A Quality Improvement Project to Standardize Opioid Analgesic Pain Management for Carpal Tunnel Release Surgical Patients by Implementation of a Pre-op Evidence-Based Educational Session

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Abstract

In recent years, opioid consumption patterns have exponentially grown, arguably contributing to the consequences seen with the opioid epidemic (Morone & Weiner, 2013). Evidence in literature suggests pre-operative pain management education results in reduction of consumed opioid pills and patient-reported pain, when compared to a control group (Alter & Ilyas, 2017; Kol, Alpar, & Erdoğan, 2014; Makki, Alameddine, Khateeb & Packer, 2011; Pepe et al., 2017; van Dijk et al., 2015). The purpose of this project was to standardize opioid analgesic pain management for carpal tunnel release surgical patients by implementation of a pre-op evidence-based pain management educational session as evidenced by tracking opioid usage and pain rating based on the Numerical (pain) Rating Scale (NRS) score. The Plan-Do-Study-Act (PDSA) model was used for structured data collection and quality improvement implementation (Langley et al., 1996). Specific criteria established within a clinical practice guideline was used as the material for the educational session presented to patients (Chou et al., 2016). Results were statistically analyzed utilizing frequencies and run charts. These frequencies revealed an average reduction in opioid consumption with the educational session implementation. All conclusions drawn from results of data analysis were used for quality improvement revisions and project findings dissemination and sustainability.

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Project Overview

Prescription opioid use has skyrocketed in healthcare since the early 2000's (Morone & Weiner, 2013). In 1995 the American Pain Society's Dr. James Campbell's concept introduced evaluating pain as a vital sign, leading to the Joint Commission on Accreditation of Healthcare Organizations' recommendation that pain be regularly assessed in all patients (Morone & Weiner, 2013). While pain management is essential to quality care, the considerable attention to this measurement may have influenced providers to overprescribe opioid analgesics (Morone & Weiner, 2013). Every region in the United States has recorded at least 50 opioid prescriptions per 100 residents; with 13 states recorded to have 96-143 prescriptions per 100 people (Centers for Disease Control and Prevention, 2017). Compared to 1999, the number of opioid prescriptions was three times higher in 2015 (Guy et al., 2017). From 1999 to 2011, the consumption of oxycodone alone had risen by 500% (Kolodny et al., 2015). As the number of opioid pills consumed has increased over the years, so has the overdose-related deaths, cases of addiction, hospital related admissions, and rehabilitation. Current reports from the Centers for Disease Control and Prevention state that 91 Americans die every day from an opioid overdose (Centers for Disease Control and Prevention, 2017). These consequences cost the U.S. about $78 billion annually (Guy et al., 2017). Individuals prescribed opioid analgesics may also exhibit aberrant behavior by seeking opioids illegally (Kolodny et al., 2015). The National Survey on Drug Use and Health found four out of five heroin substance abusers admitted that their current drug choice initially started with the use of opioid analgesics (Kolodny et al., 2015).

As patient satisfaction is a strictly measured outcome in healthcare, it is imperative to consider pain management's influence on the patient experience. Unfortunately, some patients' expectations may lack realistic pain management expectations. A misconception may exemplify that having access to stronger analgesics indicates better pain management (Hayes & Gordon, 2015).

Problem Statement

The expectancy theory suggests that pain expectations can alter the experience of pain relief in patients (Peerdeman et al., 2016). This is evidenced by subjective and neurobiological measures with placebo treatment (Peerdeman et al., 2016). A clinical practice guideline developed by the American Pain Society, the American Society of Regional Anesthesia and Pain Medicine, and the American Society of Anesthesiologists' Committee on Regional Anesthesia identified indications and recommendation for practice change (Chou et al., 2016). This expert panel conducted a systematic literature review and series of guideline revisions based on expert recommendations (Chou et al., 2016). This guideline highlighted the identified problems in healthcare associated with the opioid epidemic, such as chronic opioid use following acute surgery, risk for overdose, and risk for addiction (Chou et al., 2016). Based on the experts' collaborative effort and thorough literature findings, these recommendations concluded that pre-operative pain education should be a priority during pre-operative patient encounters to promote patients' safe opioid use and appropriate pain management (Chou et al., 2016). When surgical patients are not aware of the effects, use and implications of opioid analgesics, or have not received proper education on their pain management and prescriptions, chronic opioid use in the post-operative phase becomes more likely (Gan,

Habib, Miller, White & Apfelbaum, 2014). Furthermore, research indicates that continued or new opioid use without proper patient education might lead to misuse, diversion of medication for others' misuse, overdose, death or addiction (Chou et al., 2016; Deyo et al., 2017; Gan, Habib, Miller, White & Apfelbaum, 2014).

Specifically, within Anne Arundel County, the number of opioid overdoses has drawn concern. Data from the Anne Arundel County Health Department in 2018 show there was a 66.7% year to date increase in fatal opioid overdoses in comparison to 2017 (Opioid, 2018). In 2017, there were a total of 1062 recorded opioid overdoses, 152 of which were fatal (Opioid, 2018). Given the collaborating agency is located surrounding this region and regularly treats patients of this geographical area, patients' knowledge of safe opioid use when prescribed opioid analgesics post-operatively is imperative to their safety.

The medical director of the collaborating agency identified a lack of pre-operative education for carpal tunnel release surgery patients prior to the implementation of this project. He also stated the need to standardize opioid analgesic pain management for upper hand extremity (carpal tunnel release) surgical patients. Recognizing the lack of standardization for opioid analgesic pain management for these patients, he formulated the Orthopedic Opioid Steering Committee at the collaborating office to manage initiatives to standardize opioid analgesia prescribing and use with his patients. This quality improvement project utilized a pre-op patient educational session based on the American Pain Society, the American Society of Regional Anesthesia and Pain Medicine and the American Society of Anesthesiologists' Committee on Regional Anesthesia's clinical practice guidelines and was presented to the Orthopedic Opioid Steering

Committee (Chou et al., 2016). This committee deemed this project proposal to be an appropriate process improvement, as no standardized pre-operative pain management education previously took place for the collaborating agency's carpal tunnel release surgery patients.

Purpose

The purpose of this project was to standardize opioid analgesic pain management for upper hand extremity surgical patients by implementation of a pre-op evidence-based educational session based on the aforementioned clinical practice guidelines. The highlighted objective of this quality improvement project was to implement a practice change that would promote decreased opioid use, while still appropriately managing patient's pain using the Numerical Rating Scale (NRS) (Appendix I.) (Alter & Ilyas, 2017; Kol, Alpar, & Erdoğan, 2014; Makki, Alameddine, Khateeb & Packer, 2011; Pepe et al., 2017; van Dijk et al., 2015). This was accomplished through a single face-to-face standardized, evidence-based educational session provided to all of the carpal tunnel release surgery patients during the pre-operative history and physical office visit before the scheduled surgery.

PICOT

This project was formulated based on the following question: Does standardization of an outpatient pre-operative pain management education promote decreased opioid usage for adult patients undergoing carpal tunnel release surgery while managing pain?

Succinct Synthesis/Analysis of Supporting/Related Literature

A literature review was conducted to select and grade evidence supporting pre-operative educational sessions' reduction in opioid consumption and pain rating. The potential problems and consequences associated with opioid analgesic use as evidenced by statistics surrounding the opioid epidemic provided the purpose of this literature search. This literature search focused on studies of preoperative pain education and its impact on post-operative opioid use and post-operative pain. The literature search utilized the following keywords: pain management, patient education, opioid, orthopedic, surgery and preoperative. Databases used for this search included Cumulative Index of Nursing and Allied Health Literature (CINAHL) Full Text, Medical Literature Analysis and Retrieval System Online (MEDLINE) with Full Text, Cochrane Library and Academic Search Complete. Inclusion criteria included articles published within the last five years. Exclusion criteria included articles that discussed chronic pain, naloxone education, palliative care, opioid addiction treatment, children/adolescents, alternative pain management, intra-operative opioid administration, opioid disposal programs, pre-operative opioid tolerance/addiction, methadone programs, pre-operative opioid use and nerve blocks. After removal of duplicates, 3,858 articles were found and narrowed down based on earlier mentioned exclusion criteria and full-text availability. The formal review included a final number of 14 articles.

Important Themes

Key themes identified from the literature included education, pain expectations, opioid safety, post-operative pain, and opioids. Education was highlighted as either the independent variable or a major identified theme in all articles. Pain expectations were

mainly discussed as themes in the postoperative pain management clinical practice guideline, systematic reviews and qualitative studies (Chou et al., 2016; Peerdeman et al., 2016; Stowers et al., 2014; & Wainwright et al., 2017). Postoperative pain was mentioned in all articles included. Opioid analgesia was indicated as a component in all articles' education interventions, but specifically identified as a theme or measured as an outcome variable in the majority of studies (Alter & Ilyas, 2017; Chou et al., 2016; Kol, Alpar, & Erdoğan, 2014; Makki et al., 2011; O'Donnell, 2015; Pepe et al., 2017; Stowers et al., 2014; & Wainwright et al., 2017).

Variations in Concept Definitions or Populations

Several findings in the literature focused on orthopedic patient population, but there was some noted variation in specific surgical patient population such as hip, knee or hand (Alter & Ilyas, 2017; Cooke et al., 2016; Ho et al., 2015; Makki et al., 2011; Pepe et al., 2017; & Stowers et al., 2014). Statistically significant reduction ($p< 0.05$) in opioid consumption was found in carpal tunnel release surgery patients who were provided education (Alter & Ilyas, 2017). A pre-test post-test study grouped various orthopedic surgical patient populations for education intervention study, still finding a statistically significant reduction in patients' pain with $p=0.004$ (Ho et al., 2015). Additionally, some pertinent articles included in this review were generalized to a surgical patient population, nonspecific to orthopedics (Chou et al., 2016; Kol, Alpar, & Erdoğan, 2014; Louw et al., 2013; O'Donnell, 2015; Peerdeman, et al., 2016; van Dijk et al., 2015; & van Dijk et al., 2015). The postoperative pain management clinical practice guideline written by Chou et al., (2016) differs from all other articles included in this review as its content focuses on recommendations for post-operative pain management practice with all

surgical patients. Of particular importance, all articles recommended to education pre-operatively, discuss opioid safety and side effects of medications, and establish patients' goals of pain management.

Variations in Methods Quality

The highest level of evidence study within the review selection included a Meta-Analysis of 30 articles where patient reported pain score reduction was noted with evidence-based intervention including verbal education (Peerdeman et al., 2016). Several robust studies measuring multiple variables utilized randomization (Alter et al., 2016; Cooke et al., 2016; Makki et al., 2011; Pepe et al., 2017; & van Dijk et al., 2015). These high level of evidence studies randomly selected participants for receiving the education intervention versus being in the control group (Alter et al., 2016; Cooke et al., 2016; Kol, Alpar, & Erdoğan, 2014; Makki et al., 2011; Pepe et al., 2017; & van Dijk et al., 2015). One qualitative study identified major themes through coding interview transcripts of patients asked about their experience with pre-operative pain education (Wainwright et al., 2017). Although a smaller team conducted the initial interviews and coding, the extended research team reviewed transcripts in a series to produce reliability (Wainwright et al., 2017).

Comprehensively, these literature findings provided evidence that preoperative education impacts multiple variables' outcome improvement in the post-operative phase. The outcome variables include opioid consumption and patient-reported pain scores. It is most important to mention all of these studies relied on patient self-report data, justified by measuring patients' subjective pain. Quality improvement of pain management and decreased opioid use may be established based on the literature findings, indicating

implementation of a standardized, evidence-based pre-operative educational session regarding pain management and safe opioid use.

Conceptual/Theoretical Framework & QI/EBP Model

Theoretical models and conceptual frameworks are essential components of Doctor of Nursing Practice Projects. In order to appropriately conduct a quality improvement project with carpal tunnel release patients and implement pre-operative pain management education, Pender's Health Model and the Plan Do Study Act (PDSA) model of quality improvement were selected.

