Interprofessional Collaboration and Communication: Implementing an Enhanced Recovery After Surgery (ERAS) Spine Protocol

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Author Note

This paper is based on data from the DNP Project completed as partial fulfilment of the Doctor of Nursing Practice degree with the guidance and supervision of the following:

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Abstract

Enhanced Recovery After Surgery (ERAS) is an evidence-based multidisciplinary approach to patient care that promotes early recovery after major surgery. Striving to create a standardization of care that is aimed at improving patient outcomes, there is consistent evidence that demonstrates the efficacy of implementing ERAS protocols to improve patient recovery and reduce hospital length of stay. However, in light of of the COVID-19 pandemic, implementation of an individual project was changed to a group format and a new PICO question was generated. The goal of the group DNP project was to improve interprofessional collaboration and communication through the integration of an online simulation-based educational learning module. Simulation-based education has become a popular and effective means of teaching healthcare professionals though a wide range of interactive clinical scenarios. For this DNP project, a nine-question pre and post-survey was developed to assess change in provider knowledge after viewing the learning module. The results of this evaluation suggests that the use of an online simulation-based educational learning module is a viable and effective means of increasing provider knowledge on the subject of interprofessional collaboration and communication.

Keywords: ERAS, enhanced recovery after surgery, improved patient outcomes, interprofessional communication and collaboration, lumbar fusion, simulation-based education, spine surgery protocol

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CHAPTER 1

In the United States, back pain and spinal disorders are some of the most common medical problems that patients experience (Smith et al., 2019). At some point in life, two thirds of the population will experience lower back pain, and it's estimated that over $100 billion will be spent annually in both the direct and indirect costs towards managing these complications (Smith et al., 2019). With any major surgery, there is a considerable stress response that results in increased catabolism, immunosuppression, the production of free radicals, and hypercoagulable states, all of which have been linked to undesirable postoperative outcomes (Dietz et al., 2019). These physiologic changes, many of which can result in increased morbidity, pain, complications, and time of recovery, can all subsequently result in outcomes such as increased cost and hospital length of stay (LOS), as well as the overprescribing of prescription opioids. Today, patients understand that there are many options available to them when it comes to surgery and patient care, especially with regards to pain management. Thus, the development of enhanced recovery after surgery (ERAS) programs were created and initiated to improve patient outcomes and decrease financial strain.

Background

Introduced by Danish surgeon Henrik Kehlet in 1995, the ERAS protocol was designed to improve patient outcomes during all phases of perioperative care (Horosz et al., 2016). Initially focusing on colorectal surgery, Kehlet was able to discover that the combined effects of organ dysfunction (surgical stress), pain, nausea, vomiting, and other factors all contributed towards slowing down the phase of postoperative recovery (Wainwright et al., 2016).

Furthermore, he was also able to conclude that no one technique or drug regimen would eliminate all of the aforementioned contributors to postoperative morbidity. Instead, enhanced recovery for surgical patients could be achieved via a multimodal approach that focused on modulating the surgical stress response (Wainwright et al., 2016).

Today, ERAS is a leading example of pathway-based, perioperative care, promoting optimal surgical recovery for patients by maintaining organ function through the reduction of the surgical stress response (Soffin et al., 2019a). Since its inception, numerous ERAS societies have been formed in order to promote its practice. Subsequently, this has resulted in the international adoption and creation of guidelines for complex surgical procedures that include gastrectomy, rectal/pelvic surgery, radical cystectomies, pancreaticduodenectomy, and numerous others (Smith et al., 2019; Wainwright et al., 2016). Unfortunately, ERAS for spine surgery has significantly lagged behind other subspecialties when it comes to implementation, having been plagued by the same barriers that were faced by other specialties (Soffin et al., 2019a). These included organizational and cultural resistance to change, as well as the demands on workforces and resources that were required for success (Soffin et al., 2019a). However, a solution utilizing ERAS is more important than ever, especially with the increasing rates of spine procedures that are being completed here in the United States.

