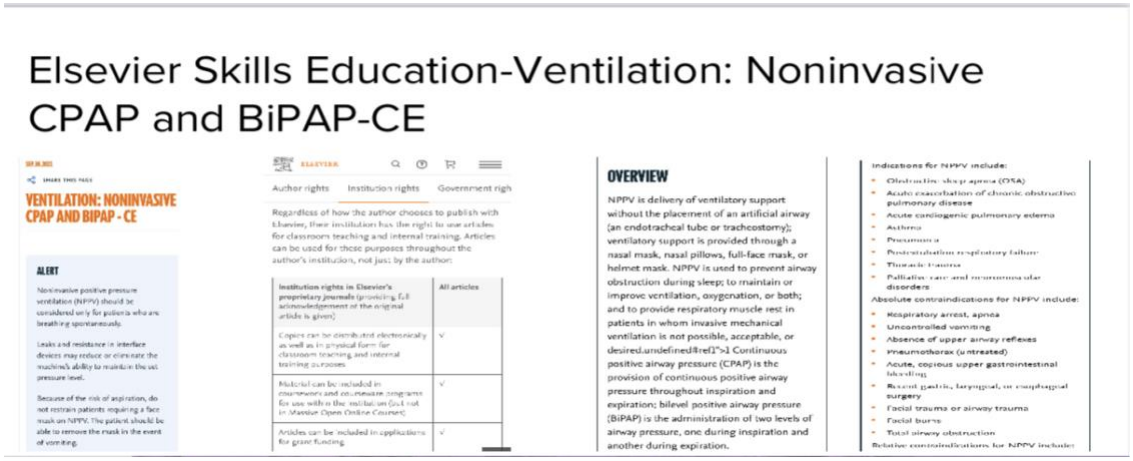
1. Safety Concerns/Issue
2. Volume
3. Staffing
4. Equipment/Repairs/Instruments/Supplies
5. Education
6. Identification of High Risk Patients