Theoretical Model

Pender's Health Promotion Model is specific to nursing theory and originally was designed to complement models of health promotion. This theory focuses on educating patients on pain management expectations and safe opioid use to improve patient outcomes and prevent aberrant drug behavior aligns with the individual experiences, behavior-specific cognitions and outcomes (Pender, 2011). The opioid epidemic is the broadly identified problem; however, this project concentrates specifically surrounding Anne Arundel County where there have been increased opioid overdoses, misuse, and addiction (Opioid, 2018). Nationwide statistics suggest the upward trend in heroin and fentanyl use and that stems from prescription opioid use (Kolodny et al., 2015). Within the collaborating office, the need to standardize opioid analgesia management with upper hand extremity surgical patients was identified. The Orthopedic Opioid Steering Committee oversees initiatives and projects with the intent to standardize opioid analgesia management within this specific orthopedic office. With the identified problem, this project implemented education with the goal of promoting patients' safety and quality pain control.

Theoretical Definitions. Several definitions within Pender's model were pertinent to the project of interest particularly during project implementation. Biological, psychological or sociocultural factors related to the individual components may impact an individual's pain, interest in learning or adherence to filling out the pill tracker form. Commitment to a plan of action is identified as "intention to carry out a particular health behavior including the identification of specific strategies to do so successfully" (Pender, 2011, p. 4). This related to the patients' potential willingness to take the pain education seriously and follow through with tracking their pain scores and opioid pill consumption within the provided tool (Pender, 2011, p. 4). Health promoting behavior related to outcome is defined as "the desired behavioral endpoint or outcome of health decision-making and preparation for action" (Pender, 2011, p. 4). This last definition relates to the project's goal for promoting patient safety and quality outcomes. More specifically, this is in the interest of patient-centered care, where individuals are engaged with their provider when discussing realistic pain expectations and safe opioid use. This project aimed to mitigate any adverse consequences of opioid analgesia use through standardization of upper hand extremity post-operative opioid analgesia pain management. This intent to improve patient outcomes was demonstrated through the health-promoting behavior.

Operational Definitions. Operational definitions as they relate to this quality improvement project focus on the measurement of outcomes. Pain scores for this project were defined as the patients' self-reported pain rating from the use of the Numeric Rating Scale, where zero is equal to no pain and ten is the worst pain. Opioid consumption for this project was defined as the number of prescribed opioid analgesic pills the patient

consumed during the entire post-operative period until they returned to the office for follow-up. All patients received Hydrocodone-Acetaminophen 5mg-325mg and instructed to take every 6 hours as needed with a maximum of 10 pills prescribed total.

EBP/QI Process Model

In the interest of conducting an organized and patient-centered quality improvement project, the Plan-Do-Study-Act (PDSA) model of quality improvement was selected as the process model framework (Langley et al., 1996). Developed in 1996 by Langley et al. this cyclic process recommends identification of objectives, implementation of the quality improvement, reassessment of the change based on measurable outcomes and to act on improvement of intervention with suggested changes. With the interest of quality improvement for standardizing opioid analgesia management in this specific patient population through an evidence-based educational session, the process was iterative. Planning was established by identifying the practice gap and need for standardized pre-operative education with this patient population and determining evidence-based education intervention criteria from the literature. Starting October 21, 2018, the educational session was implemented as the practice change and considered the "do" phase. Between October 21, 2018, and December 1, 2018, when the educational session was adopted to practice, and data continued to be collected, bi-weekly communication with the Orthopedic Opioid Steering Committee took place for evaluation of data trends. This incorporated the "study" portion of this model and then allowed for "act" to take place with further revisions to the intervention. Use of the PDSA model within the planning implementation and evaluation phases of this project formulated a theoretically based project with an organized structure.

Project Design

A standardized evidence-based pre-operative pain educational session for carpal tunnel release surgery patients was adopted into practice within an orthopedic office in urban Maryland. This quality improvement project was trended to assist in an iterative process improvement and continued sustainability of a standardized opioid analgesic pain management initiative for upper hand extremity surgical patients in an orthopedic practice. The details of methodology, participants, setting, tools, improvement, data collection, analysis, and significance to practice follows.

Methodology

Once Institutional Review Board (IRB) approval at Salisbury University was received on June 1, 2018 (See Appendix E), the following processes took place which initiated the quality improvement of patient-reported pain and opioid consumption through the adoption of a standardized pre-operative pain education session. To begin this project, baseline opioid use and pain score data were collected from September 1-October 20, 2018, occurred. The pre-operative education session was then adopted into practice for carpal tunnel release surgery patients at the collaborating agency starting October 21, 2018. From October 21, 2018, through December 1, 2018, the second phase of opioid use and pain score data collection took place. The educational session was continued beyond the period of this project's data collection as it continues to be trended as the facility has adopted this project as the standard practice for these patients.

Self-report data were collected and transcribed from pill tracker forms in which patients logged each time they took a prescribed opioid analgesic and their Numeric Rating Scale pain score at the time of each opioid pill consumption. Prior to project

implementation, no formal pre-operative education counseling took place for carpal tunnel release surgery patients at the collaborating agency; however, they utilized the pill tracking tool for all patient populations, to log their use of prescribed post-operative opioid analgesics. Patients received the pill tracker form during their pre-operative office appointment and were instructed on how to use the form, as well as to bring it with them when they returned to the office after surgery.

The single educational session included standardized one-on-one pre-operative education during the pre-operative history and physical office visit where the project implementer discussed the education points recommended by the post-operative pain management clinical practice guideline (Chou et al., 2016). Please refer to the improvement section for further details regarding these education points.

During the implementation phase in which patients received the educational session, patients were discharged home post-op with instructions to record on the provided form each time they took their medication as well as to record their pain score at each of those times. This form was then collected from the patient in the office at the 1-week post-operative appointment. These same practice processes continued both for the baseline data collection phase, as well as after the pre-operative education was adopted to practice.

Data were trended and reported at monthly meetings with the Orthopedic Opioid Steering Committee. Once all data were collected in both phases and transcribed to Microsoft Excel, a statistical analysis of descriptive-frequencies was performed for discussion of results, and then compiled as the final Doctor of Nursing Practice Project paper and presented to the Orthopedic Opioid Steering Committee.

Multiple bodies of evidence recommend these methods of pre-operative pain and opioid education as an intervention for all patients undergoing surgical procedures. In a recent study from 2017, Alter and Ilyas measured statistically significant lower opioid consumption ($p<.05$) in the post-operative phase for patients undergoing carpal tunnel release surgery, with no adverse impact to their reported pain. Quality improvement projects further support the implementation of pre-operative pain management education and counseling (O'Donnell, 2015). O'Donnell's (2015) project measured post-operative pain severity in two groups of patients. One group received one-on-one education, and the usual care group received no additional intervention. Individuals with pre-operative education were found to report less severe pain in the immediate post-operative phase, compared to the usual care group (O'Donnell, 2015). Multiple other studies specific to orthopedics also found pre-operative education interventions to result in a decrease in reported pain and/or opioid consumption (Cooke et al., 2016; Ho et al., 2015; Kim et al., 2016; Pepe, 2017; Stowers et al., 2014; van Dijk et al., 2015; Wainwright et al., 2017). An additional study where no pre-operative education was explicitly encouraged, demonstrated higher long-term opioid use of opioid analgesics in patients receiving a first-time opioid prescription for low-risk surgery pain management (Alam et al., 2012). In all relevant studies discussed, outcomes of patients' preoperative pain education were measured through self-report data of post-operative Numerical Rating Scale pain scores and the number of opioid analgesic pills consumed. The specific use of a patient-friendly pill tracker form is not explicitly discussed in the studies as mentioned above. Since this project design was quality improvement, current practice methods already in place were not entirely removed in the interest of simply revising current practice methods for

improvement. For this reason, the project continued with the collaborating agency's existing methods of capturing patient-reported pain and opioid consumption through the pill tracker form. Please refer to the tools section for a further description of this form.

Strengths Weaknesses Opportunities Threats (SWOT) Analysis

A Strengths, Weaknesses, Opportunities and Threats (SWOT) analysis was conducted to appropriately understand all measures of support and barriers to completing the project at the collaborating agency. Identified strengths included the substantial amount of support from the office's Medical Director, physician and provider staff, and orthopedic opioid steering committee. Additional strengths noted that the use of the pill tracker form was already in place, and further collaboration/support from the organizational opioid task force was evident through communication and invitation to discuss the project progress at scheduled meetings. Opportunities with this setting included incorporating nursing staff's engagement and opportunity to educate outpatient surgical patients pre-operatively. Since all education was completed by one individual, no additional office staff were specifically educated for this project. The educational session was presented and provided to the Opioid Steering Committee at the collaborating agency. Following project completion, the surgeon and his physician assistant took over providing the educational session. The surgeon was then responsible for disseminating the educational session for the staff to assist himself and the physician assistant in providing the educational session. This office continues to expand its patient population and services, so additional opportunity may be available in the interest of expanding the education to upper hand extremity surgical patients at the other locations within the practice. The educational session may then be provided to upper hand extremity surgical

patients under the care of other surgeons within this specific practice. The primary weaknesses in this project is that all data is patient self-report. Another weakness may be the vulnerability in population of patients in terms of their education and motivation to learn and participate in their care. Last to note are the potential threats, which included the limited time in office encounters, varying time lapse between pre-operative appointment and surgery dates for each patient due to individual schedules, as well as the fact that several other initiatives were continuously added to help mitigate misuse of opioids. This included changes in prescribing guidelines, including limitations in the number of pills prescribed and refills. These factors may be threats to the project outcome as patients may forget components of the educational session or not have enough time to ask questions and clarify the information. A table depicting this S.W.O.T. analysis can be found in Appendix C.

Timeline

A concise timeline of project planning and events can be found in Appendix D. This timeline lists meeting times, approval dates, important implementation dates and deadlines.

Letters of Approval

Approval was granted by both the collaborating agency and Salisbury University prior to project implementation (Appendices E & F). The project proposal was presented to and reviewed by two committees at the collaborating orthopedic office: The Nurse Research Council and Clinical Quality Review Committee, respectively. Final IRB approval from Salisbury University was obtained on June 1, 2018 (Appendices E & F).

Project Implementation

Participants

All patients undergoing carpal tunnel release surgery by an orthopedic practice were included for this evidence-based quality improvement project. No demographic data were recorded for this particular project to prevent any identifiable information from being recorded on the pill tracker sheets. Patients were seen pre-operatively in the office for a history and physical/surgical clearance appointment and provided instruction for the post-operative use of the pill tracker form. The pill tracker form was provided to the patient at the time of the pre-operative appointment (Appendix). Patients undergoing carpal tunnel release surgery were treated with the same surgical procedure, technique, care and post-operative management. The number of patients undergoing carpal tunnel release surgery in this setting is an average of 300 patients per fiscal year (J. Gelfand, personal communication, December 15, 2017). All patients are ambulatory surgery status meaning they are operated on as outpatient, not in the inpatient hospital setting. Inclusion criteria stated participants had to be patients of the surgeon at the collaborating agency receiving carpal tunnel release surgery between the dates of September 1, 2018 and December 1, 2018. Exclusion criteria was any patient not receiving carpal tunnel release surgery by the surgeon between the aforementioned dates. No additional exclusion criteria for the target population was defined, as all patients receiving the surgery would receive the education once the implementation phase began. Based on the surgeon's average number of carpal tunnel release cases per year, it was expected roughly 50 patients would be included for the total data collection (J. Gelfand, personal communication, December 15, 2017). At the end of implementation, 36 out of 46

patients returned their pill tracker data. The ten patients' missing data was attributed to patients losing the pill tracker form, forgetting to bring it to the post-op appointment or canceling their post-op appointment.

Setting

The setting for this project is a practice with multiple satellite offices within Maryland. For this project, a single office location was the specific setting. This setting's surrounding community has been dramatically impacted by the current opioid epidemic, leading to the creation of the collaborating agency's opioid task force, the Orthopedic Opioid Steering Committee. This steering committee meets monthly with goals to integrate initiatives to standardize opioid analgesia pain management and prescription, and to discuss methods to prevent any adverse consequences of prescription opioid use, such as addiction or overdose. Within Anne Arundel County, the current fatal opioid overdose number is 66.7% higher than the 2017 year to date number (Opioid, 2018). Prior to project implementation, workflow processes at the orthopedic office for pre-operative appointments for this specific patient population included a pre-operative history and physical with the Physician Assistant (PA). Patients at that time received their pill tracker forms with instructions on how to utilize it following surgery, as well as instruction to bring the completed form to their 1-week post-operative appointment. Internal and external stakeholders involved in this project included the office's management, administration, providers and surgeons, its patients, community members and family members of patients, healthcare staff, the DNP project committee and quality improvement expert personnel. The efforts in this project were considered as an

adjunctive student project to the collaborating agency's goal and initiatives to standardize opioid analgesic management and prescription of upper hand extremity surgical patients.

