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Reducing the Incidence of Opioid-Induced Unintended Advanced Sedation and Respiratory Depression in Hospitalized Patients

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Reducing the Incidence of Opioid-Induced Unintended Advanced Sedation and Respiratory Depression in Hospitalized Patients

A DNP Project Submitted to the
Graduate Faculty
of Jacksonville State University
in Partial Fulfillment of the
Requirements for the Degree of
Doctor of Nursing Practice

By

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Abstract

Background: Opioids are commonly administered to hospitalized patients to treat acute pain and can cause serious adverse events such as unintended advanced sedation and respiratory depression, also known as opioid-induced respiratory depression (OIRD). Post-surgical patients are at increased risk of unintended advanced sedation and respiratory depression due to anesthesia and pre-and post-opioid administration. They have a greater risk because they have less monitoring than those in the intensive care unit because their care teams, typically nurses, have higher staff-to-patient ratios. The use of enhanced interventions, such as the use of sedation evaluation tools, can decrease the risk of OIRD.

Purpose: The purpose of this project was to evaluate if implementing the Pasero Opioid Sedation Scale (POSS) to assess sedation and respirations before opioid administration could decrease events of OIRD in post-surgical patients.

Methods: The overall intervention of this quality improvement project included using the POSS to monitor sedations and respirations before opioid administration. The nursing staff were trained on the new protocol, the use of the POSS, and how to document POSS elements in the electronic medical record (EMR). The EMR was audited weekly to evaluate adherence to the protocol. The two outcomes of interest were adherence to the protocol and naloxone use.

Results: The results of the chart review showed more than 99.9% of the time before an opioid medication was administered, the POSS elements were documented by the nursing staff correctly. The results of the naloxone events did not show to be statistically significant in reducing incidences of advanced sedation and respiratory depression.

Conclusion: Research suggests that the POSS has the potential to decrease adverse events of advanced sedation and respiratory depression.

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Reducing the Incidence of Opioid-Induced Unintended Advanced Sedation and Respiratory Depression in Hospitalized Patients

Safe opioid medication administration protocols, evidence-based practices, and interventions are vital in increasing patient safety. However, many tools to monitor opioid administration in hospitalized post-surgical patients are lacking. The monitoring of conscious sedation and respirations is vital during opioid administration. The International Anesthesia Research Society states that 88% of sedation and respiratory events happen on the first postoperative day (Decimo, 2018). The most dangerous period is a few hours after the patient is discharged from the post-anesthesia care unit (PACU). These events can leave patients vulnerable to negative clinical outcomes such as brain injury and death.

This Doctor of Nursing Practice (DNP) project objective was to reduce the incidences of opioid-induced unintended advanced sedation and respiratory depression in hospitalized patients. Researchers support assessing sedation and respirations before opioid administration with an assessment tool that can aid in monitoring patients and prevent them from developing harmful events such as unintended advanced sedation and respiratory depression. Nurses also play a critical role in using assessment tools to facilitate early intervention to prevent patients from experiencing adverse complications from opioid medication administration (Garcia & McMullan, 2019).

Background and Significance

All hospitalized patients who receive opioid medications for pain are at risk for opioid-induced unintended advanced sedation and opioid-induced respiratory depression (OIRD), which is when a patient's level of consciousness and respiratory rate declines (Garcia & McMullan, 2019). OIRD can result in brain injuries or death, is preceded by opioid-induced advancing sedation, and is preventable. In 2018, the National Library of Medicine published a study to

identify risk factors for OIRD postoperatively. The elderly population, female sex, sleep apnea, cardiac disease, patients with two or more comorbidities, and opioid dependence were significant risk factors for postoperative OIRD (Gupta et al., 2018). The incidence of OIRD in this study also varied from 0.1% to 23.7% (Gupta et al., 2018). Fazio and Firestone (2020) reported that the cumulative incidence of OIRD in postoperative patients was between 0.1% and 23.7% due to differences in respiratory depression definitions. Best practices for the safe prescribing and administration of opioids should include a standard set of orders guiding patient selection, emphasis on the use of oral opioids when appropriate, and the incorporation of multi-modal pain management strategies.

Needs Analysis

All hospitalized patients who receive opioid medications for pain are at risk for Opioid-Induced Respiratory Depression (OIRD). Patients in an acute care setting have less monitoring than those in intensive care, and their care teams typically have higher staff-to-patient ratios (The Joint Commission, 2022). Currently, at this Doctor of Nursing Practice (DNP) facility, there is not a standardized tool in place to screen for unintended opioid-induced advancing sedation (OIAS) and opioid-induced respiratory depression (OIRD). Nurses do not routinely document or assess patients' before opioid administration. According to the facility's data report, extracted from the data warehouse electronic system, 149 doses of naloxone were administered in the entire hospital, excluding the emergency department from December 2021 to February 2023 to rescue patients from unintended advanced sedation and respiratory depression. Out of the 149 doses of naloxone, 11 doses total were administered on the thoracic and vascular post-surgical floors. Per the report, the number of naloxone administered captures any patient that received an opioid and had at least one dose of naloxone before receiving another opioid.

Currently, the facility does not use information technology (IT) support to help nursing staff assess and monitor the patient's level of sedation after opioid administration. Nurses and providers must provide safe, effective, patient-centered pain management by frequently assessing pain, administering multi-modal pain management plans, evaluating pain management plans frequently, and monitoring for unintended adverse events. Care team members must know the risks and benefits of opioids, have systematic IT support, use validated tools to create a culture of safety, routinely assess for and recognize unintended OIAS, and prevent OIRD and death (The Joint Commission, 2022).

Ideally, nurses should routinely monitor and identify unintended OIAS early and prevent OIRD for patients receiving opioids in the acute care setting using an assessment tool. Recognition of excessive sedation is imperative for possible respiratory depression. Recognizing the early signs of opioid sedation allows nurses and providers to rescue patients before excessive sedation occurs, leading to OIRD, which helps avoid brain injuries and death. To achieve the desired state, the DNP's facility proposed implementing a form of the Pasero Opioid-Induced Sedation Scale (POSS) and measuring its efficacy pre-opioid administration in the thoracic and vascular surgery units to monitor for unintended advanced sedation and avoid OIRD. According to Hall and Stanley (2019), POSS "is a tool developed to identify advancing sedation before it is compounded by continued opioid administration and results in clinically significant respiratory depression or apnea, thereby enhancing patient safety during pain management with opioid analgesics" (p. 135).

Problem Statement

Opioids are commonly administered to hospitalized, post-surgical patients to treat acute pain and can cause serious adverse events such as advanced sedation and opioid-induced

respiratory depression (OIRD). These adverse events cause patients to have poorer clinical outcomes. If enhanced interventions such as assessing sedation and respirations with an assessment tool before opioid administration are not used, patients will continue to have an increased risk for OIRD. Currently, the chosen facility does not use an opioid sedation scale or routine assessment protocol to assess post-surgical patients for unintended advanced sedation to prevent OIRD and death. Implementing a form of POSS can ensure the safe administration of opioids and reduce OIRD incidences.

Context of the Problem

The Joint Commission's requirement, rationale, and reference report (R^3 report) recommend that medical staff identify measures and establish tools and resources to monitor patients at increased risk for adverse consequences from opioid treatment (The Joint Commission, 2022). The rationale for this recommendation is that advanced sedation and respiratory depression are the most dangerous adverse effects of opioids and monitoring tools should be available to decrease these events (The Joint Commission, 2022). Furthermore, care teams should identify the best tool to assess patients deemed high-risk.

Scope of the Problem

Currently, frontline staff on the vascular and thoracic post-surgical floors have identified many barriers in the assessment, documentation, administration, and re-assessment of pain medication effectiveness causing approximately 20 to 30 patients to be at risk. One barrier was that opioid administration was based on subjective reporting of pain. Subjective reporting of pain is not consistent with a patient's sedation level or safety during opioid administration. A second barrier was the nursing staff not being empowered to administer or hold opioids based on objective assessment criteria. A third barrier was having a common language when documenting

sedation levels. Nurses were unsure of the level of consciousness during episodes of advanced sedation, causing a delay in escalating to a provider for an urgent clinical decision.

Consequences of the Problem

Opioids are commonly administered to hospitalized patients to treat acute pain and can cause serious adverse events such as unintended sedation, OIRD, and death. These adverse events cause patients to have poorer clinical outcomes. Jungquist et al. (2017) stated that opioid events increased hospital stays by 55%, healthcare costs by 47%, 30-day readmissions by 36%, and the risk for inpatient mortality rate by 3.4 times. Sedation assessments are not routinely completed before an opioid is administered. Garcia and McMullan (2019) also stated that opioid events increased hospital length of stay and hospital costs by an average of $6, 500 per patient.