For degenerative disease of the lumbar spine, surgical fusion has become one of the most commonly performed surgeries, which has more than doubled from 7.5 to 17.8 per 100,000 between 2000 and 2009 (Yavin et al., 2017). With approximately 457,000 fusions completed on a national level between 1998 and 2011, this procedure was most frequently performed at the lumbar level, involving a lengthy recovery period that was generally accompanied with pain and immobility (Andersson & Watkins-Castillo, 2014). While the application of ERAS to spine

surgery is a fairly new concept that is being applied and studied, it has increasingly become more common (Elsarrag et al., 2019) for it is already understood that the principles of ERAS are an effective approach to surgical patient care. Understanding the need to improve postoperative patient outcomes, reduce the risks that are associated with surgery, and the increasing demand for spine surgery, justification for the adoption of a multimodal approach to patient care should be implemented that is aimed at improving patient recovery and reducing overall LOS.

Problem

Prior to the current COVID-19 pandemic, the original DNP project was designed to implement an ERAS protocol for spine surgery at Lehigh Valley Health Network (LVHN) in order to improve patient outcomes within this population, however, the project could no longer be carried out in a clinical setting. Despite these unconventional circumstances, ERAS protocols continue to be a growing concept within the field of anesthesia practice, and these protocols have had an emerging role within lumbar spinal fusion surgery. As such, it's important to continue working with and educating anesthesia providers about how the components of care attributed to ERAS can improve patient outcomes and reduce their LOS. To accomplish this, an online simulation-based educational learning module was created in collaboration with two colleagues to disseminate our individual evidence-based projects.

Within this module, our desired outcome was to demonstrate how education on each of our individual topics through the implementation of an online learning module could be used to improve provider knowledge on interprofessional collaboration and communication. The learning module demonstrated how simulation-based education (SBE) can be used as a means of improving patient care. Specifically, the purpose of this researchers' component was to demonstrate how interprofessional collaboration with implementing an ERAS protocol for spine

surgery improves patient outcomes. The PICO question developed to guide this DNP project is: "In anesthesia providers and students, does an online simulation-based educational intervention improve knowledge on interprofessional collaboration and communication among providers?"

Objectives

The goal of this DNP project was to improve interprofessional collaboration and communication amongst certified registered nurse anesthetists (CRNAs) and student registered nurse anesthetists (SRNAs) through the integration of an online simulation-based educational learning module that demonstrated the simulated delivery of patient care through an ERAS spine protocol. At the conclusion of the module, the learner would be able to identify interventions that are appropriate to an ERAS spine protocol, as well as their appropriate use in the pre-, peri-, and postoperative periods.

Another objective of the project was for the learner to have a greater understanding of the interprofessional collaboration and communication that takes place between multiple disciplines of healthcare professionals at all stages of surgical care. Understanding that ERAS is a multidisciplinary approach to patient care, optimal outcomes are dependent on more than just the surgeon and anesthesia provider. Other disciplines that play a key role are primary care physicians, nurse practitioners, physician assistants, pharmacists, nutritionists, physical therapists, and many more. Whether it is the nurse practitioner who provides preoperative patient education, the pharmacist who establishes safe multimodal drug plans for surgery, or the physical therapist that is involved in the rehabilitation process, the backbone to providing safe, effective and efficient patient care is interprofessional collaboration and communication.

System and Population Impact

Over the last decade, there has been an increased emphasis placed on interprofessional practice and education in order to reform the delivery of our country's healthcare services (Lutfiyya et al., 2019). Ineffective communication has been well documented within the healthcare setting and this has resulted in misdiagnosis, medication errors, patient injury, and death (Foronda, MacWilliams, & McArthur, 2016). With an ever expanding need to improve interprofessional collaborative practice and communication, cooperation of all healthcare professions is required. ERAS protocols are excellent examples, for its approach is a safe and effective tool that reduces the overall invasiveness of surgery, decreases costs and maintains a high standard of patient care and comfort, all while improving overall patient outcomes.