Tools

The pill tracker tool (Appendix G) chosen to collect data for this quality improvement project was selected because the collaborating agency already used this tool in current practice. The use of the Numeric Rating Scale within this tracker form for pain was the primary pain assessment tool utilized within this practice and also recommended for post-operative surgical pain assessment per the clinical practice guidelines by the American Pain Society, the American Society of Regional Anesthesia and Pain Medicine and the American Society of Anesthesiologists' Committee on Regional Anesthesia. The pieces of data that were analyzed from this tool for this project included the Numerical Rating (pain) Scale scores and the number of opioid pills consumed post-operatively. Since all patients received the same opioid analgesic prescription (Hydrocodone-Acetaminophen 5 mg - 325 mg every six hours as needed) post-operatively, the measure was the total number of pills consumed during the post-op period. Data collected was self-reported by patients. Directions were provided before surgery as to how to fill out the tracker. Patients were instructed to bring the pill tracker form with them to their first post-operative appointment. No follow up questions about the pre-operative education were asked for any data collection purpose.

Following project completion, ongoing assessment and data collection took place using the same methods, with the intention of the collaborating agency's determinations for continued revisions of processes, as needed. Trends in data provide a mechanism to

determine need for improvement or sustainability of the intervention of the educational session.

Improvement

The pre-operative educational session intervention for this project were based on the educational recommendations from the post-operative pain management clinical practice guidelines developed by the American Pain Society, American Society of Regional Anesthesia and Pain Medicine, and the American Society of Anesthesiologists' Committee on Regional Anesthesia (Chou et al., 2016). Starting October 21, 2018, during each patient's individual history and physical appointment before surgery, the patients were educated in a single face-to-face session by the project implementer on specific points: (Chou et al., 2016).

- The provider inquired about patients' current understanding and expectations of post-operative pain. Assessed the patient's current knowledge of analgesics and pain management (i.e. have they taken opioids prior? What is the patients experience or understanding of the purpose of opioid analgesics; Recommendation 3).
- Explained to the patient the Numerical Rating Scale (NRS) for pain, and how it is used to measure/report pain (Thorough explanation of 0-10 pain scale and how number correlates with pain severity; Recommendation 1).
- Mitigated beliefs that any pain after surgery requires treatment, opioids are always required post-operatively, and opioids always lead to addiction (Recommendation 1).

- Encouraged a multi-modal pain management approach by explaining non-pharmacologic pain management interventions, and non-opioid analgesia options (i.e. use of ice, repositioning, ibuprofen or acetaminophen if permitted by surgeon; Recommendation 6).
- Established goals with the patient for post-operative pain [i.e. patient's stated tolerable Number (pain) Rating Scale score; Recommendation 1].
- Encouraged patients to seek physician follow-up if post-operative pain relief is not meeting established goals (i.e. remind the patient of phone numbers to call, how to schedule or change follow up appointment and indications pain is not controlled such as interfering with activities of daily living; Recommendation 4).

These education recommendations were further standardized by being implemented by the same individual for every patient and documented in the pre-operative history and physical note that the education took place. The above points were provided to the patient with the following script, which were based on Flesch Read Ease score rates 60.2.

"Today I would like to speak to you regarding your pain management following your carpal tunnel release surgery. It is important to know everyone experiences pain differently. Have you ever had opioids prescribed to you for pain? (if yes: What was your experience with opioids?) You will use this pill tracker to log each time you take your prescribed pain medicine. You will rate your pain based on the numerical rating scale zero to ten. This scale allows you to give your pain a number, where zero equals no

pain and ten equals the worst pain you could ever imagine. Based on how you are able to tolerate your pain, you can set goals for yourself on a tolerable pain number rating as a goal for your pain management. Although you will be given a pain medication prescription after surgery, it is important to take this medication only when you feel the pain is higher than tolerable. As time goes on, your pain should decrease, and you should require the pain medicine less. If your pain is not improving or worsens, please contact the office to discuss with the surgeon or his Physician's Assistant. It is important you know that taking opioids (the pain medicine) does not ALWAYS lead to addiction, but you should be aware that you should not: take the medication more than prescribed, take with alcohol or any sedating medication drive while taking the medication, share with others, take when you are very sleepy, or take consistently just because it is due time (only take if you feel it is needed). Please also use ice, position change, elevation, and over-the-counter pain relief to decrease pain and discomfort".

Patients received a hardcopy paperwork with all pre-operative instructions that also included the following bullets of education implementation components (Flesch Read Ease Score 76.5 grade level 5.8)

- Please use a number score between 0-10 to rate your pain, where zero equals no pain and ten equals the worst pain you can imagine
- Set a goal for what number out of ten (example: 3/10) is a tolerable pain level for you
- Use ice, position change, elevation and over-the-counter pain relief such as Tylenol, as directed
- Do not drive while taking pain medicine

- Do not share your medication with others
- Do not take the medication more than prescribed
- Do not take the medication if you are very sleepy, or if your pain score is at or below your goal
- Please call the office and ask for the physician or physician assistant if you have any questions/concerns/pain is not tolerable

Individuals with language barriers were not encountered but planned to receive all information via the in-house live interpreter. If the live interpreter was not available, the adaptive technology for interpretation (Pacific Interpreters Language Line or Marti for otherwise impaired) would have been used. A running log of number of patients' data collected at baseline, and number of patients who received education implementation was kept on a password protected computer. Once all data were collected, the data were manually transcribed from the pill tracker form to the password protected computer for further statistical analysis in a locked office. Only the DNP student and DNP project committee members had access to the data which were de-identified.

Data Collection

Baseline data collection took place before education implementation from September 1, 2018 through October 20, 2018. Patients who were seen for their pre-operative history and physical (H&P) appointment between September 1, 2018, and October 20, 2018, were provided the pill tracker form during their pre-operative visit and instructed on its use. Directions were provided for patients to record each time they consumed any medication for pain control along with the associated Numeric pain Rating Scale score post-operatively until they returned to the office. No data were collected at

the pre-operative appointment. The tracker (see appendix A) included space for date, time, medication taken, number of pills taken, Numerical (pain) Rating Scale score (Appendix I) at the time of taking medication, and the reason for taking medication (to sleep, uncontrolled pain, scheduled time, or anticipate pain before activity). The use of this pill tracker form was in place prior to this project, remained in place for the implementation and continued to be used following the project completion.

Beginning October 21, 2018, at the time of the scheduled pre-operative history and physical office visit, patients were provided the points of education in a single session face-to-face verbal format by the project implementer. All patients who were seen for their pre-operative appointment between October 21, 2018, and December 1, 2018, were provided the evidence-based educational session, given the pill tracker form and instructed on how to use the form post-operatively until returning to the office.

Barriers and Facilitators

There were barriers and facilitators encountered throughout the implementation of this project. The administrative assistants were extremely helpful to the student in terms of coordinating meetings with the surgeon and providing the student with the patient schedules and appointment times. The team of physicians, medical assistants, secretaries and administrators at the collaborating site were very welcoming, and verbally expressed their interest and support of project implementation. This team has already initiated several other interventions with the goal of reducing prolonged post-operative opioid usage and showed interest in how this quality improvement implementation would further assist them to meet their practices' goals. One of the greatest and unexpected facilitators in the implementation process was the operations manager for the

collaborating agency. This key individual provided access to a cubical in an office area within the building for the student to review data, transcribe and begin trending these data points. Additionally, he reviewed older data trends and provided mentorship for how to transcribe and track data points with the project goals in mind. Barriers in the implementation mainly resided in terms of scheduling. In order to comply with the approved project proposal and remain consistent, only the student provided the pre-op education. On few occasions, patients canceled, failed to arrive to their appointment, or rescheduled, which required the DNP student to be flexible to schedule adaptations. On one occasion, a patient interrupted the educational session, stating that he was not a user of a controlled substance. The student respectfully redirected the patient and disclosed that this education was not meant to target any assumptions of the patient, but to provide consistent education to all patients. The patient was then apologetic and cooperative for the remainder of the educational session. These two barriers posed challenges in the moment but were overcome as evidenced by the patient's ultimate participation. This did not allow for any negative impact on the overall project implementation or data collection.

Summative evaluation of implementation process

The implementation period of the projected met all project timeline events and adhered to achieving project implementation goals. The primary project goal was to provide a standardized educational session to carpal tunnel release surgery patients at the time of their pre-operative history and physical office appointment and track their opioid pill usage and pain scores. Long term goals for the facility included reduction of opioid use following the educational session's implementation without compromising patient's

Numerical pain Rating Scale (NRS) score. With this project implementation, patients undergoing carpal tunnel release surgery were provided one on one education prior to their surgical event. This assisted in mitigating any pre-existing misbeliefs patients may have had in regard to post-operative pain management and the use of opioid analgesics.

These project goals were achieved by a single educator providing the educational session for all patients receiving carpal tunnel release surgery. Additionally, the educator followed the exact script for each educational session. Although qualitative data were not tracked or measured during the course of this project, positive comments and feedback were received from the target patient population at the time of the educational session.

No negative effects were measured or found during the planning or implementation phases of this project. In agreement with the approved proposal to the Institutional Review Board, no harm or risks were involved with the implementation of this project. All personal health information was properly de-identified for data collection and ensured patient safety. The education provided to patients during the intervention was evidence-based information that allowed for improved post-operative pain experiences and recovery.

Data evaluation included the trends associated with the project for the target population. In this immediate post-implementation phase, all patients from October 21-December 1st receiving carpal tunnel release surgery were provided the same standardized pre-operative education (Appendix D). Run charts were utilized to track the changes in data trends throughout the project. These charts depict the pain scores per patient case on day one as compared to the last day they took pain medication, and the amount of opioid analgesics utilized with the average pain score. This raw data provided

a better understanding of the trends in opioid use and pain scores at baseline and during the education implementation.

The implementation of the pre-operative pain management education for carpal tunnel release surgical patients achieved the goal of providing a standardized educational session to the target population. The target population was education, they were provided standardized education which is supported by evidence to mitigate negative impacts of opioid use. This is further supported in the literature by a reduction in post-operative opioid usage.

Analysis and Discussion of Findings

Analysis

Data collected during the implementation period were analyzed using Microsoft Excel. Descriptive statistics were performed to further review results. Data were tracked before the education was implemented as well as during the implementation. Variables tracked included patient reported total number of narcotics used, average numeric pain rating scale (NRS) score (Appendix I), first (post-op day zero) recorded NRS score and last recorded NRS score. Initial run charts describe the range of measured data at baseline. The range of number of narcotics used at baseline were as low as zero and as high as ten. Average pain rating scores at baseline ranged from 1.57 to 8.42. Pain scores on post-op day zero at baseline ranged from two to nine. Pain scores on the last day of record at baseline ranged from zero to seven. Run charts of data with the intervention evaluated these same variables once the educational session had been implemented to practice. The number of narcotics used with the intervention ranged from zero to eight. Average pain rating scores measured as low as zero, and as high as 5.11. Pain scores on post-op day zero once the education was implemented ranged from zero to nine. Pain scores on the last day of record post-implementation ranged from zero to five.

Discussion

Although the nature of the project does not support the use of statistical analysis to measure statistical significance of variables, the descriptive statistics support the quality improvement. The intended goal with this project was to provide the targeted patient population with a preoperative educational session that would promote a reduction opioid pain analgesic usage while managing pain. As found in the tables and

figures below the variables measured support improvement in patient outcomes. The number of total opioid pills used reduced by an average of one pill, and the average pain score reduced from 4.48 to 3.63 following the educational session. Numeric pain scores first recorded for the baseline group averaged 4.94 and reduced to 4.5 once the educational session was implemented. On the patient's last day of taking pain medication the average pain score reduced from an average of 3.44 to 2.72. As seen in Figure 1, there is consistent reduction in both opioid pill usage and pain scores once the educational session was implemented. Figures two through five show specific measures of pain scores and opioid use per patient, with a trended reduction of both with time. This leads to several implications and recommendations for DNP scholarly roles as well as possible future projects surrounding similar patient populations.