Proposed Project/Evidence-based Intervention

Recognition of excessive sedation is imperative for possible respiratory depression. Recognizing the early signs of opioid sedation allows nurses and providers to rescue patients before excessive sedation occurs, leading to OIRD, which helps avoid brain injuries and death. The DNP project included implementing an assessment tool and measuring its efficacy before opioid administration to monitor unintended opioid sedation and avoid OIRD. The intervention took place in a thoracic and vascular post-surgical unit of a 1,207-bed major center in the southeastern United States. The nursing staff was trained on the new protocol and use of POSS. Nurses documented POSS results in the electronic medical record (EMR). The EMR was audited weekly to evaluate adherence to the protocol. Retraining was provided as needed. Quinlan-Colwell et al. (2017) stated that POSS is a validated tool used to assess sedation when an opioid medication is administered for pain. POSS is endorsed by the Joint Commission and the

American Society for Pain Management Nursing to help prevent OIRD (Quinlan-Colwell et al., 2017).

Objective/Purpose of the Proposed Project

The purpose of this project was to determine if using an assessment tool (POSS) to monitor sedations and respirations before opioid administration in adults in a thoracic and vascular post-surgery unit could decrease events of OIRD. The PICOT question that guided this project was as follows: Among patients in the thoracic and vascular unit receiving opioid medications, does implementing an assessment tool to monitor sedations and respirations before opioid administration, compared to current practice, decrease events of advanced sedation and Opioid-Induced Respiratory Depression (OIRD) within eight weeks? Specifically, the purpose of this quality improvement project was to determine if using an assessment tool will aid in decreasing events of advanced sedation and OIRD.

Review of Literature

The following keywords used in the search included the following: opioids, advanced sedation, respiratory depression, opioid-induced respiratory depression (OIRD), sedation assessment tools, and POSS. The Cumulative Index to Nursing and Allied Health Literature (CINAHL), PubMed, Cochrane Database of Systematic Reviews, and Google Scholar produced relevant evidence-based research articles on opioid-induced unintended advanced sedation, respiratory depression, and POSS. The results were further narrowed by including peer-reviewed articles, randomized control studies, and qualitative and quantitative reviews within a five-year time frame. Two primary themes were identified in the review of literature: 1) risk factors for unintended advanced sedation and respiratory depression; 2) tools for assessing unintended advanced sedation and respiratory depression.

Risk Factors for Unintended Advanced Sedation and Respiratory Depression

Conditions that cause patients to be at high risk of OIRD require attention. Mild sedation is expected when a patient receives an opioid, but some patients experience OIRD and advanced sedation. Several advocates, including the Joint Commission, the Institute of Healthcare Improvement (IHI), and the Centers for Medicare and Medicaid Services (CMS), have issued warnings that OIRD and advanced sedation is a national problem and are urging healthcare facilities to take action to assess what are the reasons and risk factors to why these adverse events are developing (Jungquist et al., 2017).

A variety of conditions may cause patients to be at high risk for OIRD. Advanced age, female gender, sleep apnea, cardiac disease, patients with two or more comorbidities, and opioid dependence are significant risk factors for postoperative OIRD (Gupta et al., 2018). Patients who receive high doses of morphine are also at increased risk for OIRD (Gupta et al., 2018). This understanding is crucial because, to keep patients safe before opioid administration, successful identification of risk factors for OIRD and advanced sedation is vital. Yiu et al. (2022) also revealed that common risk factors such as sleep apnea, renal disease, frequent use of sedatives, prior exposure to opioids, age, male gender, chronic obstructive pulmonary disease, and neurologic disorders can lead to postoperative OIRD. The authors of the articles both agree that sleep apnea, COPD, renal and cardiac disease, sedating medications, advanced age, and prior opioid exposure are significant risk factors that can lead to OIRD (Gupta et al., 2018; Yiu et al., 2018). There were two risk factors not agreed upon by the authors, male and female gender. Gupta et al. (2018) literature reviews revealed female gender was a risk factor and Yiu et al. (2018) literature reviews revealed male gender was a risk factor, however, the reasons for gender disparity are unclear. This tells us that unintended advanced sedation and respiratory depression

can develop from several risk factors, and nurses need to be able to identify them to reduce incidences in patients receiving opioid medications. Understanding and recognizing these risk factors can lead to more effective prevention strategies.

Tools for Assessing Unintended Advanced Sedation and Respiratory Depression

Opioids are a primary therapy for post-surgical patients, and nurses face many challenges when administering them. As previously mentioned, the goal is to achieve adequate pain control while avoiding unintended sedation and respiratory depression, which can be caused by several risk factors. However, regardless of the risk factor, if nurses administer opioid medications without assessing a patient's sedation level, the patient becomes at risk for opioid-induced respiratory depression (OIRD). Therefore, to aid in reducing incidences of opioid-induced sedation and respiratory depression, assessment tools, such as sedation scales, need to be in place to assist nurses. Sedation scales assist nurses by helping them assess a patient's sedation level before administering an opioid medication and when to take necessary action when the patient is over-sedated (Hall & Stanley, 2019).

Many sedation scales have been developed and compared for validity including the Pasero Opioid Sedation Scale (POSS), Ramsey Sedation Scale, and the Richmond Agitation-Sedation Scale (RASS). The POSS, Ramsey Sedation Scale, and the RASS are often used in sedated patients to assess the degree of sedation (Davis et al., 2017). POSS assesses a patient's sedation level specifically when an opioid medication is given. POSS ranges from (S) sleep, easy to arouse, (1) awake and alert, (2) slightly drowsy but easily aroused, (3) frequently drowsy and drifts off to sleep during a conversation, and (4) somnolent-minimal or no response to stimulation (Hall & Stanley, 2019). The Ramsey Sedation Scale assesses sedation, but divides the sedation into six categories ranging from severe agitation (1), oriented (2), response to

commands (3), exhibits brisk response to loud stimulus (4), sluggish response to loud stimuli (5), no response/deep coma (6), and is widely used in the intensive care unit (Davis et al., 2017). RASS assesses a patient during purposeful sedation, agitation, and anxiety specifically in the intensive care unit ranging from combative (+4), very agitated (+3), agitated (+2), restless (+1), alert and calm (0), drowsy (-1), light sedation (-2), moderate sedation (-3), deep sedation (-4), and unarousable (-5) (Davis et al., 2017). The Ramsey Sedation Scale and RASS are vital but are not as unique as POSS because when used, a patient may conform to more than one level of sedation causing difficulties for a nurse to make a clinical decision (Davis et al., 2017). POSS is unique in making clinical decisions easier and demonstrates higher levels of nursing confidence when assessing a patient's sedation level because each sedation score is linked to a specific nursing intervention (Davis et al., 2017). These comparisons are significant and reveal that POSS mainly focuses on sedation and does not assess anxiety or agitation (Davis et al., 2017). The Joint Commission recommends the Pasero Opioid-Induced Sedation Scale (POSS) to minimize opioid-induced respiratory depression and advanced sedation events (Davis et al., 2017).

Quinlan-Colwell et al. (2017) also compared the documentation of sedation levels, and respiratory events before and after implementing POSS, and evaluated if POSS was appropriate and safe to use. Interestingly, there were no adverse respiratory events during the study, but the documentation of sedation levels did increase from 14% to 46%. Furthermore, POSS was defined as providing a safe standard of care and aiding in the consistency of documentation with distinct parameters (Quinlan-Colwell et al., 2017). This is worth noting because unlike any other tool, POSS has been found to assess the effects of unintended advanced sedation and respiratory depression directly and has established validity and reliability in preventing these adverse events.

Nurses can prevent adverse events of advanced sedation and respiratory depression by using POSS to delay opioid medication administration when advanced sedation is detected, which precedes respiratory depression (Quinlan-Colwell et al., 2017). Nurses can also standardize sedation assessments and communicate sedation levels clearly with healthcare providers while using POSS during opioid administration. McNaughton et al. (2021) explored nurses' knowledge and confidence in recognizing and preventing unintended sedation and respiratory depression while using POSS. Nurses strongly believed POSS was beneficial, supported safe practices in identifying appropriate interventions for patients receiving opioid medications, and was easy to use (McNaughton et al., 2021). What this means is that POSS can help nurses focus on preventing drowsiness and somnolence, which leads to unintended advanced sedation and respiratory depression. Furthermore, POSS can assist in guiding nurses during and delaying of opioid administration (McNaughton et al., 2021).