The use of interprofessional workshops, online learning modules, and interprofessional simulations has expanded, and research suggests that the standardization of these tools can significantly improve collaboration and communication between healthcare professionals (Foronda, MacWilliams, & McArthur, 2016). Specifically, the use of SBE, a fairly new approach has become very popular as an effective means to teach, educate, train, and coach healthcare professionals throughout a wide range of real-life or near-real-life clinical scenarios (Piryani et al., 2019). Understanding the important role that education and interprofessional practice plays towards providing high-quality healthcare services, it is essential that educators and healthcare providers utilize the research-based methods that will effectively improve their knowledge, skills and attitudes.

CHAPTER 2. LITERATURE REVIEW

Search Methodology

The search process focused on keywords and acronyms such as “ERAS”, “enhanced recovery after surgery”, “spine surgery”, “lumbar spine surgery”, “ERAS spine protocol”, “lumbar fusion”, “TLIF”, “PLIF”, “simulation-based education” “interprofessional communication” and “interprofessional collaboration” in order to find articles that applied to the project. The aforementioned keywords were entered into the search engines of databases including the Cumulative Index of Nursing and Allied Health Literature (CINAHL), PubMed, Goggle Scholar, and SpringerLink in order to find scholarly literature. For each of these searches, parameters were established so publication results would be limited to those that had full text access and were written within the last five years. Initial search results between all of the databases yielded several hundred results. Using a more focused approach, the screening of article titles that specifically related to the use of ERAS protocols for spine surgery was performed. After reading appropriate abstracts, approximately 40 studies were identified. Inclusion criteria consisted of literature that was published during or after 2015. Subjects of interest included the implementation of a surgical spine ERAS protocol for both instrumented and non-instrumented lumbar spine surgery, simulation-based education, and interprofessional collaboration and communication.

Findings

Preoperative Period

Preadmission. Preoperative care for spine surgery is first aimed at maximizing both the physical and functional status of the patient before any surgical intervention is performed (Ali et al., 2018). With the target effect aimed at reducing complications, ERAS components of

preoperative care consist of educating about the importance of smoking cessation and excessive alcohol intake (Ali et al., 2018; Wainwright et al., 2018). Additionally, the practitioner should engage in educating the patient about surgical expectations, providing patient counseling about the type of surgery that is going to be performed, and its potential complications (Ali et al., 2018). At this time, there should also be evaluation of the patients' nutritional status, whether or not they currently use or depend on narcotics, and review of medical optimization for any chronic diseases that the patient may suffer from (Ali et al., 2018; Wainwright et al., 2018). Appropriate consultations to nutrition, smoking cessation, physical/occupational therapy, endocrine and pain management should be made at this time in order to address any patient problems and concerns prior to surgery. At this time, interprofessional collaboration and communication between the patient and healthcare providers will also present the opportunity to outline the expectations of care while also establishing short and long-term goals before and after surgery. It is especially important to assess diabetic status, for approximately 5-20% of all patients who have spine surgery live with the disease, and it is associated with poor post-operative outcomes, such as infection, reoperation, and prolonged hospital stay (Ali et al., 2018).

In the ERAS spine protocol presented by Chakravarthy et al. (2019), preoperative risk assessment and mitigation is aimed at assessing smoking and diabetic status, patient BMI, age/frailty, and the presence of anemia. If the patient meets the criteria for risk within any of these categories, a referral is made and reevaluation is required before surgical intervention can occur. In the protocol by Staartjes et al. (2019), elements of the preoperative period consist of systemic patient education on what is expected with recovery, structured nutritional advice and counseling in obese patients, and control towards smoking and the intake of alcohol. Smith et al. (2019) created a protocol that addressed smoking, drinking, and pain status prior to surgery, as

well as an educational surgical packet. Furthermore, their preoperative interventions required routine lab work in order to assess blood count, bleeding time, and diabetic status. Finally, with the protocol proposed by Soffin et al. (2019a), preoperative items that take place during the preadmission period should include patient education, as well as goal and expectation setting, for each aspect is associated with an improved postoperative recovery process. In summary, a fundamental aspect of ERAS is preoperative counseling prior to surgery. Patients receive information that will not only optimize their postoperative recovery and function, but also allow them to actively participate in a process that will alleviate their anxiety and prepare them for the process of meeting their surgical goals (Dietz et al., 2019).