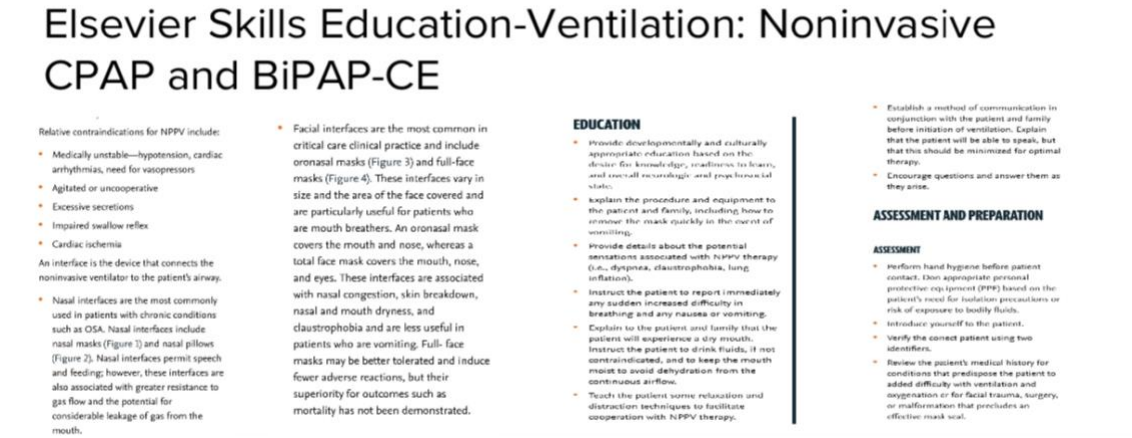
Open Discussion/General Announcements

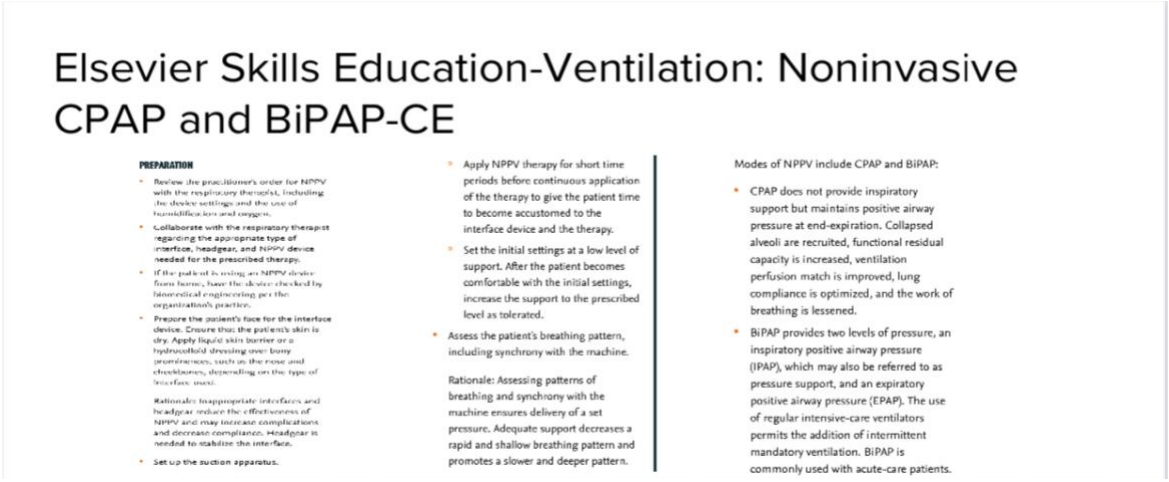
Perioperative/Inspirational Quote:

Compassion**. A**ccountability**. R**espect**. E**xcellence Through Knowledge**. S**afety and **S**ocial **C**onsciousness

Appendix D: Elsevier: Ventilation Noninvasive CPAP and BIPAP-CE







Elsevier Skills Education-Ventilation: Noninvasive CPAP and BiPAP-CE

- Assess the patient's level of consciousness, level of anxiety, and ability to tolerate the procedure.
- Assess the patient's ability to protect their airway with an active gag and cough reflex.
- Assess the patient's upper airway patency, including the nasal passages.
- Assess the patient's cardiovascular and pulmonary status, including work of breathing.
- Assess the patient's vital signs and oxygen saturation.
- Assess the patient for signs and symptoms of inadequate oxygenation and ventilation, including the presence of visible secretions in the airway, inspiratory wheezes, expiratory crackles, diminished breath sounds, tachypnea, shallow respirations, tachycardia or bradycardia, hypertension or hypotension, and hypoxemia.
- Assess the patient's face for pressure points that would place the patient at high risk for pressure injuries.

PROCEDURE

- Perform hand hygiene and don gloves. Don additional PPE based on the patient's need for isolation precautions or risk of exposure to bodily fluids.
- Verify the correct patient using two identifiers.
- Explain the procedure to the patient and ensure that the patient agrees to treatment.
- Position the patient in an upright position, with the head of the bed elevated 30 degrees. [1]
- Assist the respiratory therapist with initiating NPPV as directed.
  - Hold the interface device on the patient's face or have the patient hold the interface device until the patient is comfortable with the sensation of NPPV.

    Avoid placing the mask too high over the eyes because doing so can create a leak in the system and can cause eye irritation.

Report ventilatory asynchrony to the practitioner.

- Monitor the patient's work of breathing, oxygen saturation, and vital signs.
- Monitor the fit of the interface and associated headgear.
  - Check for leaks around the interface.
  - Readjust the straps as needed.
  - Consult with the respiratory therapist if a problem develops.
  - If air is leaking from the patient's mouth, use a chin strap with a nasal mask to prevent excessive leaks through the mouth.

    Rationale: An ill-fitting mask affects the delivery of adequate pressure.

- Remain at the bedside upon initiation of the therapy to coach the patient on how to achieve ventilator synchrony and decrease the anxiety associated with NPPV.
  - Reassure the patient as needed.
  - Assess the patient's response to therapy.
  - Adjust the ventilator settings as necessary.
- Set and activate NPPV device alarms, if present.
- Reassess the patient at least every 30 minutes for tolerance and efficacy of NPPV for the first 1 to 2 hours. [1]
- Discard supplies, remove PPE, and perform hand hygiene.
- Document the procedure in the patient's record.

Elsevier Skills Education-Ventilation: Noninvasive CPAP and BiPAP-CE

MONITORING AND CARE

- Monitor the patient for changes in oxygenation and ventilation, including vital signs, oxygen saturation, breath sounds, breathing pattern, and work of breathing.