Summary of the Literature

The key implications from this review are that multiple risk factors can influence the occurrence of unintended advanced sedation and respiratory depression, and nurses play a vital role in identifying patients at risk and when intervening to prevent patients from becoming worse. Even though POSS, Ramsay Sedation Scale and RASS are used to assess sedation, per the literature, POSS guides nurses in determining whether or not an opioid medication is safe to administer. POSS has been recommended by the Joint Commission and has proven to be a unique assessment tool and a safe standard of care because it is specific to unintended advanced sedation and respiratory depression. POSS helped nurses to assess sedation levels and respiration rates before an opioid administration. Furthermore, POSS helped nurses feel confident in

recognizing unintended advanced sedation and respiratory depression and assisted them in identifying the appropriate interventions to keep patients safe when they encounter these events.

Theoretical Model

The theory used to guide this project was Rogers' Change Theory. Nurses develop habits as part of their daily work routine. Changing those habits can be challenging. This DNP quality improvement project used Rogers's Change Theory, also known as Rogers' Theory of Diffusion of Innovations, as a framework for implementation. This theory was congruent with the project because it supported the description of a new process currently not in use and helped nurses to adapt to a new approach and assist the DNP (the innovator-implementer of change) in determining how to deal with any resistance to change. This theory also supported implementing evidence-based practice changes (Leming-Lee & Watters, 2019). There are five stages of innovation in Rogers' theory: knowledge, persuasion, decision, implementation, and confirmation (Leming-Lee & Watters, 2019). As adopters of change move through the stages, they accept or reject the innovation.

Knowledge is the first stage, and inside the knowledge stage, there are five patterns of response categories: innovators, early adopters, early majority, late majority, and laggards (Leming-Lee & Watters, 2019). Change starts with the innovator, and depending on the change, patterns of the response from others may vary. Determining which pattern the nurses will have, gives the DNP student the ability to predict where they will fall. The knowledge step reveals the gap in practice. The gap in practice discovered on two post-surgical floors is that there is no standardized monitoring system or assessment tool to identify unintended advanced sedation and respiratory depression in patients receiving opioids. During the knowledge stage, nurses become aware of the gap and develop an understanding of how it is a problem and the need for change

and a new protocol. Ramis et al. (2019) conducted a systematic review to determine how effective evidence-based practice teaching strategies are in undergraduate health students, focusing on the effectiveness of theory-based strategies. Rogers' Change Theory supported the study by examining how the knowledge phase was addressed through a provision of ten educational sessions including presentations and question and answer sessions, making the health students aware of a gap in practice.

The persuasion stage is the favorable or unfavorable attitude toward innovation or change (Leming-Lee & Watters, 2019). Therefore, the nurses on the post-surgical floor will either have a positive or negative attitude toward changing how they monitor patients. To aid in persuading nurses to adapt to the new protocol, the current practice will be explained to them, including the numbers of naloxone events to rescue patients from advanced sedation and respiratory depression and how the new protocol-Pasero Opioid Sedation Scale (POSS) can be effective.

During the decision stage, the adopters get involved in activities to accept or reject the innovation (Leming-Lee & Watters, 2019). During this stage, education about the drawbacks of the current practice and the benefits of using the POSS was conducted during shift huddles for nurses. The nurses also completed a survey to uncover any barriers to understanding POSS. Al-Jubouri and Ali (2021) used Rogers' Change Theory to evaluate the competency of nurses while implementing a quality improvement project. The nurses' competency was a key factor in deciding to maintain or terminate the project (Al-Jubouri & Ali, 2021).

In the implementation stage, adopters put the new change into practice (Leming-Lee & Watters, 2019). During this stage, nurses used the POSS and asked questions to ensure they implemented correctly. The ease of using POSS was paramount in the implementation stage. Al-Jubouri and Ali's (2021) study results also aided in the implementation stage of the study by the

faculty creating materials and appropriate questions for the competency exam to improve nursing quality. The faculty played significant roles in implementing new ideas such as assessing learning achievements during the study (Al-Jubouri & Ali, 2021).

The final stage of the change process is confirmation, which is an evaluation of whether the goal of change has been met (Leming-Lee & Watters, 2019). In this stage, the nurses confirmed their final decision to accept or reject the POSS protocol. The evidence of success was revealed when the nurses no longer resorted to the old process. A survey was given to capture the staff's overall response to using the POSS protocol. In Al-Jubouri and Ali's (2021) study, Rogers' Change theory supported the confirmation stage in the study to improve nurses' quality being met when the results of the decision being made were evaluated and confirmed. By adopting the new comprehensive exam (the goal of change), nurses became highly competent, and the quality of care increased (the goal being met) (Al-Jubouri & Ali, 2021).

Methodology

In keeping with Rogers' Change Theory framework, a QI project helps to develop and implement best practices and evidence-based practice recommendations. QI projects present ways for nurses to be involved in conveying change, from improving patients' care to changing healthcare systems' services (Backhouse & Ogunlayi, 2020). To introduce and test the QI project, the Plan-Do-Study-Act (PDSA) is a four-stage problem-solving model to test the change being implemented. Durham et al. (2019) used the PDSA to accelerate quality improvement methods, found favorable results, and considered the PDSA a role model QI approach. The PDSA can provide structure and guidance to nursing staff by assisting them to focus on improving the change and allowing nurses to test the change they want to see (Coury et al., 2017).

In the plan (P) stage, nurses had the opportunity to learn about what changes were needed, which in this QI project was to decrease sedation and respiratory depression, and how POSS aided in the change. The nurses developed an understanding of POSS, the action plan tool for the QI project. The setting for this QI project was on a thoracic and vascular post-surgical floor of a 1,207-bed major center in the southeastern United States. Both units' patient populations are adults greater than 18 years old of all genders. These units primarily care for post-surgery patients, averaging 24 patients a day per unit. Both units included regular 12-hour shift nurses, travel nurses, float nurses, and contract nurses. Since nurses are the primary staff who assessed patients and implemented POSS during administering opioids, doctors, respiratory therapists, physical therapists, pharmacists, and radiology technicians were excluded.

The do (D) stage is where nurses implemented POSS, and data were collected to evaluate the effectiveness of POSS. The timeline for this QI project took place during the spring of 2023 and concluded within 8 weeks. Training for the nursing staff was completed over eight weeks before the initiation of the POSS scale documentation protocol. The training focused on when and how to use POSS during opioid administration. After training, the POSS intervention was implemented. Resources for this QI project did not require funding inside or outside the facility. Chart audits to monitor how often an opioid was held or given were conducted weekly to monitor compliance using the POSS assessment tool. The audits were documented on an Excel spreadsheet.

The study (S) stage was to determine if POSS resulted in an improvement. Measures of quantitative data were used to gauge the effectiveness of the POSS assessment tool. The Joint Commission recommends tracking the use of naloxone since this medication is administered during unintended sedation and respiratory depression events (The Joint Commission, 2022).

Before using the POSS assessment tool, the number of times naloxone was administered on the two post-surgical floors was collected from the data warehouse of the project facility. According to the facility's data report, 149 doses of naloxone were administered in the entire hospital, excluding the emergency department, from December 2021 to February 2023 to rescue patients from unintended advanced sedation and respiratory depression. Eleven of the 149 doses of naloxone were administered on the thoracic and vascular post-surgical floors. After nurses used the POSS assessment tool, the number of times naloxone was administered was collected again from the data warehouse of the project facility. Lastly, the nurse's compliance using the assessment tool was collected based on whether an opioid medication was held or given.

The act (A) stage helped nurses reflect on POSS, the associated outcomes, and if there was a need for further improvement. A survey was used to analyze the nurses' perception of the POSS assessment tool. Reducing unintended sedation and respiratory depression was a priority at the QI project study site. The methodology chosen for this QI project was based on the assumption that implementing the POSS assessment tool would reduce unintended sedation and respiratory depression events. The PDSA model, a standard QI improvement process, aids in facilitating practice based on evidence and also helps to guide clinical decision-making (Katowa-Mukwato et al., 2020). Unfortunately, the legitimacy of the PDSA model is questionable. Even though most QI projects report improvement using the PDSA model, there are still methodological challenges, for example, the misconception that the PDSA model can be used as a standalone method (Knudsen et al., 2019). Even though the PDSA Model poses a challenge, it was still the ideal choice for the structure of this QI project.

Agency Description

The project was implemented in a regional teaching hospital in the southeastern United

States. The facility has 1,207 beds and is the only facility to receive Magnet Nursing designation by the American Nurses Credentialing Center. The facility is nationally ranked in eight adult specialties and also has a high-performance rating in adult cancer care. There are approximately 7,000 employees at this facility and its vision is to inspire and produce knowledge through education and research that aids in helping patients and the community.