Day of Surgery. In their systematic review of ERAS for spine surgery, Dietz et al. (2019) concluded that initial studies demonstrate the efficacy of limiting fasting to the timeframe of 6-8 hours before surgery, as well as implementing carbohydrate or protein loading to potentially improve the nutritional and metabolic status of the patient after surgery. Simultaneously, there should also be the administration of preoperative gabapentin and acetaminophen in order to reduce postoperative pain and narcotic consumption, a practice that is consistent with traditional ERAS modalities used in other types of surgery (Dietz et al., 2019). Consistent with the aforementioned suggestions, the systematic review by Elsarrag et al. (2019) suggested that on the day of surgery, preoperative interventions should include carbohydrate loading up to 2 hours before surgery, limiting fasting of a light meal to only 6 hours before surgery, and providing preoperative multimodal medications such as gabapentin and acetaminophen, with or without regional anesthesia.

Preoperative administration of an oral (PO) or intravenous (IV) nonsteroidal anti-inflammatory drug (NSAID) was utilized on the same day as surgery (Brusko et al., 2019; Feng

et al., 2019; Smith et al., 2019; Soffin et al., 2019a; Soffin et al., 2019b; Staartjes et al., 2019) in conjunction with PO gabapentin (Feng et al., 2019; Smith et al., 2019; Soffin et al., 2019a) as a part of the protocol for preemptive analgesia. Each study that consisted of one or both of these preoperative interventions resulted in having improved patient outcomes and reduced LOS when utilized in an ERAS protocol for spine surgery. Additionally, in a meta-analysis conducted by Peng et al. (2017), they concluded that the administration of gabapentin was statistically significant towards reducing postoperative pain and total morphine consumption. Furthermore, the administration of high dose gabapentin (greater than or equal to 900mg/d) was more effective than low dose administration (less than 900mg/d) (Peng et al., 2017).

Intraoperative Period

During the intraoperative period, efforts are put together in order to reduce the overall surgical stress response, specifically through the utilization of minimally invasive techniques, local and regional anesthesia, total intravenous anesthesia (TIVA) with propofol, and the avoidance of opioids (Dietz et al., 2019). Common components of intraoperative care for ERAS usually included the maintenance of normovolemia and normothermia, antiemetic and antibiotic prophylaxis, opioid sparing multimodal analgesia, and the avoidance of surgical tubes and drains (Elsarrag et al., 2019; Smith et al., 2019; Soffin et al., 2019a; Staartjes et al., 2019). With regards to selecting an anesthetic for case management, a multimodal, TIVA-based anesthetic technique was used for both instrumented and non-instrumented lumbar surgery (Carr et al., 2019; Soffin et al., 2019a; Soffin et al., 2019b; Staartjes et al., 2019), as well as lumbar fusion (Staartjes et al., 2019). While inhaled anesthetics were permitted up to a mean alveolar concentration (MAC) of 0.5 in order to enhance the initial depth of anesthesia, nitrous oxide was not permitted at any time for use (Soffin et al., 2019a; Soffin et al., 2019b). In the protocols

implemented by Busko et al. (2019) and Smith et al. (2019), the choice of anesthetic technique was not measured.

Multimodal interventions during the intraoperative period that were identified in the literature included intravenous ketamine, lidocaine, dexmedetomidine, and toradol within individual ERAS protocols for a spine pathway. Ketamine infusions of 0.1-0.5 mg/min were utilized as an adjunct to TIVA (Carr et al., 2019; Soffin et al., 2019a; Soffin et al., 2019b) while a ketamine bolus of 30 mg was given to all high-risk pain patients with the induction of anesthesia (Smith et al., 2019). A lidocaine infusion of 1-2 mg/kg/hr was used until closure in two protocols for non-instrumented lumbar surgery (Soffin et al., 2019a, Soffin et al., 2019b). In place of a lidocaine infusion, three studies performed infiltration of the surgical site with local anesthetic (Brusko et al., 2019; Feng et al., 2019; Staartjes et al., 2019). Dietz et al. (2019) identified that when dexmedetomidine is used in conjunction with a TIVA regimen, there is decreased spinal cord edema. Toradol (15-30 mg) was given at the end of two non-instrumented cases as a means of additional NSAID therapy for pain management (Soffin et al., 2019a; Soffin et al., 2019b). The use of NSAIDs in the postoperative period was a mainstay of care within multiple protocols.