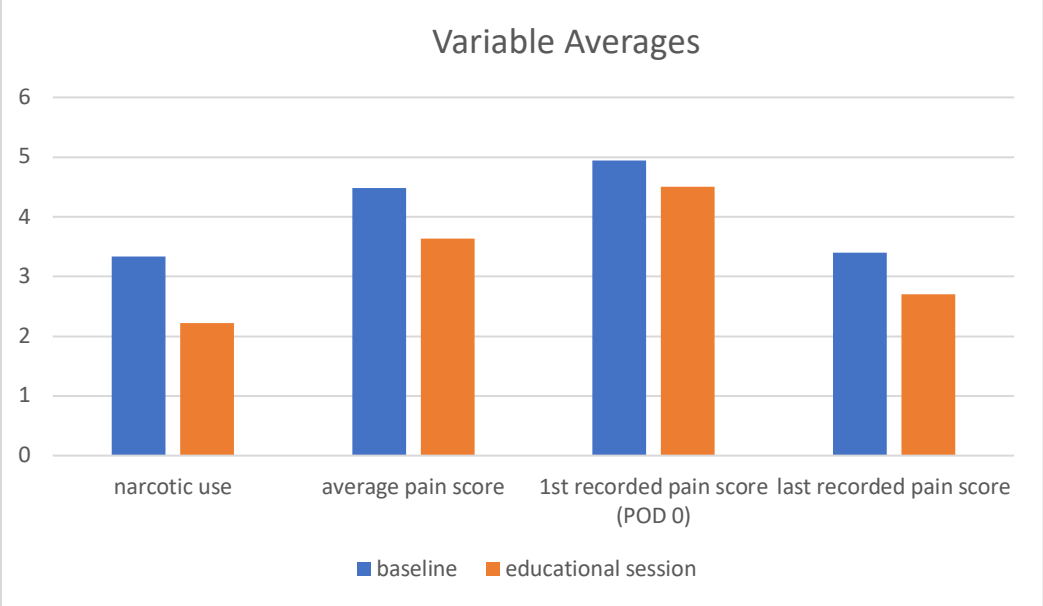

Figure 1. Averages between the two groups for number of narcotics used, average pain score, first recorded pain score and last recorded pain score.

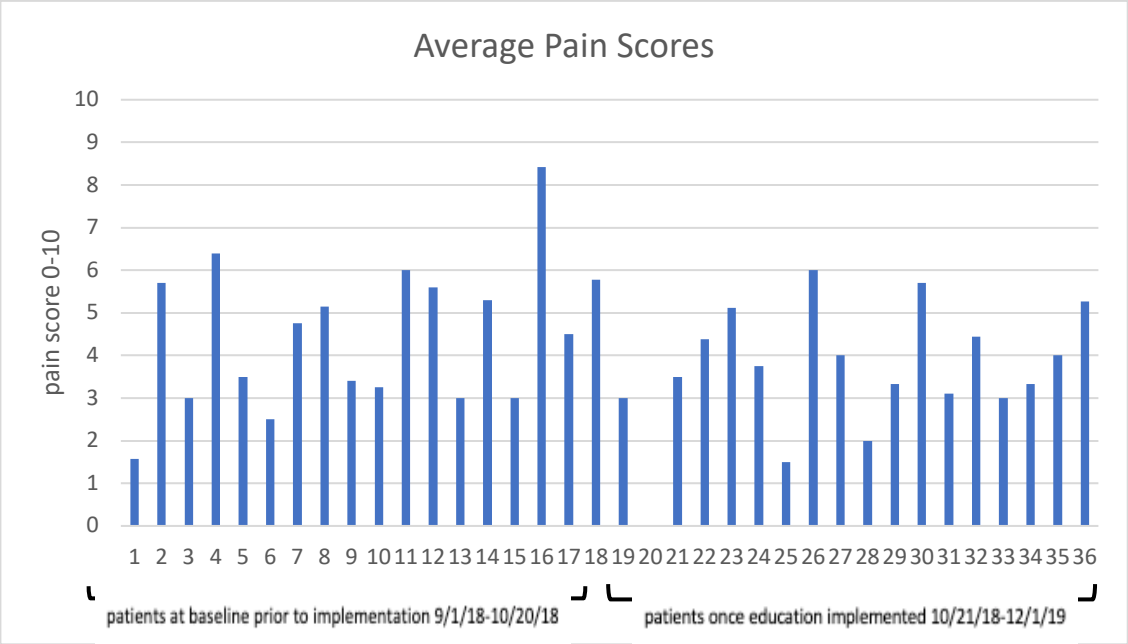

Figure 2. Chronological patient data points of total number of narcotic pills taken where each bar represents a different patient's data.

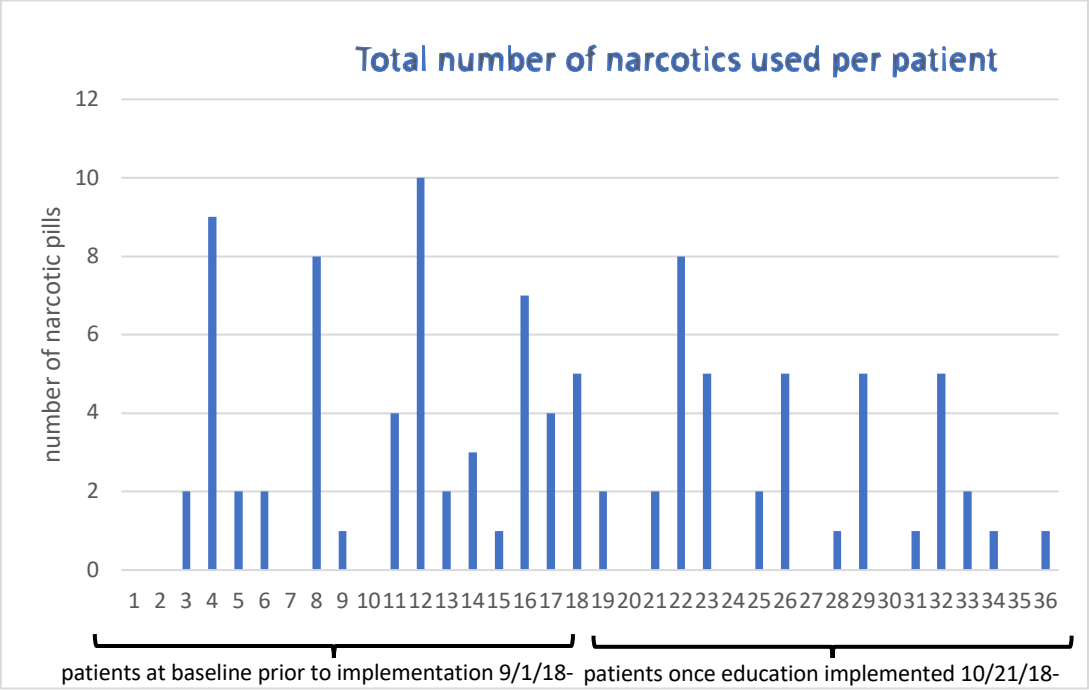

Figure 3. Chronological data points of average pain scores where each bar represents a different patient's data.

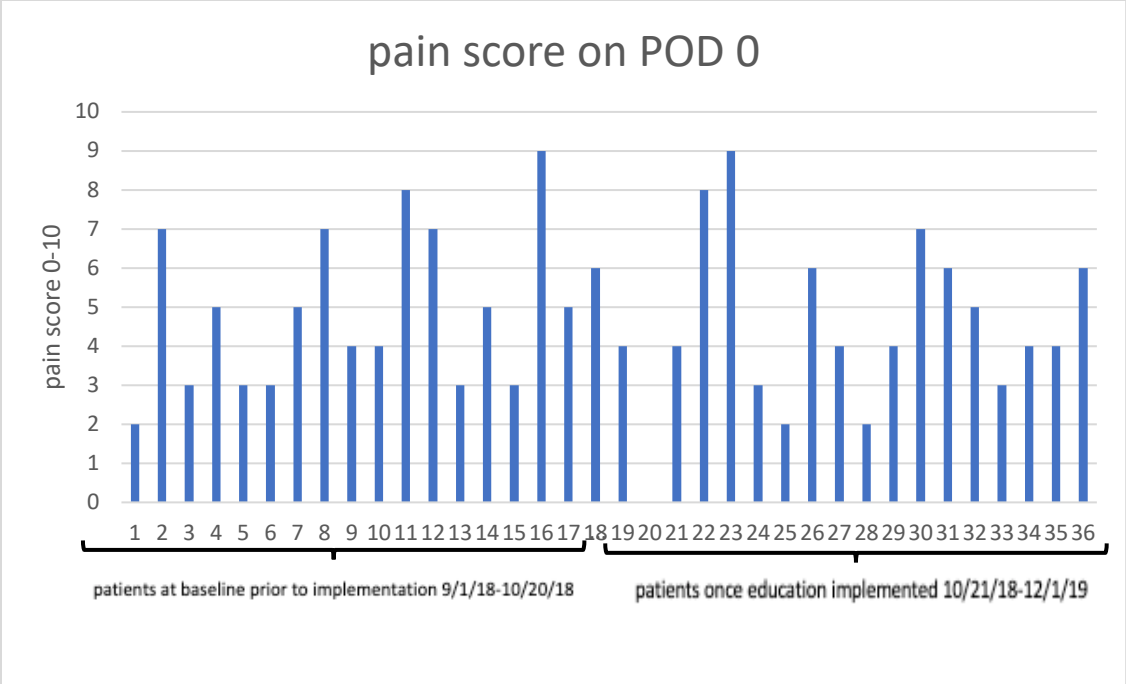

Figure 4. Chronological data points of pain scores on post-op day zero where each bar represents a different patient's data.

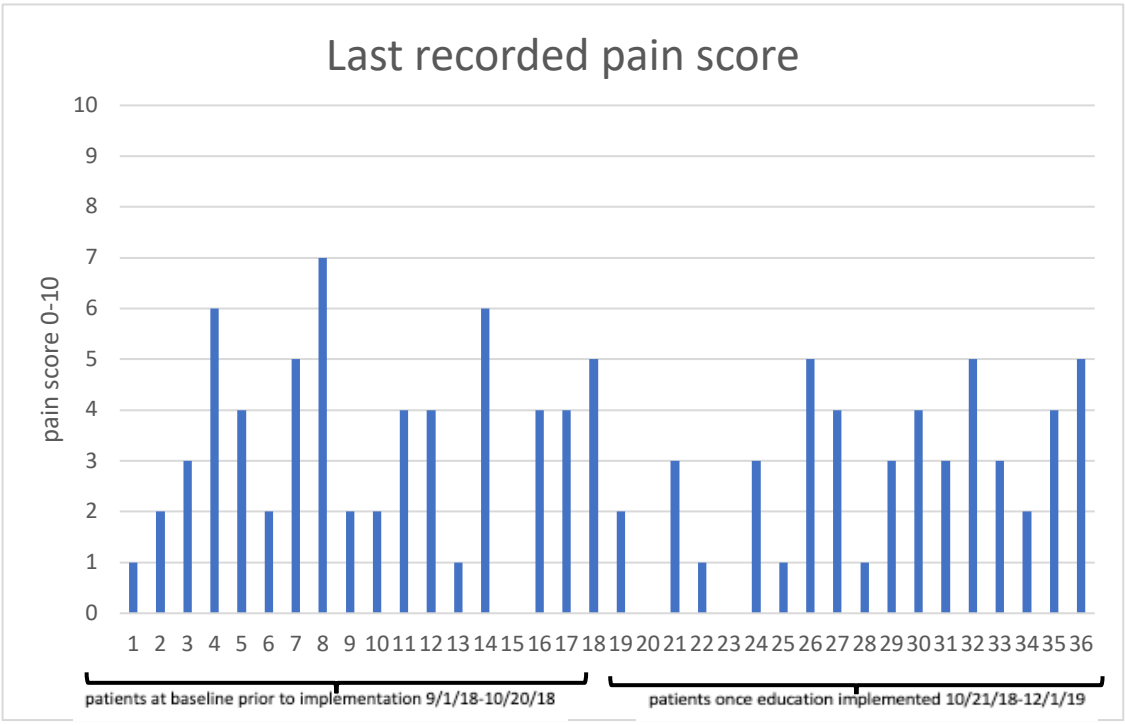

Figure 5. Chronological data points of last recorded pain scores where each bar represents a different patient's data.