Setting

This quality improvement project was implemented in the vascular and thoracic post-surgical floors. The institution has an opioid stewardship program supported by hospital leadership and frontline staff. The facility also has good resources and strong beliefs in creating a safety culture and using evidence-based practice interventions. The providers in the vascular and thoracic surgery unit treat the full spectrum of vascular disorders. The thoracic surgery unit provides care for patients undergoing thoracic surgical procedures, acute lung and heart transplant patients, and patients with underlying lung and heart disease. The staff is dedicated to advancing the field of vascular surgery to improve patient outcomes.

Population

The target population for implementation of the new protocol included registered nurses, licensed practical nurses, contract nurses, pool nursing staff, and travel nurses. All shifts were included during the implementation of the POSS assessment tool. Doctors, respiratory therapists, physical therapists, pharmacists, and radiology technicians were excluded because they did not meet the criteria of being staff who will use the POSS assessment tool during implementation. The patient population for the patient care units are thoracic and vascular post-surgical patients. The thoracic post-surgical patients typically have airway and chest wall disorders requiring resection or reconstruction. The vascular post-surgical patients typically have conditions

affecting circulation, including disease of the arteries and veins, and complex aneurysms needing repair.

Congruence of the DNP Project

The facility's values include integrity, respect, diversity and inclusiveness, collaboration, excellence and achievement, stewardship, and accountability. These values provide a framework for collaboration and strategic goals to build a strong foundation. The facility encourages nursing research and seeks continuous care improvements for better quality and well-being of patients. Currently, the facility's opioid stewardship vision is creating an infrastructure for safe opioid prescribing. The primary goal is excellent care and effective acute pain management to enhance safety and faster recovery.

Description of Stakeholders

Stakeholders for this project included the chief nursing officer, the director of the information technology service, the manager of the orders and power-plans team, the opioid stewardship manager, the quality improvement manager, nursing managers, nursing staff, and patients in the vascular and thoracic post-surgical floors. These stakeholders assisted in providing knowledge of constraints and risks during the implementation of the project. The stakeholders also aided in reiterating the expectations needed from the nursing staff during the implementation of the project.

Project Design

The DNP project used a quality improvement project design. The basis of this quality improvement project assumed that implementing the Pasero Opioid-Induced Sedation Scale (POSS) would reduce unintended advanced sedation and respiratory depression in post-surgical patients receiving opioid medications. This quality improvement project used quantitative data,

including naloxone events before and after the implementation of POSS, weekly chart audits of nurses on the thoracic and vascular post-surgical floor to monitor if the POSS was being documented correctly, and a post-survey to assess how the POSS intervention was perceived.

The first phase of implementation started with inviting nurses on the thoracic and vascular post-surgical floor to an educational session during shift huddles that included all aspects of how to use the POSS (see Appendix A and B) to monitor patients for unintended sedation and respiratory depression. Permission was granted to the DNP student to use the POSS for educational purposes (see Appendix C).The educational session allowed the nurses to recognize and assess the change in the process needed, which also allowed nurses to pass through the knowledge, persuasion, and decision stage of Rogers' Change Theory (Coury et al., 2017). The educational session assisted nurses in understanding the need and the development of the plan (P), the first stage of the Plan-Do-Study-Act (PDSA), to correct the problem using the POSS intervention. The educational sessions were conducted within eight weeks, including nurses on the dayshift, nightshift, and weekend shifts. The educational sessions allowed time for questions to be addressed and for comments or thoughts from the nurses. At the end of each educational session, questions were verbally asked to evaluate the knowledge the nurses gained to implement POSS. Resource documents and one-pagers were available for the nursing staff who could not attend the educational sessions (see Appendix D).

The second implementation phase, the POSS intervention, consisted of nurses documenting ranges of sedation and respiratory rates in the electronic medical record. POSS ranges from (S) sleep, easy to arouse, (1) awake and alert, (2) slightly drowsy but easily aroused, (3) frequently drowsy and drifts off to sleep during a conversation, and (4) somnolent-minimal or no response to stimulation (Hall & Stanley, 2019). If a patient scores two or less, no action is

required, and the nurse may proceed with opioid administration. If a patient scores three or greater, sedation and respirations will be monitored closely by the nurse, and the opioid medication will be held. Nurses were passing through the implementation stage of Rogers' Change Theory and the do (D) stage of the PDSA by putting the POSS intervention into practice and collecting data to evaluate the POSS effectiveness. Data was collected and documented using Excel and was concluded within eight weeks of implementation.

The third phase of implementation was where the nurses passed through the confirmation stage of Rogers' Change Theory and the study (S) stage of the PDSA by confirming that they understood the need for change and are not following the old process of monitoring patients during opioid administration. The data collected allowed nurses to recognize, assess, and monitor patients using POSS to reduce unintended sedation and respiratory depression. This implementation phase also consisted of a weekly chart audit to monitor compliance and determine if POSS was being used correctly. Retraining was provided when data revealed noncompliance while nurses were using the POSS intervention.

The final implementation stage was where nurses were in the act (A) stage of the PDSA. This stage aids in determining if POSS was a vital assessment tool and identified a plan for continuous improvement (Garcia & McMullan, 2019). After implementing the POSS intervention, a post-survey was given to assess the nurses' knowledge and perception of POSS (see Appendix E). Also, the second review of data from the data warehouse was conducted to determine if naloxone events decreased and if the goal of reducing unintended sedation and respiratory depression was met.

This author was the primary facilitator and project leader responsible for disseminating all materials and educational sessions for the nurses. The one benefit of this quality improvement

project was that nurses were to be involved in leading and delivering change. Using the POSS intervention, nurses can potentially improve patient care by reducing unintended sedation and respiratory depression and potentially transform the intervention across complex healthcare for sustainability (Backhouse & Ogunlayi, 2020). The project presented some barriers and limitations during implementation. Learning new knowledge can be met with anxiety or fear of understanding, therefore, the author explored the different personalities during the educational sessions and planned accordingly.

IRB Submission Process

The DNP projects facility's policy required that all research involving human subjects be reviewed and approved by its IRB before research started. Requirements applied to all human subjects for research conducted by students or staff. Any data collection, use of existing data, or specimens involving research on human subjects needed approval. After review, the DNP project's facility determined the project was not subject to FDA regulations and was not Human Subjects Research. The DNP student's educational institution granted an exemption by the Institutional Review Board. See Appendix F and G for the IRB determination letter and approval.

Timeline for Project Phases

The timeline for the DNP project planning began in the summer of 2022 (see Appendix H). The problem was identified, a needs assessment and gap analysis were conducted, local and national data was discovered, key stakeholders were identified and selected, the initial literature search was conducted, and a PICOT question was created and finalized. In the fall of 2022, CITI training was completed (see Appendix I), the review of literature was concluded, the IRB application was submitted and approved, and a letter of support and site approval was granted by

the agency. In the spring of 2023, implementation of the DNP project took place, including data collection and analysis, and revisions of the DNP manuscript. Summer 2023 entailed the completed manuscript, dissemination of the project, and submission of the electronic portfolio.

Resources

Only a few resources were needed to complete the DNP project. To conduct the project, this author needed access to the electronic health record. The facility required a pin and token to access the database for security. To maintain the integrity and ensure data quality within the project, this author created and extracted a single source of data using analytic software at the study site and then displayed the data using a contingency table in Excel to explore the analysis better. The educational materials were emailed to the nurse managers and nurse professional development leaders on both post-surgical floors.

Data Collection Plan

Maintaining integrity during the data collection process is vital. Data were retrieved from the electronic health records (EHR) on the vascular and thoracic post-surgical floor, and the data warehouse. To maintain the integrity and ensure data quality within the project, this author created and extracted data from the EHR at the study site and then displayed the data using a contingency table in Excel to explore the analysis better. Creating a single source of data decreased the potential for errors.

Data Analysis Plan

An analysis of the data was conducted using Excel. Excel has many charts, tables, and graph types to help visually present and interpret data. Excel is enhanced for data analysis and calculations. Sylvia and Terhaar (2018) stated that statistical software packages like Microsoft Access and Excel display a basic view of the analysis of data fields.

Results

This section will review the results of the data analysis. It will also include quantitative results from the post-survey. Demographics were examined, and key findings are summarized below.

Results of Chart Review

A chart review was performed for six weeks on the thoracic and vascular post-surgical floors to evaluate if the POSS was being documented correctly before opioid administration. The POSS elements and opioid administration were captured in a database, and then entered into Excel to capture the percentage of the nursing staff's compliance. Overall, more than 99.9% of the time before an opioid medication was administered, the POSS elements were documented by the nursing staff correctly. No particular patterns were identified during implementation.