Antiemetic prophylaxis for the prevention of postoperative nausea and vomiting (PONV) was achieved through the use of therapy with intravenous ondansetron with or without dexamethasone. Smith et al. (2019) included in their protocol the additional administration of 40 mg aprepitant for patients who were at high risk for PONV. In the consensus guidelines for the management of PONV, Gan et al. (2014) identified that ondansetron is the “gold standard at a dose of 4 mg 30 minutes before the end of surgery. A prophylactic dose of 4 to 5 mg of dexamethasone for PONV is recommended immediately after the induction of anesthesia (Gan et

al., 2014). Additionally, perioperative doses >0.1 mg/kg are recognized as an effective adjunct in multimodal therapies towards reducing postoperative pain and opioid consumption (Gan et al., 2014).

Antibiotic prophylaxis and maintenance of normovolemia and normothermia are also key components of the intraoperative period for ERAS spine protocols. As a standard of care, broad spectrum antibiotics for coverage of gram-positive microorganisms was suggested, usually in the form of 2 grams of Cefazolin. Clindamycin and Vancomycin were also available options based on drug allergies and provider preference. Maintenance of adequate hemodynamics and urine output is recommended to achieve normovolemia. A study conducted by Bacchin et al. (2016) in which they measured stroke volume variation (SVV) in patients undergoing major spine surgery in the prone position to achieve goal-directed fluid therapy (GDFT) was performed to measure normovolemia. Utilizing an arterial line that was connected to a fluid maintenance monitoring system, the researchers measured SVV rather than the traditional mean arterial pressure while infusing crystalloids at a rate of 4 mL/kg/hr. The conclusion they reached was that when GDFT is based on SVV in major spine surgery, it had the potential to reduce total blood loss, improve postoperative respiratory performance, and promote faster return of bowel function (Bacchin et al., 2016). In order to maintain normothermia, the control of core body temperature via connective warming devices was universally adopted.

Postoperative Period

Postoperative care for ERAS protocols generally consists of supporting early oral intake, early ambulation, and the use of opioid-sparing multimodal analgesia for pain relief. Early oral intake was encouraged as soon as possible after recovery from surgery in almost every study and literature review, because it may also hasten the return of bowel function (Elsarrag et al., 2019).

A review of early mobilization protocols for spine surgery was performed by Epstein (2014), which concluded that early mobilization leads to a reduction in perioperative morbidities and LOS. This is because prolonged bed rest is associated with respiratory decompensation, the development of deep vein thrombosis/pulmonary embolism, infection, and sepsis (Epstein, 2014). A significant aspect of any ERAS protocol, early mobilization was also directly identified as a key component of care within nearly every spine protocol and literature review.

The systematic review by Elsarrag et al. (2019) clearly identified that while multimodal pain control for postoperative management was a common theme within ERAS spine protocols, there were several that differed in their exact analgesic regimen. Between studies, common postoperative drug regimens included the administration of acetaminophen (Brusko et al., 2019; Carr et al., 2019; Smith et al., 2019; Soffin et al., 2019a; Soffin et al., 2019b; Staartjes et al., 2019), gabapentin (Carr et al., 2019; Feng et al., 2019; Smith et al., 2019; Soffin et al., 2019b), NSAIDs (Carr et al., 2019; Feng et al., 2019; Smith et al., 2019; Soffin et al., 2019a; Soffin et al., 2019b; Staartjes et al., 2019), tramadol (Feng et al., 2019; Soffin et al., 2019a; Soffin et al., 2019b), methocarbamol (Smith et al., 2019), and short-acting opioids via patient controlled analgesia (PCA) (Smith et al., 2019) or the PO route (Brusko et al., 2019; Soffin et al., 2019a; Soffin et al., 2019b). While many different postoperative multimodal pain regimens were utilized between spine surgery protocols, the common theme was that when they are used in conjunction with the aforementioned components of care, the complete pathway was associated with improved patient outcomes.