Recommendations

Economic considerations

The resources required to implement this quality improvement project did not require any funding requests or additional budgeting. Time taken to provide the educational session was not statistically analyzed, however there was no obvious compromise in work flow or productivity. Should the implementation be further improved with alterations to the time needed or methods of presentation for the educational session, additional economic considerations may be required.

Implications for practice

Findings from this quality improvement project suggest support in continuation and further improvement of the pre-operative educational session on pain management/opioids for upper extremity surgical patients. This may translate into the opportunity for the DNP leader to assist in implementation of educational sessions for similar patient populations or expanded to additional office locations. The expansion of an educational session for pre-operative patients may be beneficial for other patient populations such as those undergoing more extensive surgeries. An example of this may include total hip replacement patients who undergo physical therapy evaluations pre-operatively. A multi-disciplinary approach for providing initial and reinforcing pre-operative education may be in the best interest of providing holistic patient-centered care.

Process and outcome recommendations

Although this quality improvement project allowed for implementation of an evidence-based improvement in practice by implementing an educational session for upper extremity surgical patients, ongoing change with the improvement is expected. It

is recommended the PDSA framework continue to be used to allow for ongoing evaluation of the process and subsequent quality improvement. Reinforcement of education may be considered on the day of surgery which would require additional staff training. Competency verification of staff knowledge may also be considered as the number of individuals providing the educational session will grow from the one individual for this project. Additionally, the educational session content may require revision in the future as guidelines and recommendations from evidence and literature may change with time. Continued data analysis of run charts should be tracked for ongoing evaluation and sustainability of this project.

Dissemination Plan

This DNP scholarly work will be formally presented at Salisbury University to the School of Nursing faculty, colleagues and peers in April 2019. Following final project approval, the manuscript of this piece will be available as a digital archive at Salisbury University and ProQuest Dissertations and Theses Global. The DNP student will also present a summarization of the project outcomes and recommendations to the collaborating agency. This will allow for the collaborating agency to indefinitely continue with the quality improvement and make further improvements to the educational session. Staff and providers associated with this patient population at the collaborating agency will have access to the project results. Additionally, abstracts will be submitted to scholarly journals with the goal of publication. Further opportunity to present at professional meetings will be sought out through abstract submission.

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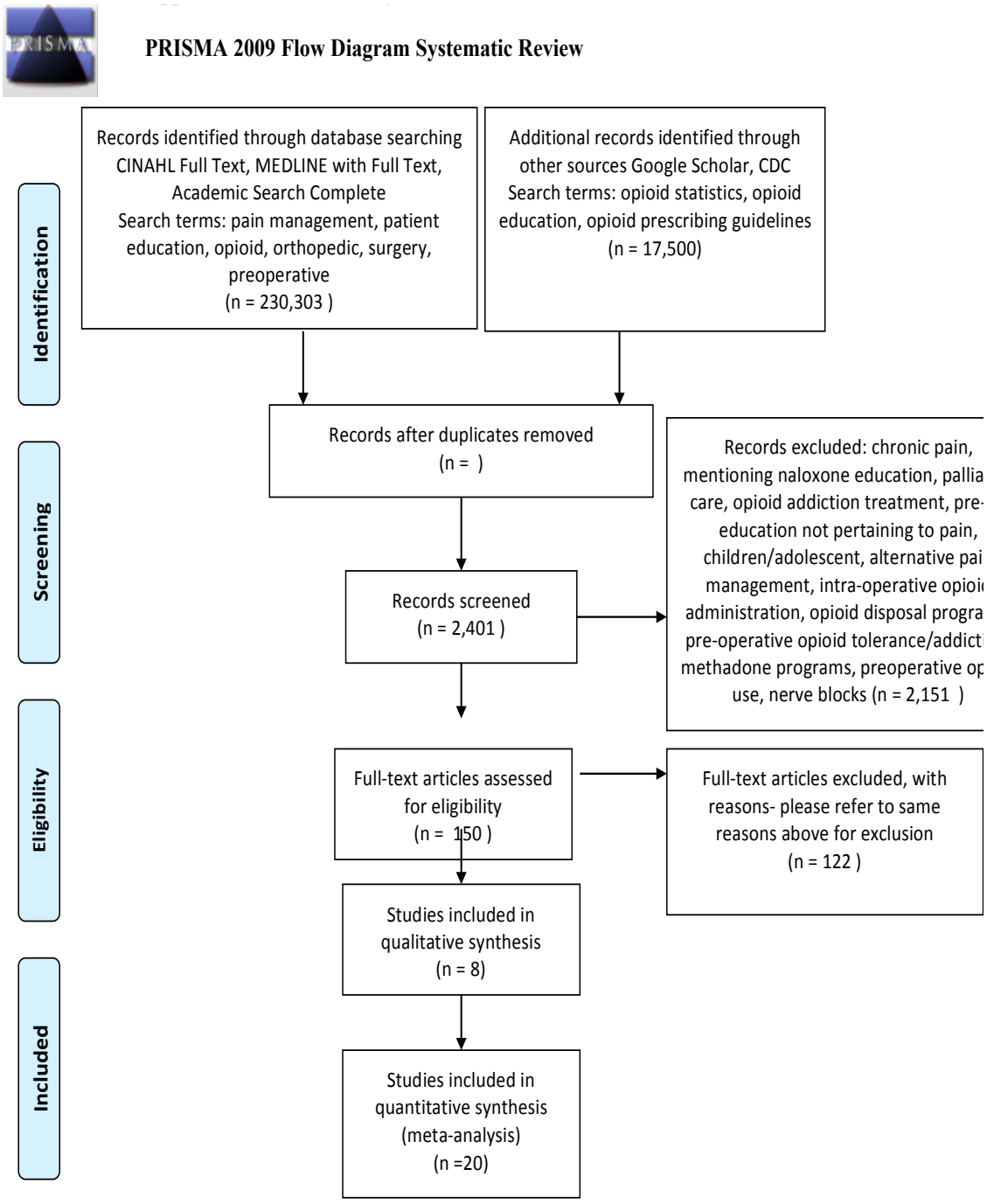
Appendices

Appendix A. PRISMA Diagram



Appendix B. Table of Evidence

Citation: Author(s), date of publication & title	**Conceptual Framework**	**Design/Method**	**Sample/Setting**	**Major Variables Studied and their definitions**	**Measurement of Major variables**	**Data analysis**	**Study findings**	**Appraisal of worth to practice strength of the evidence (i.e. level of evidence + quality [study strengths & weaknesses)**
Alter, T. H., & Ilyas, A. M. (2017). A prospective randomized study analyzing preoperative opioid counseling in pain management after carpal tunnel release surgery. *The Journal of Hand Surgery*, *42*(10), 810-815.	No conceptual framework specified	Prospective randomized experimental trial	One surgeon's patients undergoing the same carpal tunnel release surgery with same surgical technique (n=50); post-operative pain prescription for all patients: 10 pills of Tylenol no. 3 (325mg acetaminop	IV=pre-operative opioid counseling intervention DV=number of documented opioids used DV2=pain levels	Statistical analysis of patients' self-reported data of daily opioid consumption and correlated pain levels. Any adverse reactions also recorded (none recorded)	Fisher exact test (significance $p < .05$)	Statistically significant difference ($p < .05$) in number of pills consumed between counseled vs. non-counseled groups on Post-operative day 0 &POD1 as well as overall (1.40 average versus 4.20 average)	Level I; B **S=** randomization, control utilized, measures taken to prevent confounding variables (i.e. same surgeon & technique); **W=** small sample size, self-report data

			hen and 30 mg of codeine) Exclusion criteria: taken opioids pre-operatively						
Chou, R., Gordon, D. B., de Leon-Casasola, O. A., Rosenberg, J. M., Bickler, S., Brennan, T., ... & Griffith, S. (2016). Management of Postoperative Pain: a clinical practice guideline from the American pain society, the American Society of Regional Anesthesia and Pain Medicine, and the American Society of Anesthesiologists' committee on regional anesthesia, executive committee, and administrative council. *The Journal of Pain*, *17*(2), 131-157.	No framework identified	Clinical Practice Guideline	Developed by the American Pain Society, American Society of Regional Anesthesia and Pain Medicine and the American Society of Anesthesiologists' Committee on Regional Anesthesia; systematic review of literature also conducted for evidence support of recommendations	Multiple themes surrounding	Grading of Recommendations Assessment Develop, and Evaluation Working Group to appraise articles; multi-stage Delphi process utilized for draft recommendations ranked and revised	Persons with no conflict of interest were included on the panel; with more than 20 external peer reviewers providing comments and revisions. Approval by the APS Board of Directors in April 2015 and	Recommendations highly suggest the preoperative period is essential to effective pain management; preoperative education, perioperative pain management planning, use of nonpharmacological and pharmacological modalities	Level II, B; S= expert panel with diverse experience, systematic review of literature to support experts' recommendations W=research gaps found in literature review for opioid sparing regimens, and managing patients using opioids preoperatively	

						ASA in October 2015		
Cooke, M., Walker, R., Aitken, L. M., Freeman, A., Payey, S., & Cantrill, R. (2016). Pre-operative self-efficacy education vs. usual care for patients undergoing joint replacement surgery: a pilot randomized controlled trial. *Scandinavian Journal of Caring Sciences, 30*(1), 74-82. doi:10.1111/scs.12223	No framework specified,	Pilot randomized control trial	91 patients undergoing hip or knee replacement surgery randomly distributed between experimental and control groups	IV= education intervention vs control DV1=pain DV2=anxiety DV3=self-efficacy DV4=healthcare utilization	Self-report questionnaires: Numeric Rating Scale (for pain); the state-trait anxiety inventory; 10 item general self-efficacy scale; total quality pain management	Independent t-tests	Though not statistically significant, pain and anxiety did decrease more for intervention group compared to control	Level I; B **S=** randomization, control utilized, elimination of bias via blinded study **W=**one site; protocol adherence varied
Ho, S. E., Ahmad, W. L., Ho, C. C., Tan, Z. Y., Nursharifah, M. S., Choy, Y. C., ... & Sharaf, I. (2015). The impact of a patient education package on outcomes of pain management following orthopaedic surgery in a tertiary hospital in Malaysia. *MEDICINE AND HEALTH-KUALA LUMPUR*, *10*(1), 58-65.	No framework identified	Pre-test post-test study examining impact of pain education on patients' pain following orthopedic surgery	30 patients undergoing orthopedic surgery at a tertiary hospital in Malaysia	IV=preoperative education intervention DV1=pain belief DV2=pain management DV=side effect of pain	BQ-13 instrument to measure patient's pain belief, pain management and medication side effects (Likert scale) administere	t-test and ANOVA of BQ-13 data results	Statistically significant decrease in pain belief (p=0.004) and management (p=0.001) following education intervention	Level II, B; S=use of validated tool for measurement, experimental (pre-test/post-test) W=rely on self-report, small sample size

				medication knowledge	d on post operation day 3			
Louw, A., Diener, I., Butler, D. S., & Puentedura, E. J. (2013). Preoperative education addressing postoperative pain in total joint arthroplasty: review of content and educational delivery methods. *Physiotherapy theory and practice*, *29*(3), 175-194.	Phenomenological	Systematic Review of Literature surrounding educational content for preoperative pain education	Articles searched in February 2011 via Biomed Central, BMJ.com, CINAHL, the Cochrane Library, NLM Central Gateway, OVID, ProQuest, PsycInfo, PubMed/Medline, ScienceDirect and Web of Science	Key words/phrases: preoperative, perioperative, pre-admission, orthopedic, surgery, arthroplasty, replacement, spine, education, instruction, advice, inform, consultation and pain	Critical appraisal of each study based on Australian National Health and Medical Research Council	Three researchers' appraisal, coding of themes and phrases for final evaluation of educational materials	Majority of educational materials delivered in person, however no statistical significance in decrease in reported pain	Level III B; S=comprehensive review W=outdated studies included for review, including some as old as 20 years