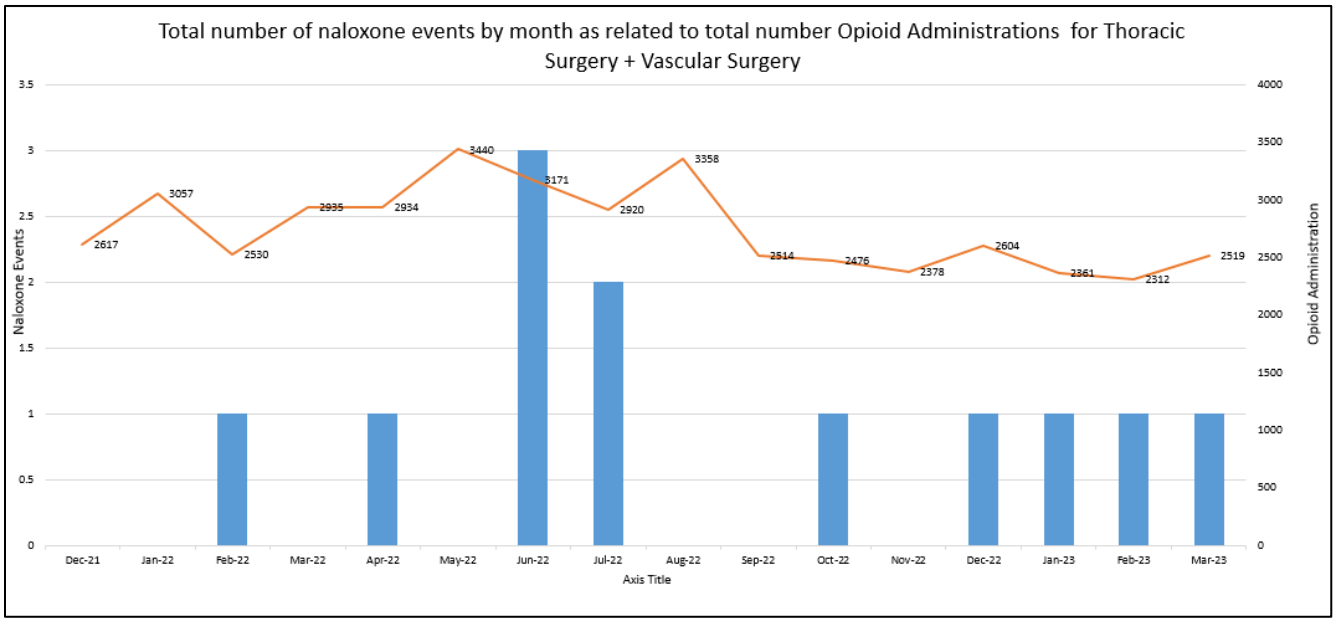
Results of Naloxone Events

Tracking naloxone events is vital because naloxone is administered during unintended sedation and respiratory depression. A paired-sample t-test was conducted to compare naloxone events on the thoracic and vascular post-surgical floors before (11 events) and after (1 event) implementation. Data were retrieved from the facility's data warehouse, then entered and graphed into Excel (Figure 1). Figure 1 defines naloxone use as the number of naloxone events per month as related to the total number of opioid administrations. First, the naloxone events were broken down from months to weeks. Second, the average (mean) naloxone events per week were calculated pre (0.180328-observation 61 weeks) and post (0.166667-observation 6 weeks) implementation. Third, the two averages were placed into a t-test calculator in Excel. The overall naloxone events resulted in a p-value of 0.530. The null hypothesis cannot be rejected because

the p-value is greater than 0.05. Therefore, the results of the pre-and post-implementation naloxone events are not statistically significant.

Figure 1

Total Number of Naloxone Events with Opioid Administration



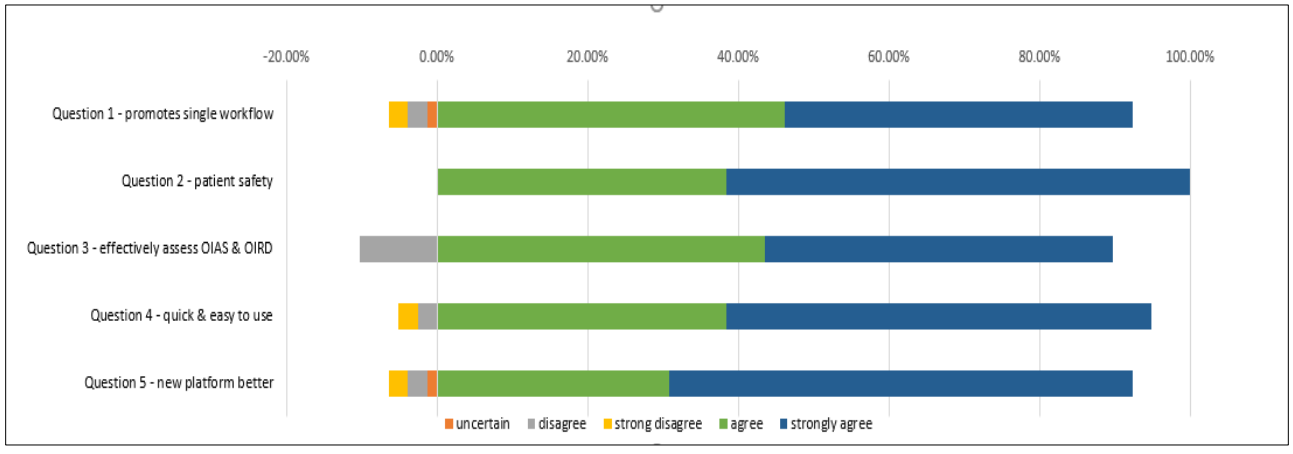
Results of Post-Survey

A post-survey was administered to the nursing staff on the thoracic and vascular post-surgical floor to explore their perception, opinions, and attitudes toward the POSS. The survey options included strongly agree, agree, uncertain, disagree, and strongly disagree. Thirty-nine surveys were completed anonymously, entered into a database, analyzed in Excel, and displayed in a bar chart. Figure 2 shows the percentage of the values for each selected option on the post-survey. The chart revealed that the nursing staff overall agreed and strongly agreed with the post-survey questions. Question 1 in the chart revealed the nursing staff equally agreed and strongly agreed (46.15%) that implementing the POSS aided in promoting a single workflow before opioid administration and documentation [uncertain (-1.28%), disagree (-2.56%), strongly

disagree (-2.56%)]. Question 2 in the chart revealed that the nursing staff agreed (38.36%) and strongly agreed (61.54%) that documenting POSS was important to patient safety [uncertain (0%), disagree (0%), strongly disagree (0%)]. Question 3 in the chart revealed that the nursing staff agreed (43.59%) and strongly agreed (46.15%) that the POSS allowed them to effectively assess for advanced sedation and respiratory depression [uncertain (0%), disagree (-10.26%), strongly disagree (0%)]. Question 4 in the chart revealed that the nursing staff agreed (38.46%) and strongly agreed (56.41%) that the POSS was easy to use [uncertain (0%), disagree (-2.56%), strongly disagree (-2.56%)]. Question 5 in the chart revealed that the nursing staff agreed (30.77%) and strongly agreed (61.54%) that using the POSS was a better platform that allowed the nurses to document in one location [uncertain (-1.28%), disagree (-2.56%), strongly disagree (-2.56%)].

Figure 2

Post-Surveys



Discussion

This project's purpose was to reduce the incidences of unintended advanced sedation and respiratory depression using the POSS. The results showed a high compliance percentage of the

nursing staff using the POSS, suggesting that the intervention assisted the nurses to assess sedation and respirations in patients before opioid administration, therefore, aiding to decrease the incidences of an adverse event. The results of the naloxone events were not statistically significant in reducing incidences of advanced sedation and respiratory depression. However, the findings did reveal a downward trend of opioid use and this could be due to the facility's opioid stewardship approach to pain management. The overall post-survey results were positive and supported the POSS in being an effective tool to assess patients before an opioid medication was administered to aid in reducing unintended advanced sedation and depression.

Implications for Clinical Practice

The findings of this quality improvement project suggest that the POSS is an appropriate tool to assess OIRD in the acute care setting. The POSS should be the nursing standard of care when assessing for OIRD in acute-hospitalized patients. Through intervention, this project increased the nursing staff's awareness of how POSS is a vital tool in reducing adverse events leading to OIRD.

Implications for Healthcare Policy

There are always opportunities for change. Currently, there is no policy to assess patients for advanced sedation and respiratory depression. This project markedly improved compliance with documentation of the POSS when assessing patients before opioid administration.

Implications for Quality/Safety

This quality improvement project demonstrated an increased initiative using the POSS among nursing staff. The project also demonstrated an overall improvement in compliance in reducing events of advanced sedation and respiratory depression with documentation of the

POSS. Implementing the POSS hospital-wide could show promise in improving advanced sedation and respiratory depression events in other acute-care settings.