Limitations

Unfortunately, a key challenge to creating an ERAS protocol for spine surgery has directly resulted from the fact that there is a dearth of evidence on its specific application to

spine surgery. While this may be the case, it is already well established that ERAS protocols are a multidisciplinary evidence-based approach to care that reduce the likelihood of complications, LOS, and improve postoperative pain scores within a wide range of surgical procedures (Dietz et al., 2019). Although there are few studies that examine the application of ERAS protocols within the spine surgery population, existing evidence demonstrates that there are benefits to its application within the population. Recognizing this fact, the current and available evidence suggests that by utilizing the aforementioned components of care, surgical patients are demonstrating improved overall outcomes after surgery (Wainwright et al., 2018).

Summary of Relevant Research

The implementation of ERAS protocols as a multidisciplinary approach to patient care is an evidence-based practice that is well established and continues to grow within the realms of surgery and anesthesia. In reviewing the current literature that has been published on the subject, preliminary evidence has suggested that ERAS protocols for different types of spine surgery are an effective means of improving patient outcomes, ranging from improved postoperative pain to reduced LOS. Understanding that a shorter LOS is indicative of faster patient recovery, it's important that anesthesia providers are educated and made aware of the evidence-based effects of implementing a multidisciplinary, multimodal approach to patient care for spine surgery. Online SBE is recognized as a new and innovative means of achieving this outcome.

CHAPTER 3. THEORETICAL FRAMEWORK

The Kurt Lewin Change Theory is widely accepted within the healthcare community as an effective model for implementing meaningful and successful change. Considered one of the founding fathers of change management (Lock, 2019), Lewin and his model are regarded by many as the classic or fundamental approach that organizations can use in order to help people adapt to and deal with change. Lewin believed that by understanding why people do things, how they do things, and what can be done to influence the forces that impact them, change is capable of taking place (Shirey, 2013). With this understanding in mind, the DNP project group chose to adopt his theory for implementing this project. As a change process model, the Kurt Lewin Change Theory involves three simple change stages that are designed to improve the odds of success and subsequent practice improvement (Barrow et al., 2017). These stages include: (1) unfreezing, where there is a recognized understanding that change is needed, (2) moving, which is the process of initiating change, and (3) refreezing, which is the establishment of a new status quo (Barrow et al., 2017).

The first stage, unfreezing, includes identifying a problem, recognizing a need for change, and organizing the correct people to make change happen (Shirey, 2013). During this period, there must be an internal realization that the potential benefits of the proposed or recommend changes outweigh the potential negatives that are associated with the change process as a whole (Batras et al., 2016). This is reliant on groups of individuals working together in order determine what needs to be changed, accomplished most effectively through communication and education with each of the stakeholders who are involved.

Understanding these objectives, this DNP group created an online educational module that recognized three anesthesia practices in which change can occur: the use of an ERAS

protocol for spine surgery, effective communication techniques between a preceptor and student, and the use of a post-operative handoff tool. With each subject, individual research was performed in order to determine the best practices related to their implementation. The simulation module not only promoted the unfreezing stage by demonstrating current practices, but also set the stage for what the newest research identified while simultaneously compared it to current practice. Identified by Deborah (2018), in order to effectively prepare an organization for change, the process has to begin at the main point, keenly scrutinize current fundamentals, and motivate participants, all while simultaneously cultivating trust and recognition for change.

During the second stage of Lewin's change theory, there is a shift from what is planned in the unfreezing phase towards a new and desired behavior. Appointed the change or movement stage, during this period, the actual implementation and trialing component of the proposed change takes place (Batras et al., 2016). Initiated with new approaches to current problems that arrive at new learning outcomes (Lock, 2019), it is during this stage that resistance is overcome and adherence to the new change is verified (Sullivan, 2012). In order to accomplish this, two factors play an important role: employee resistance and the openness to change (Hussain et al., 2018). According to Hussain et al. (2018), in order to overcome the resistance to organizational change, the oldest and most effective strategy is to have healthcare employee involvement. By communicating clearly and widely about the planned implementation, the proposed impact, and the overall benefits that are associated with its outcomes, the sharing of information will both involve and empower its participants while simultaneously promoting the change process.