O'donnell, K. F. (2015). Preoperative pain management education: A quality improvement project. *Journal of PeriAnesthesia Nursing, 30*(3), 221-227.	Marita Tilter's Model of Evidence-Based Practice to Promote Quality Care	Quality Improvement Project	24 patients who underwent same-day laparoscopic cholecystectomy	IV=preoperative education DV=pain severity	Revised American Pain Society Patient Outcome Questionnaire (APS-POQ-R)	No inferential statistical analysis specified in published version	Education intervention group patients had a reduction in severity of pain	Level III, C; S= control group; standardization of education provided W=small sample sizes, some patients with language barrier here instructions/education provided in translation (could have not translated with same impact of comprehension)
Peerdeman, K. J., Van Laarhoven, A. I., Keij, S. M., Vase, L., Rovers, M. M., Peters, M. L., & Evers, A. W. (2016). Relieving patients' pain with expectation interventions: A meta-analysis. *Pain, 157*, 1179-1191. http://dx.doi.org/10.1097/j.pain.0000000000000540	Expectancy theory	Meta-Analysis	PubMed, PsycInfo, EMBASE, Cochrane CENTRAL and Cochrane Methodology Register searched in 2015 with a final selection of 30 articles	IV=expectancy induction (in DV= pain rating on numerical rating scale	Cochrane risk of bias tool utilized by review authors	Effect size (Hedge's g) calculated; pooled effects analyzed using random-effects model	Pain rating reduction noted with expectation inductions on average by 1.16 on numeric rating scale	Level 1, A; S= comprehensive review; appropriate methods to eliminate bias, specific criteria set for studies to be meta-analyzed, can be generalized W=patient population (i.e. type of pain chronic vs. acute) not specific

Pepe, M., Austin, L., Tjoumakaris, F., Abboud, J., Tucker, B., Getz, C., ... & Aleem, A. (2017). Does patient education prior to arthroscopic rotator cuff repair decrease narcotic consumption? A randomized prospective study. *Arthroscopy: The Journal of Arthroscopic & Related Surgery*, *33*(6), e22.	No specific framework identified	Prospective randomized experimental trial	Patients undergoing arthroscopic rotator cuff repair at a single facility, randomized into experimental and control groups	IV=pre-operative education on opioids versus no education DV= number of pills consumed postoperatively	Patient Questionnaire depicting VAS pain score, refills, total number of narcotic pills remaining at 2 week and 6 week follow up	ANOVA	Although results not statistically significant, 48% of educated group consumed more than 20 pills compared to 76% in the control group	Level I; B **S=** subjects blinded of study's true purpose, randomization of subject group assignment, no statistically significant difference in groups' demographics ; studies from multiple geographic locations **W=** patient self-report data
Stowers, M. D., Lemanu, D. P., Coleman, B., Hill, A. G., & Munro, J. T. (2014). Perioperative care in enhanced recovery for total hip and knee arthroplasty. *Journal of Orthopaedic Surgery*, *22*(3), 383-392.	No framework identified	Systematic Review of Literature	MEDLINE, PubMed, PsycInfo, Cochrane Central Register of Controlled Trials searched in January 2013	Key terms: arthroplasty, replacement, knee, hip, fast track, ERAS, enhanced recovery after surgery, accelerated rehabilitation, postoperative complications, pain,	Critical appraisal of selected articles for level of evidence	Findings were grouped by themes between preoperative care, intraoperative care and postoperative care	Recommendations for enhanced recovery protocol for elective total hip and knee arthroplasty including preoperative education specific to pain, expectations, medication and management	Level III B; S=22 studies in total reviewed

			patient satisfactio n						
van Dijk, J. F., van Wijck, A. J., Kappen, T. H., Peelen, L. M., Kalkman, C. J., & Schuurmans, M. J. (2015). The effect of a preoperative educational film on patients' postoperative pain in relation to their request for opioids. *Pain Management Nursing, 16*(2), 137-145.	No framework identified	Quasi-randomize d controlled trial	Patients at University Medical Center Utrecht between November 2011- March 2012 undergoing elective surgery (n=507)	IV=educati onal film on postoperati ve pain interventio n DV= postoperati ve pain score via Numeric Rating Scale (indicating need for additional opioids)	Numeric Rating Scale (NRS) for pain; Barriers Questionnai re (BG); Fear of Surgery Questionnai re	Mann-Whitney test to statistica lly analyze non-normally distribut ed variables ; differenc es between groups analyzed with Chi-squared test	Lower numeric rating scale pain scores seen in intervention group compared to control; intervention group additionally had significantly higher knowledge with lower barriers to pain management	Level I; B **S**= large sample size, completed with randomization and control **W**= relying on self-report
van Dijk, J., Schuurmans, M., Alblas, E., Kalkman, C., & van Wijck, A. J. (2015). The effect of written information on patients' knowledge, beliefs, and fear toward postoperative pain and its management: A randomized controlled trial. *Measuring postoperative pain*.	No framework identified	Randomiz ed Control Trial	706 patients undergoing elective surgery at University Medical Center in Utrecht	IV=Preope rative education interventio n DV1=kno wledge of postoperati ve pain	Barriers Questionnai re, Fear of Surgery Questionnai re and Pain Knowledge Questionnai re	Mann-Whitney for evaluati on of patients' knowled ge level intervent ion vs.	Intervention group receiving preoperative information and education had significantly higher	Level 1 A; S= large sample size with control and randomization W=short data collection period, one site location

				management DV2=beliefs about analgesics		control groups	(p=0.002) knowledge levels	
Wainwright, A., Kennedy, D., Webster, F., Christian, J., Pereira, L., Dickson, P., & Robarts, S. (2017). A qualitative study of patient education needs for hip and knee replacement. *BMC musculoskeletal disorders*, *18*(1), 413.	Phenomenological	Qualitative study investigating patients' experience with preoperative educational material	Purposive sampling with total of 32 participants. Interviews took place via focus group (6 groups) or telephone interview (7) of patients undergoing total joint replacements	Descriptive qualitative method themes identified through coded interview analysis	Each research team member identified codes from pilot interviews; coding framework developed for further theme identification by research team	A larger research team analyzed interview transcripts for theme identification via code framework. Reliability maintained by having more than one investigator perform each step	Key themes: need for further education regarding postoperative pain medication, expected pain levels, management for weaning of pain medication, medication side effects	Level III; B **S=** research team qualified, diverse and ensured reliability in theme identification; **W=** data from one location; self-report data, room for error in interpretation

Appendix C. S.W.O.T. Analysis

Strengths	Weaknesses
• Support of collaborating agency's physician staff, mid-level provider staff, nurse educators and Medical Director • Use of pill tracker form is already current practice • Collaboration with collaborating agency's opioid task force committee	• Number of patients for time period of data collection could be low • Varying education backgrounds of patients • Patients go home directly after surgery- relying on their self-report
Opportunities	**Threats**
• Further support from nursing staff as they are currently not engaged in outpatient pre-operative visits and/or education • Multiple services provided in this office to allow for expansion of intervention if successful • Growth of office includes plans to create more ambulatory surgery programs/locations	• Many initiatives to mitigate misuse of opioids already taking place at AAMC • Limit of time with patients during office appointment • Varying time laps between pre-op appointment and surgery (due to patients' individual scheduled appointments)- could interfere with retention of education

Appendix D. Timeline for completion

December 2017- obtained faculty approval of topic and proposed project

February 2018- Began IRB approval process and application; met with committee chair; collaborated with content expert

February 13th-proposal to collaborating agency's Nurse Research Council

February 16th- met with Project Chair

February 28th- met with Project Chair

March 2018- completed education needs assessment at collaborating agency (NURS 880 practicum);

March 16th- meet with Project Chair; IRB draft submitted to Project Chair

March 21st-QI proposal to collaborating agency due

March 23rd- met with collaborating agency

March 30th-met with Project Chair

April 2018- produce copies of all supplies that will be needed: patient consent forms, patient pill tracker forms, patient education materials etc., submit IRB to Salisbury University

April 8th- proposal defense to DNP Project Chair and committee completed

April 13th- met with Project Chair

April 27th-met with Project Chair

May 2018-

May 4th, met with collaborating agency; communication with content expert

May 11th-met with Project Chair

June 2018-IRB approval obtained June 1, 2018

July 2018- ongoing communication with collaborating agency for specification of dates for implementation phase

August 2018- ongoing communication with collaborating agency

August 29th- met with project chair

September 2018-

September 1st-initiated baseline data collection

September 18th-met with collaborating agency

September 28th-met with collaborating agency

October 2018-

October 5th-met with collaborating agency

October 21st 2018- began education intervention phase with continued data collection (rolling follow-up data collection)

November 2018- continued education intervention phase with wrap up of rolling follow up data collection; continued data transcription to Excel

November 16th-met with collaborating agency

December 2018- met with collaborating agency for debrief (12/17); data transcription to Excel

December 1st-last day of data collection

January 2019- data/statistical analysis using SPSS 23;
1/28/19-met w/ DNP project 884 course coordinator and peers
February 2019- project paper submitted to project chair 2/10/19
March 2019- selected journals for abstract submission; met with collaborating agency for review of findings/ follow up – debrief on further practice improvement needs with this specific pre-operative education intervention; meet with Project Chair
April 2019- project presentation, printing

Appendix E. IRB Approval

Salisbury
UNIVERSITY
A Maryland University of National Distinction

Salisbury University
Institutional Review Board
Committee on Human Research
Phone: (410) 548-3549
Fax: (410) 677-0052
Email:humanresearch@salisbury.edu

IRB Research Protocol Approval Notification

Date: 6/1/18

To: M. Bracken
RE: Protocol #52
Type of Submission: Exempt
Type of IRB Review: Exempt
Protocol is scheduled to begin 8/18 end 5/19

Approval for this project is valid from 6/1/18 to 5/31/19

CONGRATULATIONS.

This letter serves to notify Dr. Michele Bracken that the Salisbury University (SU) Institutional Review Board (IRB) approved the above referenced protocol entitled, A Quality Improvement Project to Standardize Opioid Analgesic Pain Management for Upper Hand Extremity Surgical Patients by Implementation of a Pre-op Evidence-Based Educational Session on June 1, 2018.

Pursuant to Federal regulations 21 CFR 56.109, the IRB has determined that this protocol qualifies for Exempt review.

Federal regulation 45 CFR 46.103 (b)(4)(iii) requires Primary Investigators (PI), except when a subject is in immediate danger, to assure any change to an approved protocol is not initiated prior to IRB review and approval. Additionally, the PI must also inform the IRB of unanticipated problems involving risks to participants.