Implications for Education

Education can emphasize the importance of reducing the incidences of opioid-induced unintended advanced sedation and respiratory depression in hospitalized patients. Education empowers nurses to either administer or hold opioids based on the patient's assessment. Furthermore, educating nurses can increase compliance in documentation, and nurse educators can use this project to provide future education to other acute-care settings.

Limitations

A few limitations were identified in this quality improvement project. The project's implementation date was delayed by eight weeks due to the facility's deadlines and requirements for education. Therefore, the project was over six weeks, limiting the number of chart reviews. Furthermore, the overall number of naloxone events was small due to the collection of data over a short period. Another limitation was the number of nurses who participated in the post-survey. The post-survey response rate was also a factor. This DNP student included reminders in unit huddles, face-to-face rounding, and email reminders to the nursing leadership for support to increase participation. Given the project's results, a longer-term to capture data may show more success.

Dissemination

The DNP student presented the project's results to the key stakeholders, including the Chief Nursing Officer, the director, the nurse manager, the quality improvement manager, and the nursing staff in the thoracic and vascular post-surgical floors. The findings of the project

were disseminated via a poster, zoom presentation, and paper. The project results were presented in a poster presentation at the DNP's dissemination day on Thursday, July 13, 2023.

Feasibility and Plan for Sustainability

After the DNP project was implemented on the thoracic and vascular surgery units, the results displayed a meaningful change in practice to decrease incidences of Opioid-Induced Respiratory Depression (OIRD). To maintain sustainability, continued project support from key stakeholders is needed. Stakeholders can assist in developing a policy based on the evaluation of the project results which can assure the continuation of sedation and respiration monitoring and aid in integrating throughout the entire organization. Based on the expected positive outcomes of the project and the Joint Commission's recommendations, the intervention will serve as a standard of care on the thoracic and vascular post-surgical floors. The protocol will also expand throughout the hospital, especially on other post-surgical floors. Overall, the intervention was expected to meet the Joint Commission's recommendations, aid in the early identification of over-sedation, decrease hospital stays, decrease transfers to intensive units, and decrease costs related to over-sedation.

Conclusion

Nurses and providers must provide safe, effective, patient-centered pain management by frequently assessing pain, administering multi-modal pain management plans, evaluating pain management plans frequently, and monitoring for unintended adverse events. Care team members must know the risks and benefits of opioids, have systematic IT support, use validated tools to create a safety culture, and routinely assess for and recognize and prevent OIRD and death. Research suggests that the POSS has the potential to decrease adverse events of advanced sedation and respiratory depression,

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Appendix A

Education Material 1

Pasero Opioid-induced Sedation Scale (POSS) with Interventions*

S = Sleep, easy to arouse
Acceptable; no action necessary; may increase opioid dose if needed

1 = Awake and alert
Acceptable; no action necessary; may increase opioid dose if needed

2 = Slightly drowsy, easily aroused
Acceptable; no action necessary; may increase opioid dose if needed

3 = Frequently drowsy, arousable, drifts off to sleep during conversation
Unacceptable; monitor respiratory status and sedation level closely until sedation level is stable at less than 3 and respiratory status is satisfactory; decrease opioid dose 25% to 50% or notify prescriber or anesthesiologist for orders; consider administering a non-sedating, opioid-sparing nonopioid, such as acetaminophen or a NSAID, if not contraindicated.

4 = Somnolent, minimal or no response to verbal and physical stimulation
Unacceptable; stop opioid; consider administering naloxone; notify prescriber[2] or anesthesiologist; monitor respiratory status and sedation level closely until sedation level is stable at less than 3 and respiratory status is satisfactory.

*See appropriate action in italics at each level of sedation.

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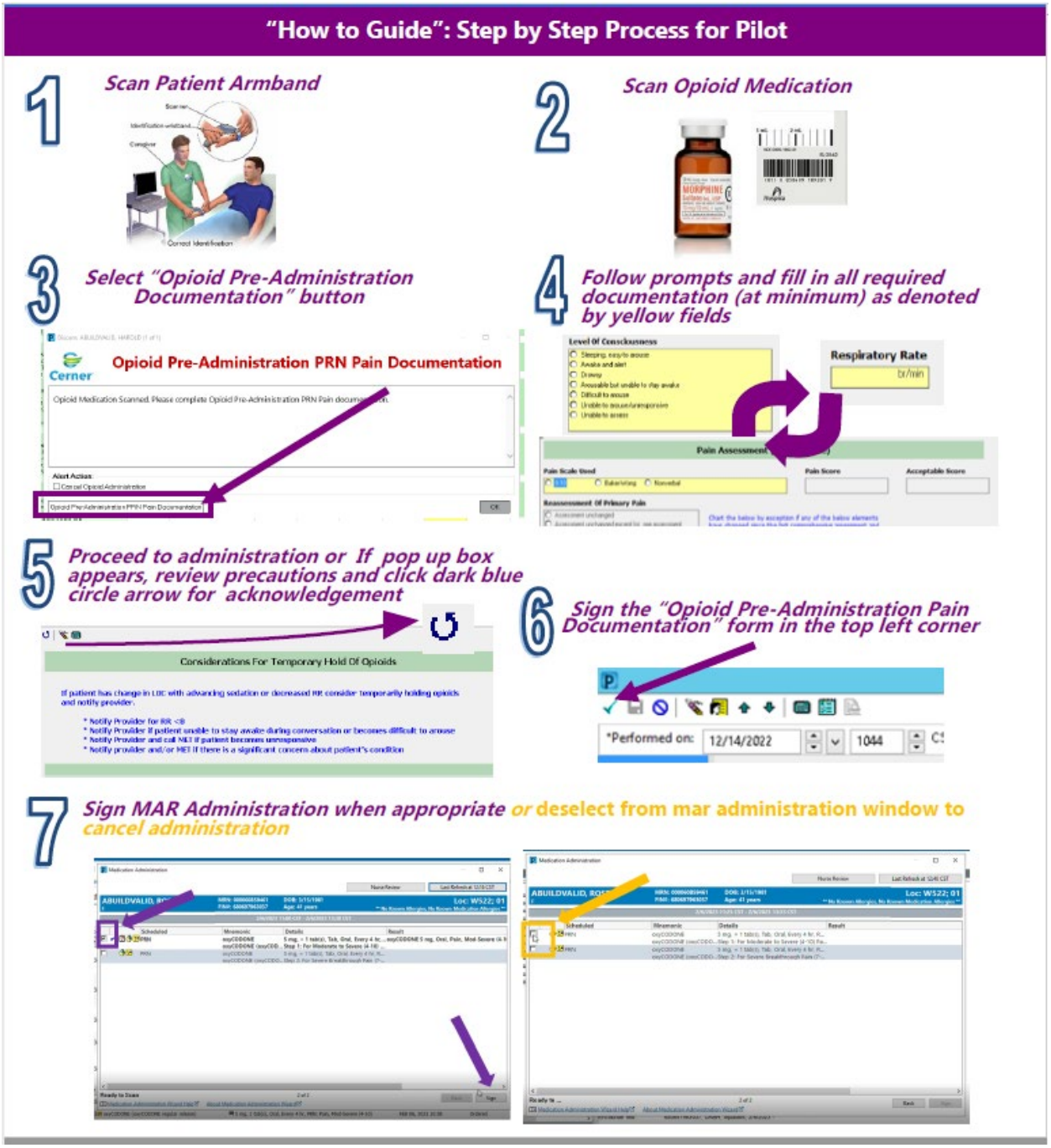
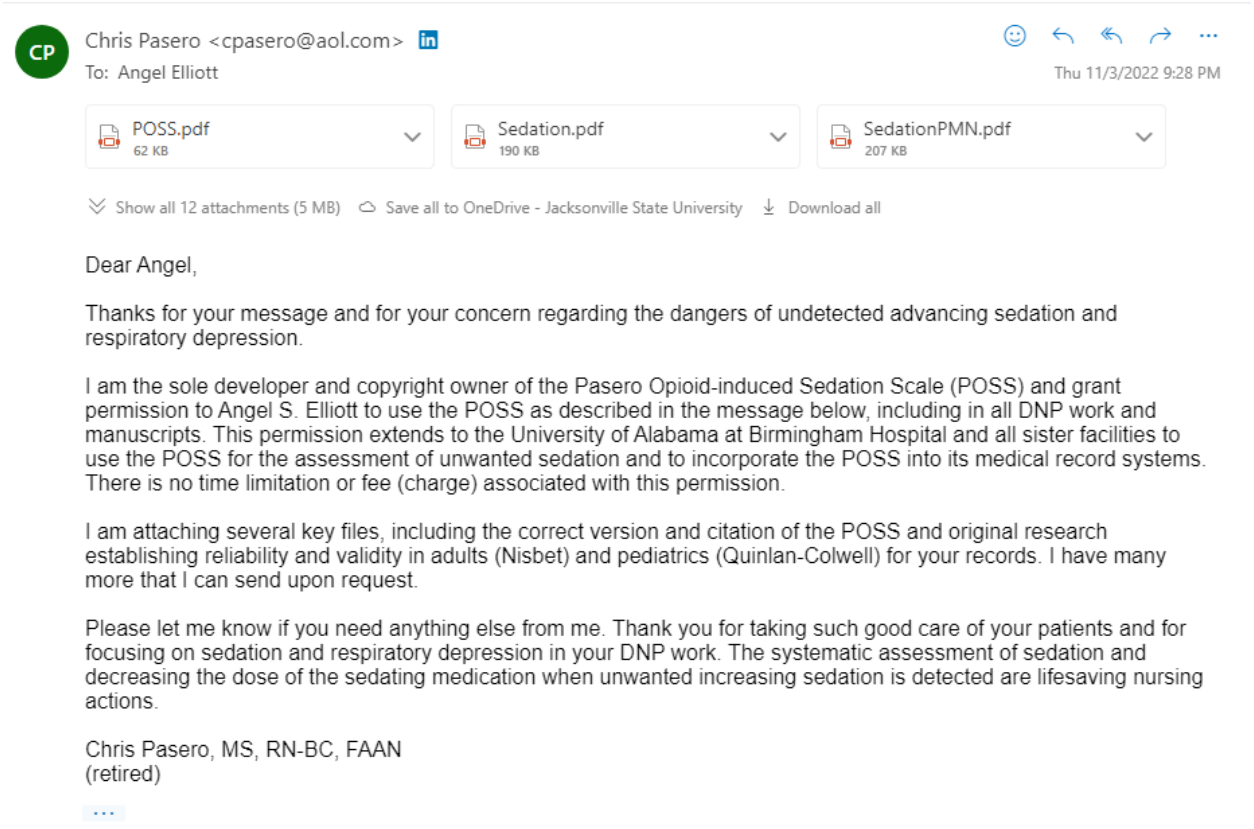
Appendix B