In order for this DNP group to gain involvement and have a platform for its learners, an online simulation-based educational learning module was created. The module demonstrated simulated scenarios to the learner, clearly communicating evidence-based research specific to

each of our proposed best practices. Understanding that resistance to change is a factor, it was important for the group to present the information in a way that actively engaged the learner and helped them to understand the need for change within their own practice. The simulated module was designed to first present the new information that was gathered from the literature, followed by a demonstration of its use in everyday practice compared to the current standard. In conjunction with the module, the pre- and post-surveys were implemented, allowing the DNP students to measure the intent to transition (or change) from old practice to new.

The final phase of Lewin's change theory is known as refreezing. During this time, new attitudes, values, and behaviors are established as the new status quo (Lock, 2019). The goal is that participants who were involved in the change process now consider the change as the new norm, however, these individuals will also have to work with each other in order to develop strategies that are aimed at reinforcing the new changes that have been implemented. Without establishing the new status quo (refreezing), healthcare employees have an increased risk of returning back to old habits. As such, it's important during the refreezing phase to not only identify what supports change, but also the barriers against sustainability. Batras et al. (2016) identifies that at this time, organizational norms, culture, practices and policies should now become realigned in order to support the continuation of implemented change. This begins via a thorough analysis of the data collected after implementation of the proposed DNP project. Ultimately, the goal is that participants in this project will have an enhanced knowledge of interprofessional collaboration and communication and incorporate the newly learned information into their everyday clinical practice. As advocates and leaders within the clinical setting, they will communicate with providers to reinforce their newly learned knowledge, creating sustainable change that is collaborative, effective and meaningful in nature. Deborah

(2018) concludes that the best action to implement the refreezing phase is to institutionalize the change, ensuring that it becomes a normal part of day-to-day processes within the organization.

CHAPTER 4. PROJECT DESIGN

IRB Approval

Cedar Crest College (CCC) institutional review board (IRB) approval was obtained prior to the start of the DNP project. All information obtained from participants who watched the educational module and completed the in-module surveys was kept anonymous. Anonymity was achieved for participants through the individual creation of a unique identifier that could be matched between the responses of each pre- and post-module survey. Participation in the module and its surveys was performed on a voluntary basis.

Implementation

Prior to the COVID-19 pandemic, a need was identified at the clinical site to find ways in which outcomes could be improved within the spine surgery population. Already implementing ERAS protocols in bariatric, urologic, colorectal, and gynecological-oncology surgery, a gap in knowledge and practice existed with regards to implementing ERAS for spine surgery. Originally, to close this gap between current and best practice at the clinical site the implementation of an ERAS protocol for spine surgery was suggested. However, the current group DNP project was designed so that each of the individual projects could be combined as a singular cohesive module. The goal of the new group project was to improve provider knowledge on interprofessional collaboration and communication while simultaneously incorporating research from the needed change that was identified within the clinical setting of each group member.

Implementation of the project was carried out in three phases: (1) participant recruitment, (2) dissemination of the learning module, and (3) completion of a survey to evaluate pre- and post-module learning. The first phase took place between November and December 2020, by

sending emails to current SRNAs or CRNAs. Each anesthesia contact who was interested in participating signed up by providing their name and email so that they could be contacted with all of the necessary materials. Once a sufficient number of participants agreed to view the learning module, the second and third phases of reviewing the module and completing a pre- and post-survey had a start date of February 5th, 2021, and an assigned due date of March 5th, 2021. Each participant proceeded to receive an email that included the unique link to the Wix webpage that housed the entire project. Once received, the participant completed the learning module at their own pace up to the aforementioned assigned due date.

Data Collection Tools

Data collection for the learning module consisted of the participant completing a 9-question questionnaire that evaluated pre- and post-module learning outcomes. Specific to the subject of this DNP project, the survey included questions to determine how well the learner understood ERAS, as well as key components that are related to spine surgery. Questions assessed the participants' understanding of ERAS modalities, focusing on the types of drugs that are used, appropriate surgical doses and the overall goals of anesthesia care during surgery.