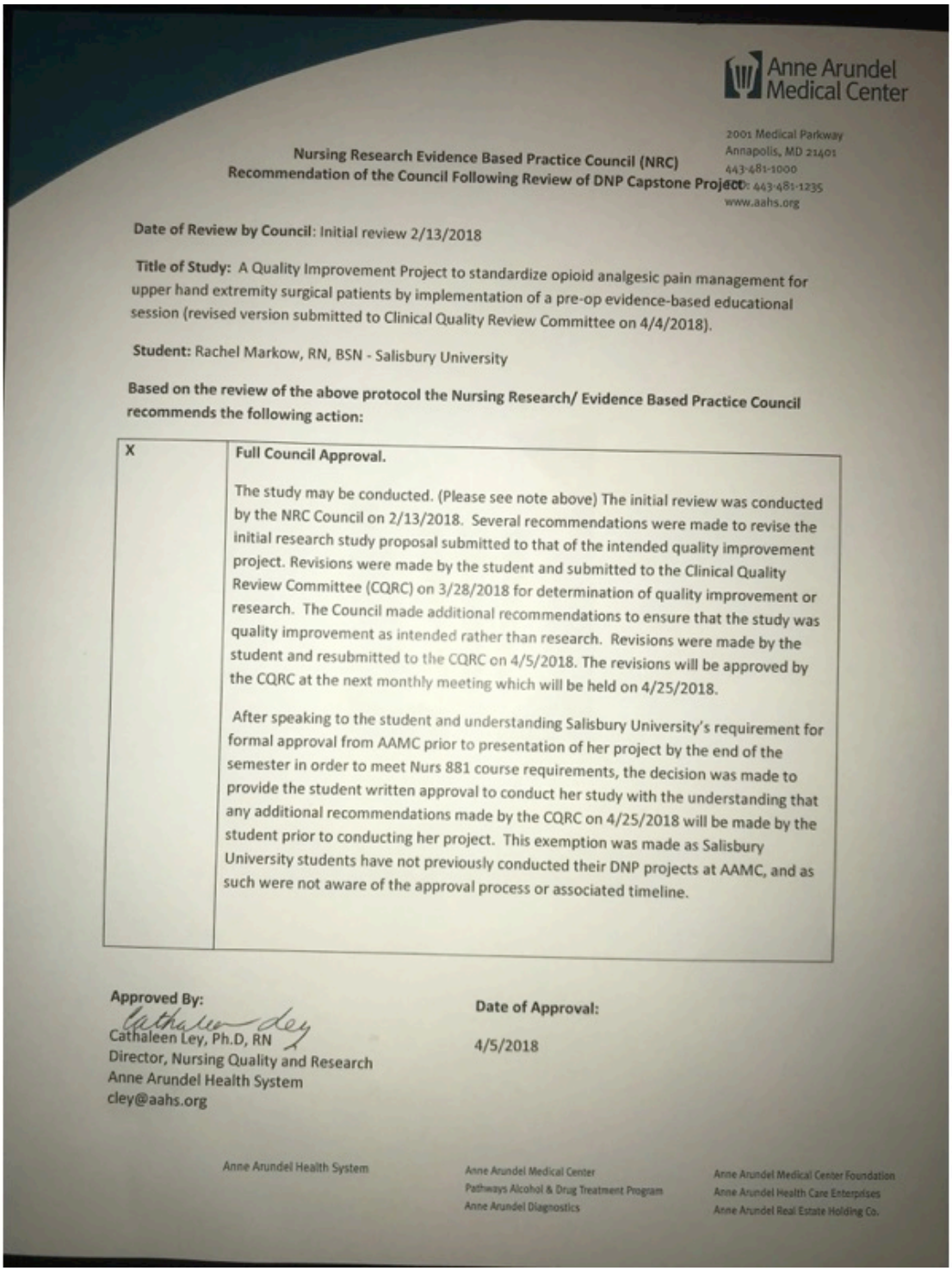
These same federal regulations require **continuing review** of research be conducted by the IRB at intervals appropriate to the degree of risk. Your research is scheduled to begin 6/18 and end 5/19. When necessary, the PI will receive a continuing review reminder notice prior to the date protocol approval ends; however, it is the PI's responsibility to submit continuing review reports in a timely manner (at least 3 weeks prior to scheduled end date on the protocol approval).

The SU IRB is organized and operated according to guidelines of the United States Office for Human Research Protections and the United States Code of Federal Regulations and under Federal Wide Assurance No. FWA00020237.

If you have any questions about this review or questions, concerns, and/or suggestions regarding this process, please do not hesitate to contact the Office of Graduate Studies and Research at 410-548-3549 or humanresearch@salisbury.edu.

Chair, IRB Committee on Human Research

Appendix F. Agency Approval



Anne Arundel Medical Center

2001 Medical Parkway
Annapolis, MD 21401
443-481-1000
Fax: 443-481-1235
www.aahs.org

Nursing Research Evidence Based Practice Council (NRC)
Recommendation of the Council Following Review of DNP Capstone Project

Date of Review by Council: Initial review 2/13/2018

Title of Study: A Quality Improvement Project to standardize opioid analgesic pain management for upper hand extremity surgical patients by implementation of a pre-op evidence-based educational session (revised version submitted to Clinical Quality Review Committee on 4/4/2018).

Student: Rachel Markow, RN, BSN - Salisbury University

Based on the review of the above protocol the Nursing Research/ Evidence Based Practice Council recommends the following action:

X	**Full Council Approval.** The study may be conducted. (Please see note above) The initial review was conducted by the NRC Council on 2/13/2018. Several recommendations were made to revise the initial research study proposal submitted to that of the intended quality improvement project. Revisions were made by the student and submitted to the Clinical Quality Review Committee (CQRC) on 3/28/2018 for determination of quality improvement or research. The Council made additional recommendations to ensure that the study was quality improvement as intended rather than research. Revisions were made by the student and resubmitted to the CQRC on 4/5/2018. The revisions will be approved by the CQRC at the next monthly meeting which will be held on 4/25/2018. After speaking to the student and understanding Salisbury University's requirement for formal approval from AAMC prior to presentation of her project by the end of the semester in order to meet Nurs 881 course requirements, the decision was made to provide the student written approval to conduct her study with the understanding that any additional recommendations made by the CQRC on 4/25/2018 will be made by the student prior to conducting her project. This exemption was made as Salisbury University students have not previously conducted their DNP projects at AAMC, and as such were not aware of the approval process or associated timeline.

Approved By:
Cathaleen Ley, Ph.D, RN
Director, Nursing Quality and Research
Anne Arundel Health System
cley@aahs.org

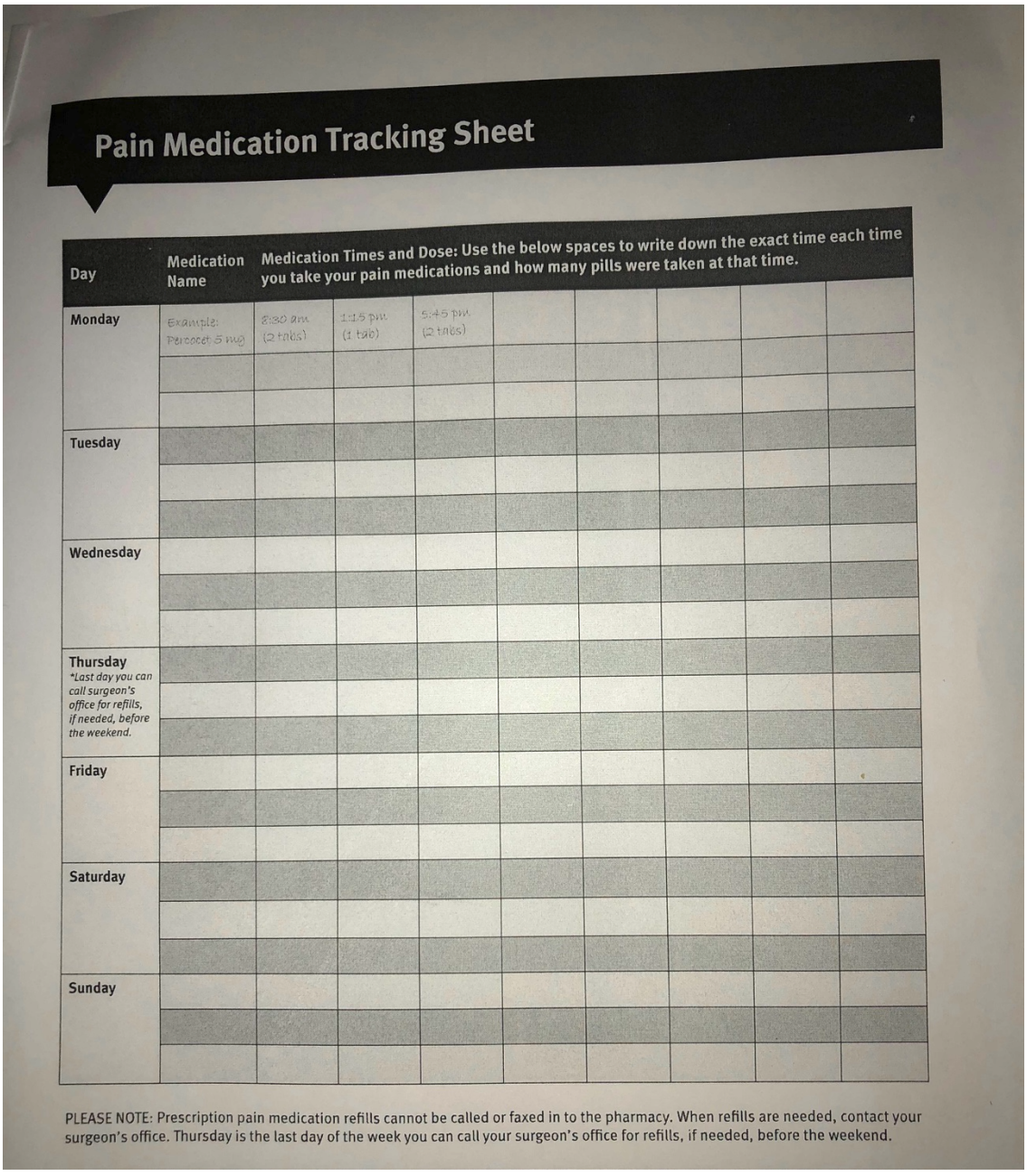
Date of Approval:
4/5/2018

Anne Arundel Health System

Anne Arundel Medical Center
Pathways Alcohol & Drug Treatment Program
Anne Arundel Diagnostics

Anne Arundel Medical Center Foundation
Anne Arundel Health Care Enterprises
Anne Arundel Real Estate Holding Co.

Appendix G. Pill Tracker Tool



Pain Medication Tracking Sheet

Day	Medication Name	Medication Times and Dose: Use the below spaces to write down the exact time each time you take your pain medications and how many pills were taken at that time.							
Monday	Example: Percocet 5 mg	8:30 am (2 tabs)	1:15 pm (1 tab)	5:45 pm (2 tabs)					
Tuesday									
Wednesday									
Thursday **Last day you can call surgeon's office for refills, if needed, before the weekend.*									
Friday									
Saturday									
Sunday									

PLEASE NOTE: Prescription pain medication refills cannot be called or faxed in to the pharmacy. When refills are needed, contact your surgeon's office. Thursday is the last day of the week you can call your surgeon's office for refills, if needed, before the weekend.