Education Material 2



Appendix C

Pasero Opioid-Induced Sedation Scale Permission Email



CP

Chris Pasero <cpasero@aol.com>

To: Angel Elliott

Thu 11/3/2022 9:28 PM

POSS.pdf 62 KB

Sedation.pdf 190 KB

SedationPMN.pdf 207 KB

Show all 12 attachments (5 MB) Save all to OneDrive - Jacksonville State University Download all

Dear Angel,

Thanks for your message and for your concern regarding the dangers of undetected advancing sedation and respiratory depression.

I am the sole developer and copyright owner of the Pasero Opioid-induced Sedation Scale (POSS) and grant permission to Angel S. Elliott to use the POSS as described in the message below, including in all DNP work and manuscripts. This permission extends to the University of Alabama at Birmingham Hospital and all sister facilities to use the POSS for the assessment of unwanted sedation and to incorporate the POSS into its medical record systems. There is no time limitation or fee (charge) associated with this permission.

I am attaching several key files, including the correct version and citation of the POSS and original research establishing reliability and validity in adults (Nisbet) and pediatrics (Quinlan-Colwell) for your records. I have many more that I can send upon request.

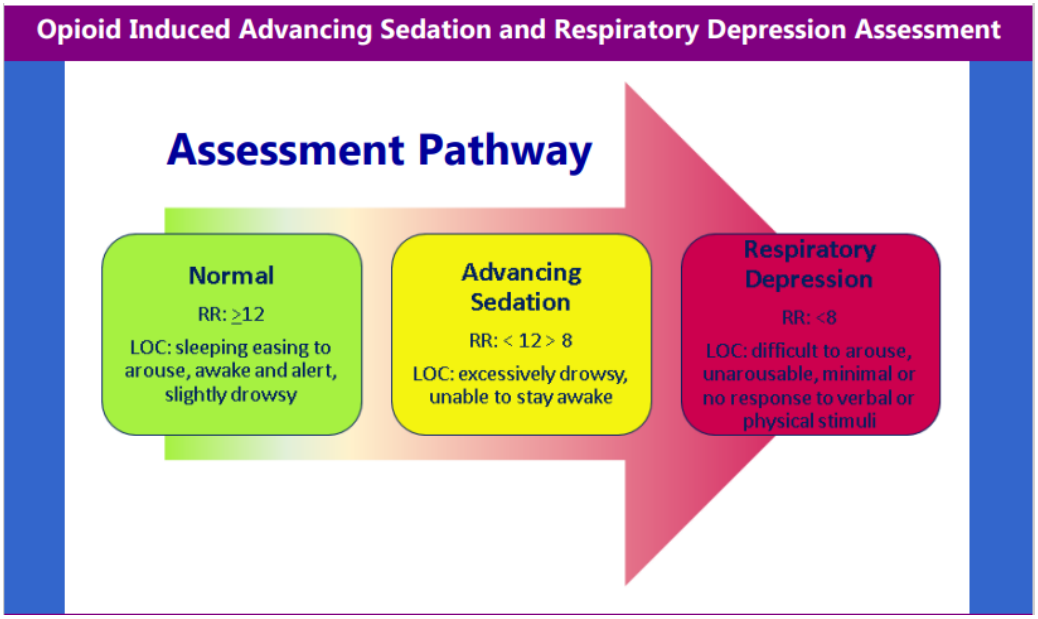
Please let me know if you need anything else from me. Thank you for taking such good care of your patients and for focusing on sedation and respiratory depression in your DNP work. The systematic assessment of sedation and decreasing the dose of the sedating medication when unwanted increasing sedation is detected are lifesaving nursing actions.

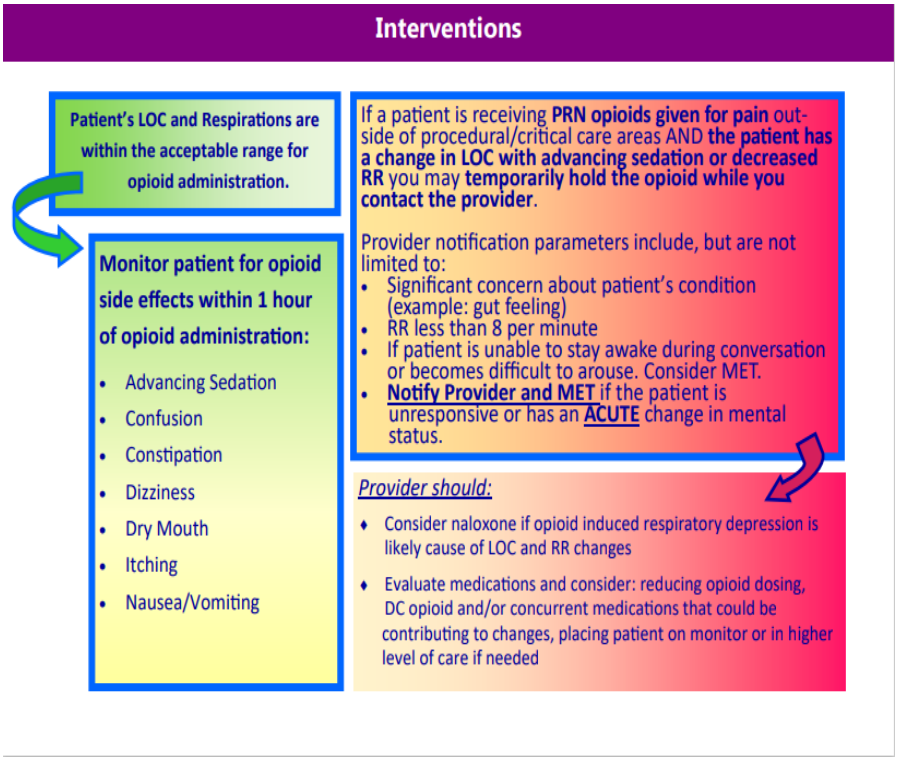
Chris Pasero, MS, RN-BC, FAAN
(retired)

...