  Reportable conditions: Visible secretions in the airway, inspiratory wheezes, expiratory crackles, diminished breath sounds, increased work of breathing, tachypnea, shallow respirations, tachycardia or bradycardia, hypertension or hypotension, cyanosis.
- Check for and maintain the proper fit of the patient's NPPV interface. Readjust the headgear straps as needed.

  Reportable conditions: An ill-fitting interface and leaks around the interface
- Monitor the patient for gastric insufflations and decompress the stomach as needed.

  Rationale: NPPV can lead to increased gas flow to the stomach. Decompression of the stomach may be necessary.

  Reportable conditions: Gastric distention, nausea, vomiting
- Suction the patient's oral and nasal airways as needed.

  Rationale: Increased secretions may impede ventilation.

  Reportable conditions: Increased oral, nasal, or respiratory secretions
- Frequently assess the patient's skin in contact with the interface.
  - Pay close attention to bony prominences of face and head.
  - Keep the skin clean and dry under the interface.
  - Use liquid skin barrier or a hydrocolloid dressing under the interface over areas in contact with the interface.
  - If a pressure injury occurs, assess the appropriateness of the interface. Rotation of the interface device may be required to allow pressure injuries to heal.
  - Remove the mask every 4 to 6 hours for a few minutes if the patient can tolerate it without increasing respiratory distress. [1]

    Rationale: Impaired skin integrity increases the risk of infection. The bridge of the nose and the cheeks are prone to skin breakdown.

    Reportable condition: Pressure injury related to interface
- Assess, treat, and reassess pain.

EXPECTED OUTCOMES

- Improved oxygenation and ventilation
- Reduced work of breathing
- Patient–ventilator synchrony
- Absence of gastric distention
- Ability to clear secretions
- Maintenance of skin integrity
- Adequate pain and anxiety management
- Patient able to cooperate with therapy

Elsevier Skills Education-Ventilation: Noninvasive CPAP and BiPAP-CE

UNEXPECTED OUTCOMES

- Aspiration
- Claustrophobia
- Decreased ability to cough and clear secretions
- Discomfort with the interface and related headgear
- Eye irritation
- Gastric insufflation and distention
- Hypercarbia
- Hyperinflation or air trapping
- Hypoxemia
- Inability to obtain adequate nutrition
- Increased or decreased blood pressure
- Increased or decreased heart rate
- Nasal congestion or dryness
- Patient-ventilator asynchrony
- Pneumothorax
- Pressure injuries
- Respiratory muscle fatigue
- Sinus or ear pain

DOCUMENTATION

- Patient's tolerance of the procedure
- Education
- Type and size of interface
- Date and time therapy is initiated and stopped
- NPPV device settings
- Skin assessment
- Cardiovascular and respiratory assessment
- Vital signs
- Unexpected outcomes and related interventions
- Pain assessment and management

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Appendix E: Request for Facility Support

October 13, 2022

Dear Nancy Garcia,

RE: DNP Project

I am requesting support for a quality improvement project "The use of the Agency Healthcare Research and Quality Patient Safety Indicator 11 toolkit: Noninvasive Positive-Pressure Ventilation to Decrease Postoperative Respiratory Failure Rates".

Kind Regards,

Nancy Garcia
Abilene Christian University
Nursing Student

Appendix F: Level of Support by Facility

October 20, 2022

Dear Nancy Garcia,

RE: DNP Project

On behalf of Hospital we are supportive of the quality improvement project "The use of the Agency Healthcare Research and Quality Patient Safety Indicator 11 toolkit: Noninvasive Positive-Pressure Ventilation to Decrease Postoperative Respiratory Failure Rates". We strongly endorse quality improvement projects focusing on reducing medical errors. This project has been presented to our organization as a process improvement for reducing post-operative respiratory failure.

We are supportive pending IRB approval.

Chief Executive Officer

Appendix G: ACU IRB Approval Letter

Date: 8-10-2023

IRB #: IRB-2023-24
Title: The use of the Agency Healthcare Research and Quality Patient Safety Indicator 11 Toolkit: Noninvasive Positive-Pressure Ventilation to Decrease Postoperative Respiratory Failure Rates
Creation Date: 2-1-2023
End Date:
Status: Approved
Principal Investigator: Nancy Garcia
Review Board: ACU IRB
Sponsor:

Study History

Submission Type	Review Type	Decision
Initial	Exempt	Exempt