Appendix H. CITI Training Certificates

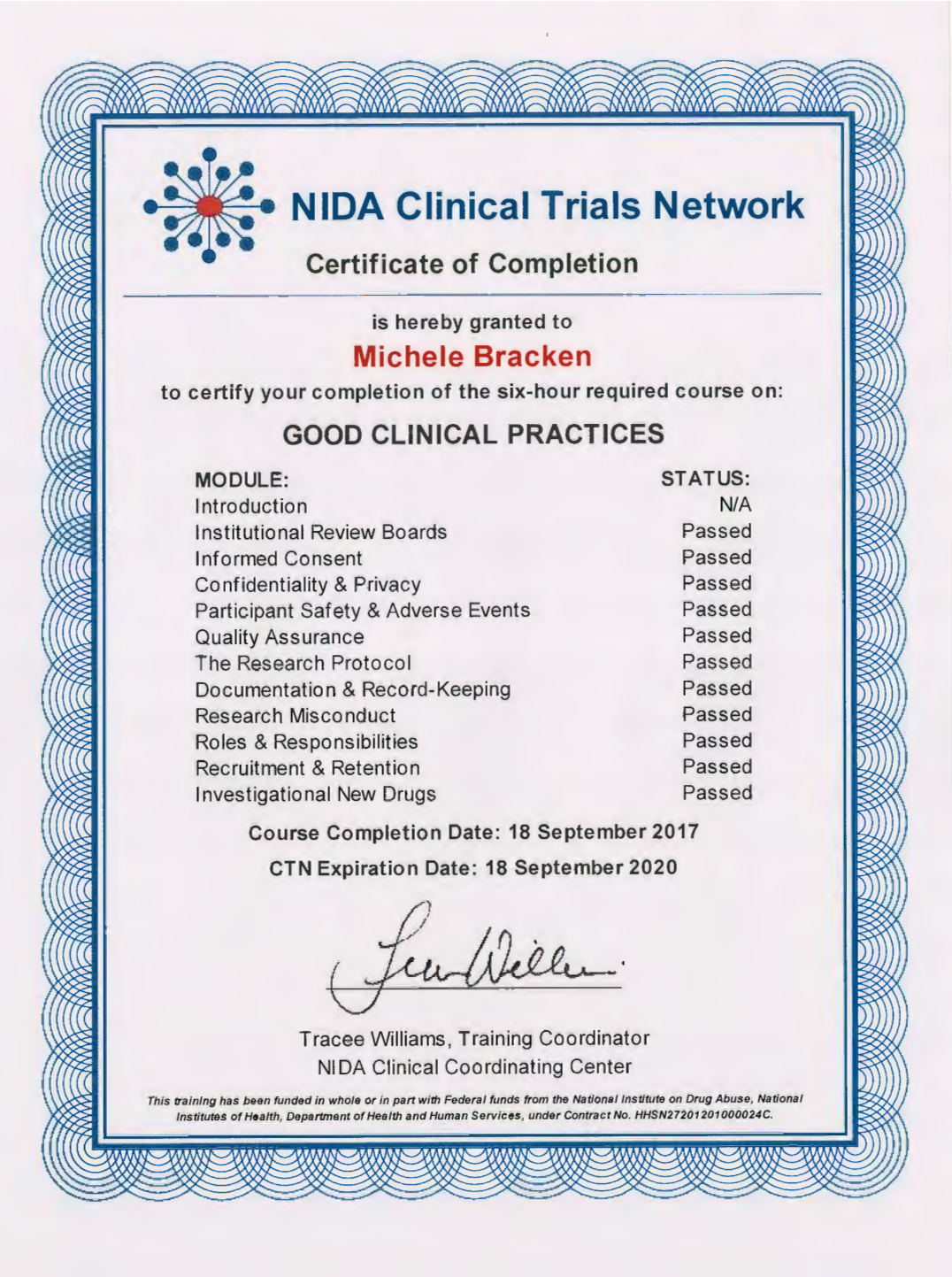
Certificate of Completion

The National Institutes of Health (NIH) Office of Extramural Research certifies that **Michele Bracken** successfully completed the NIH Web-based training course "Protecting Human Research Participants".

Date of completion: 02/12/2012.

Certification Number: 863851.

Appendix H. CITI Training Certificates



NIDA Clinical Trials Network

Certificate of Completion

is hereby granted to

Michele Bracken

to certify your completion of the six-hour required course on:

GOOD CLINICAL PRACTICES

MODULE:	STATUS:
Introduction	N/A
Institutional Review Boards	Passed
Informed Consent	Passed
Confidentiality & Privacy	Passed
Participant Safety & Adverse Events	Passed
Quality Assurance	Passed
The Research Protocol	Passed
Documentation & Record-Keeping	Passed
Research Misconduct	Passed
Roles & Responsibilities	Passed
Recruitment & Retention	Passed
Investigational New Drugs	Passed

Course Completion Date: 18 September 2017

CTN Expiration Date: 18 September 2020

Tracee Williams, Training Coordinator
NIDA Clinical Coordinating Center

This training has been funded in whole or in part with Federal funds from the National Institute on Drug Abuse, National Institutes of Health, Department of Health and Human Services, under Contract No. HHSN27201201000024C.

Appendix H. CITI Training Certificates

COLLABORATIVE INSTITUTIONAL TRAINING INITIATIVE (CITI PROGRAM)

COMPLETION REPORT - PART 1 OF 2
COURSEWORK REQUIREMENTS*

* NOTE: Scores on this Requirements Report reflect quiz completions at the time all requirements for the course were met. See list below for details. See separate Transcript Report for more recent quiz scores, including those on optional (supplemental) course elements.

- **Name:** Rachel Markow (ID: 6122048)
- **Institution Affiliation:** Salisbury University (ID: 1581)
- **Institution Email:** rmarkow1@gulls.salisbury.edu
- **Institution Unit:** Nursing

- **Curriculum Group:** Social & Behavioral Research - Basic/Refresher
- **Course Learner Group:** Same as Curriculum Group
- **Stage:** Stage 1 - Basic Course
- **Description:** Choose this group to satisfy CITI training requirements for Investigators and staff involved primarily in Social/Behavioral Research with human subjects.

- **Record ID:** 22325857
- **Completion Date:** 13-Feb-2017
- **Expiration Date:** 13-Feb-2020
- **Minimum Passing:** 80
- **Reported Score*:** 81

REQUIRED AND ELECTIVE MODULES ONLY	DATE COMPLETED	SCORE
Belmont Report and CITI Course Introduction (ID: 1127)	01-Feb-2017	3/3 (100%)
Defining Research with Human Subjects - SBE (ID: 491)	13-Feb-2017	5/5 (100%)
Assessing Risk - SBE (ID: 503)	13-Feb-2017	4/5 (80%)
History and Ethical Principles - SBE (ID: 490)	13-Feb-2017	4/5 (80%)
The Federal Regulations - SBE (ID: 502)	13-Feb-2017	5/5 (100%)
Informed Consent - SBE (ID: 504)	13-Feb-2017	5/5 (100%)
Internet-Based Research - SBE (ID: 510)	13-Feb-2017	4/5 (80%)
Privacy and Confidentiality - SBE (ID: 505)	13-Feb-2017	4/5 (80%)
Research with Prisoners - SBE (ID: 506)	13-Feb-2017	3/5 (60%)
Research with Children - SBE (ID: 507)	13-Feb-2017	5/5 (100%)
Research in Public Elementary and Secondary Schools - SBE (ID: 508)	13-Feb-2017	2/5 (40%)
International Research - SBE (ID: 509)	13-Feb-2017	4/5 (80%)
Research and HIPAA Privacy Protections (ID: 14)	13-Feb-2017	3/5 (60%)
Conflicts of Interest in Research Involving Human Subjects (ID: 488)	13-Feb-2017	4/5 (80%)
Unanticipated Problems and Reporting Requirements in Social and Behavioral Research (ID: 14928)	13-Feb-2017	4/5 (80%)

For this Report to be valid, the learner identified above must have had a valid affiliation with the CITI Program subscribing institution identified above or have been a paid Independent Learner.

Verify at: www.citiprogram.org/verify/?k65f44883-3aba-4664-b292-1d3e9ebc9fda-22325857

Collaborative Institutional Training Initiative (CITI Program)
Email: support@citiprogram.org
Phone: 888-529-5929
Web: https://www.citiprogram.org

Appendix H. CITI Training Certificates

COLLABORATIVE INSTITUTIONAL TRAINING INITIATIVE (CITI PROGRAM)

COMPLETION REPORT - PART 1 OF 2
COURSEWORK REQUIREMENTS*

* NOTE: Scores on this Requirements Report reflect quiz completions at the time all requirements for the course were met. See list below for details. See separate Transcript Report for more recent quiz scores, including those on optional (supplemental) course elements.

- **Name:** Rachel Markow (ID: 6122048)
- **Institution Affiliation:** Salisbury University (ID: 1581)
- **Institution Email:** rmarkow1@gulls.salisbury.edu
- **Institution Unit:** Nursing

- **Curriculum Group:** Information Privacy Security (IPS)
- **Course Learner Group:** Students and Instructors
- **Stage:** Stage 1 - Basic Course

- **Record ID:** 22161596
- **Completion Date:** 01-Feb-2017
- **Expiration Date:** N/A
- **Minimum Passing:** 80
- **Reported Score*:** 82

REQUIRED AND ELECTIVE MODULES ONLY	DATE COMPLETED	SCORE
Basics of Health Privacy (ID: 1417)	01-Feb-2017	13/16 (81%)
Health Privacy Issues for Clinicians (ID: 1418)	01-Feb-2017	7/8 (88%)
Health Privacy Issues for Researchers (ID: 1419)	01-Feb-2017	4/5 (80%)
Health Privacy Issues for Fundraisers (ID: 1421)	01-Feb-2017	4/5 (80%)
Health Privacy Issues for Marketers (ID: 1422)	01-Feb-2017	4/5 (80%)

For this Report to be valid, the learner identified above must have had a valid affiliation with the CITI Program subscribing institution identified above or have been a paid Independent Learner.

Verify at: www.citiprogram.org/verify/?kb1157f12-2ae5-473f-b4fa-5aa8516def11-22161596

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Appendix H. CITI Training Certificates

COLLABORATIVE INSTITUTIONAL TRAINING INITIATIVE (CITI PROGRAM)

COMPLETION REPORT - PART 1 OF 2
COURSEWORK REQUIREMENTS*

* NOTE: Scores on this Requirements Report reflect quiz completions at the time all requirements for the course were met. See list below for details. See separate Transcript Report for more recent quiz scores, including those on optional (supplemental) course elements.

- **Name:** Rachel Markow (ID: 6122048)
- **Institution Affiliation:** Salisbury University (ID: 1581)
- **Institution Email:** rmarkow1@gulls.salisbury.edu
- **Institution Unit:** Nursing

- **Curriculum Group:** Students conducting no more than minimal risk research
- **Course Learner Group:** Students - Class projects
- **Stage:** Stage 1 - Basic Course
- **Description:** This course is appropriate for students doing class projects that qualify as "No More Than Minimal Risk" human subjects research.

- **Record ID:** 22161767
- **Completion Date:** 01-Feb-2017
- **Expiration Date:** 01-Feb-2020
- **Minimum Passing:** 80
- **Reported Score*:** 88

REQUIRED AND ELECTIVE MODULES ONLY	DATE COMPLETED	SCORE
Belmont Report and CITI Course Introduction (ID: 1127)	01-Feb-2017	3/3 (100%)
Students in Research (ID: 1321)	01-Feb-2017	4/5 (80%)

For this Report to be valid, the learner identified above must have had a valid affiliation with the CITI Program subscribing institution identified above or have been a paid Independent Learner.

Verify at: www.citiprogram.org/verify/?k380ce35f-bc20-43cf-8d60-4626cc5b0cc4-22161767

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Appendix H. CITI Training Certificates

COLLABORATIVE INSTITUTIONAL TRAINING INITIATIVE (CITI PROGRAM)

COMPLETION REPORT - PART 1 OF 2
COURSEWORK REQUIREMENTS*

* NOTE: Scores on this Requirements Report reflect quiz completions at the time all requirements for the course were met. See list below for details. See separate Transcript Report for more recent quiz scores, including those on optional (supplemental) course elements.

- **Name:** Rachel Markow (ID: 6122048)
- **Institution Affiliation:** Salisbury University (ID: 1581)
- **Institution Email:** rmarkow1@gulls.salisbury.edu
- **Institution Unit:** Nursing

- **Curriculum Group:** Social and Behavioral Responsible Conduct of Research
- **Course Learner Group:** Same as Curriculum Group
- **Stage:** Stage 1 - RCR
- **Description:** This course is for investigators, staff and students with an interest or focus in **Social and Behavioral** research. This course contains text, embedded case studies AND quizzes.

- **Record ID:** 22161595
- **Completion Date:** 01-Feb-2017
- **Expiration Date:** 31-Jan-2022
- **Minimum Passing:** 80
- **Reported Score*:** 93

REQUIRED AND ELECTIVE MODULES ONLY	DATE COMPLETED	SCORE
Authorship (RCR-Basic) (ID: 16597)	01-Feb-2017	5/5 (100%)
Collaborative Research (RCR-Basic) (ID: 16598)	01-Feb-2017	5/5 (100%)
Conflicts of Interest (RCR-Basic) (ID: 16599)	01-Feb-2017	5/5 (100%)
Data Management (RCR-Basic) (ID: 16600)	01-Feb-2017	4/5 (80%)
Mentoring (RCR-Basic) (ID: 16602)	01-Feb-2017	5/5 (100%)
Peer Review (RCR-Basic) (ID: 16603)	01-Feb-2017	5/5 (100%)
Research Misconduct (RCR-Basic) (ID: 16604)	01-Feb-2017	5/5 (100%)
Research Involving Human Subjects (RCR-Basic) (ID: 13566)	01-Feb-2017	3/5 (60%)

For this Report to be valid, the learner identified above must have had a valid affiliation with the CITI Program subscribing institution identified above or have been a paid Independent Learner.

Verify at: www.citiprogram.org/verify/?k64cb1dfd-8133-4091-8181-c2427c36a498-22161595

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Phone: 888-529-5929
Web: https://www.citiprogram.org

Appendix I. Numeric Rating Scale