Appendix D

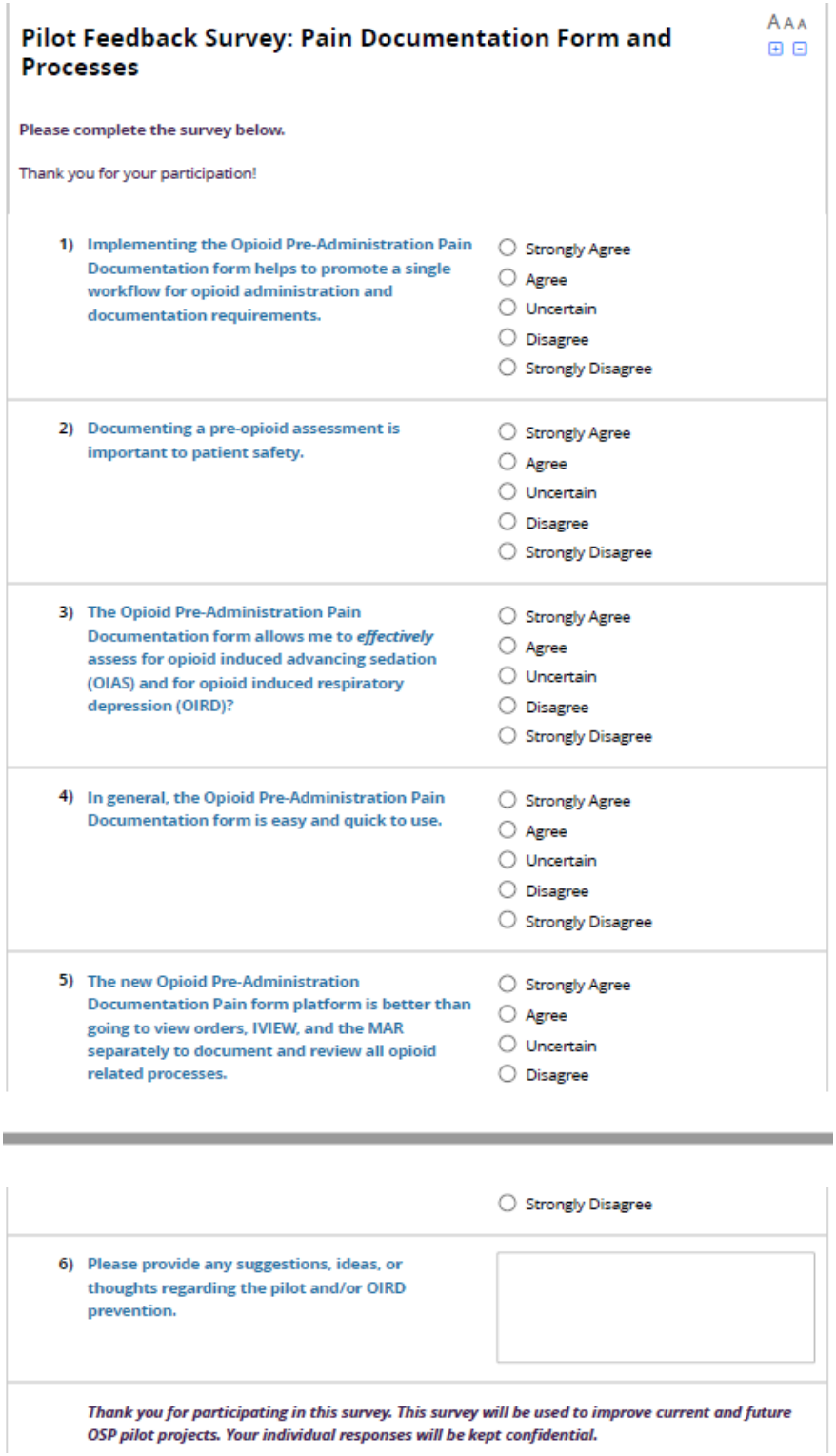
Resource Document





Appendix E

Post-Survey



Pilot Feedback Survey: Pain Documentation Form and Processes

AAA

Please complete the survey below.

Thank you for your participation!

1) **Implementing the Opioid Pre-Administration Pain Documentation form helps to promote a single workflow for opioid administration and documentation requirements.**
- Strongly Agree
- Agree
- Uncertain
- Disagree
- Strongly Disagree

2) **Documenting a pre-opioid assessment is important to patient safety.**
- Strongly Agree
- Agree
- Uncertain
- Disagree
- Strongly Disagree

3) **The Opioid Pre-Administration Pain Documentation form allows me to *effectively* assess for opioid induced advancing sedation (OIAS) and for opioid induced respiratory depression (OIRD)?**
- Strongly Agree
- Agree
- Uncertain
- Disagree
- Strongly Disagree

4) **In general, the Opioid Pre-Administration Pain Documentation form is easy and quick to use.**
- Strongly Agree
- Agree
- Uncertain
- Disagree
- Strongly Disagree

5) **The new Opioid Pre-Administration Documentation Pain form platform is better than going to view orders, IVIEW, and the MAR separately to document and review all opioid related processes.**
- Strongly Agree
- Agree
- Uncertain
- Disagree

- Strongly Disagree

6) **Please provide any suggestions, ideas, or thoughts regarding the pilot and/or OIRD prevention.**

Thank you for participating in this survey. This survey will be used to improve current and future OSP pilot projects. Your individual responses will be kept confidential.

Appendix F

DNP Project Facility Determination Letter

THE UNIVERSITY OF ALABAMA AT BIRMINGHAM
Office of the Institutional Review Board for Human Use

470 Administration Building
701 20th Street South
Birmingham, AL 35294-0104
205.934.3789 | Fax 205.934.1301 |
irb@uab.edu

NHSR DETERMINATION

TO: Elliott, Angel Sanders

FROM: University of Alabama at Birmingham Institutional Review Board
Federalwide Assurance # FWA00005960
IORG Registration # IRB00000196 (IRB 01)
IORG Registration # IRB00000726 (IRB 02)
IORG Registration # IRB00012550 (IRB 03)

DATE: 01-Nov-2022

RE: IRB-300010133
Reducing Incidences of Opioid Induced Unintended Advanced Sedation and Respiratory Depression in Hospitalized Patients

---

The Office of the IRB has reviewed your Application for Not Human Subjects Research Designation for the above referenced project.

The reviewer has determined this project is not subject to FDA regulations and is not Human Subjects Research. Note that any changes to the project should be resubmitted to the Office of the IRB for determination.

if you have questions or concerns, please contact the Office of the IRB at 205-934-3789.

Appendix G

Educational Institution IRB Exemption Letter

Institutional Review Board for the Protection of Human Subjects in Research
249 Angle Hall
700 Pelham Road North
Jacksonville, AL 36265-1602

November 4, 2022

Angel Elliot
700 Pelham Rd. North
Jacksonville, AL 36265

Dear Angel:

Your project "Reducing Incidences of Opioid Induced Unintended Advanced Sedation and Respiratory Depression in Hospitalized Patients" 11042022 has been granted exemption by the JSU Institutional Review Board for the Protection of Human Subjects in Research (IRB). If your research deviates from that listed in the protocol, please notify me immediately. One year from the date of this approval letter, please send me a progress report of your research project.

Best wishes for a successful research project.

Sincerely,

Lynn Garner
Associate Human Protections Administrator, Institutional Review Board

Appendix H

Timeline of Project Phases

Task 2022	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
• Project Planning • Site Selection • Problem Statement	**X**							
• 1st needs assessment/Gap Analysis • Stakeholder meeting • 2nd needs assessment/Gap Analysis		**X**						
• Project Scope • 3rd needs assessment/Gap Analysis • Stakeholders Meeting			**X**					
• Project Goal/needs identification • Best Practice Guidelines • Stakeholders Meeting • Identify Project Team Members • Initial PICOT • Final PICOT • Draft Proposal			**X**					
• CITI training				**X**				
• Final Literature Review					**X**			
• IRB Approval							**X**	

• Agency letter of support and project site approval								
• How to Incorporate Assessment Tool in EHR • Develop Staff Education • Identify any patient education needs • Develop data report to monitor compliance • Stakeholders Meeting								**X**
Task **2023**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**
• Educate Staff on PILOT process • Stakeholders Meeting	**X**	**X**	**X**					
• Final PILOT Implementation • Data Collection • Data Analysis • Stakeholders Meeting				**X**	**X**			
• Final Manuscript • Project Dissemination • Final Presentation • Electronic Portfolio Submission						**X**	**X**	**X**

Appendix I

CITI Training Certificate

CITI PROGRAM

Completion Date 16-Aug-2022
Expiration Date 15-Aug-2025
Record ID 50681226

This is to certify that:

Angel Elliott

Has completed the following CITI Program course:

Not valid for renewal of certification through CME.

Social and Behavioral Responsible Conduct of Research
(Curriculum Group)
Social and Behavioral Responsible Conduct of Research
(Course Learner Group)
1 - RCR
(Stage)

Under requirements set by:

Jacksonville State University

CITI
Collaborative Institutional Training Initiative

Verify at www.citiprogram.org/verify/?wbb7ff68e-4ad8-4603-aaf5-56b864bb1c20-50681226