Resources Needed

Resources that were required to complete the project were primarily associated with creating the learning module. At CCC, there is an on-campus simulation lab that has a wide variety of mannequins, hospital equipment and supplies, as well as individual rooms that are designed to replicate a post anesthesia care unit (PACU), holding area and operating room. All of the rooms and equipment that was required to record the online learning module was provided to the students at no cost. A three-month subscription to Wix was purchased to house the pre- and post-survey, as well as the learning module that was collectively recorded and edited as a

group. Each simulation module was recorded with a dual 12MP ultra-wide and wide camera that comes standard on the iPhone 11. Each video recording was then edited with iMovie, the standard video editing software that comes with all Macintosh operating systems.

Budget

The only budgetary cost to implementing the project was ninety dollars for a three-month subscription to Wix. The learning module was recorded with personal iPhones and edited with iMovie. All resources used for the purposes of recording were available to graduate students who are enrolled at CCC in the Nurse Anesthesia Program.

CHAPTER 5. IMPLEMENTATION PROCEDURES AND PROCESSES

The implementation of this DNP project focused on a common theme of improving interprofessional collaboration and communication amongst anesthesia professionals. Due to Covid-19 and the pandemic of 2020, the nursing administration at CCC met to review each individual student project, leading to the creation of this DNP group. During these meetings, it was determined that a recorded online simulation-based educational learning module would allow for project implementation while maintaining social distancing guidelines to ensure the safety of participants. Initially, three individual topics were researched towards improving best practice: (1) the use and implementation of an ERAS protocol for spine surgery, (2) effective communication between a preceptor and student, and (3) the use of a handoff tool in the PACU.

During DNP Project I, thorough research was conducted by each individual to support why their topic was of importance to clinical anesthesia practice. Once interprofessional collaboration and communication became the primary focus for a group project that incorporated each individual subtopic, new research was conducted to identify how this DNP group could implement best practice, specifically through the use of an educational learning module. Utilizing evidence-based research, creation of the actual module began with the development of individual scripts that demonstrated current or poor practice followed by improved clinical practice. Incorporating voice-over PowerPoints to enhance participant learning, the design of the simulated module would demonstrate how the theme of interprofessional collaboration and communication could implement evidence-based best practice for each individual topic.

During DNP Project II, the simulated module was filmed at CCC in the graduate simulation center. The three team members for this DNP project were utilized as actors and helped each other with their individual components of the project. All props and equipment were

included in the simulation center. The simulated module was filmed using an iPhone 11 and editing for the final project was completed on a MacBook using iMovie. Upon completion, a Wix page was created as a platform to store and access the module. In order to evaluate an increase in knowledge from the educational module, pre and post-module surveys were created. These surveys were also housed in the Wix page, allowing for all components of the module to be accessed and completed in one primary location.

During DNP Project III, the project was implemented over a four-week timeline beginning on February 5th, 2021. On that date, the educational module was sent via an email link to all recruited participants. Upon opening the link, participants were asked to sign an informed consent and to create a unique and anonymous identifier prior to beginning the online module and its corresponding surveys. Participants were then given a four-week period to complete the educational module. Weekly reminders were sent out to all potential participants. Participation was performed on an individual and voluntary basis.

CHAPTER 6. EVALUATION AND OUTCOMES

Evaluation

The purpose of this DNP project was to evaluate whether or not there was an improved knowledge on the importance of interprofessional collaboration and communication among anesthesia students and providers after the implementation of an online simulation-based educational learning module. The learning module was provided utilizing a Wix page that housed the module as well as the pre and post-module surveys. A four-week period was provided to allow participants to complete all components of the project.

Fifteen participants voluntarily watched the learning module and completed the pre and post-module learning surveys. The pre and post-module survey consisted of nine total questions, eight of which were single answer multiple choice questions and one question that was select all that apply. Survey questions can be found in Appendix A. Upon data collection, a paired sample t-test was performed utilizing IBM SPSS Statistics version 27; the output can be found in Appendix B. To determine whether or not an online educational module improved provider knowledge on interprofessional collaboration and communication, the total number of correct pre and post-module answers for each participant was paired for analysis. The findings are statistically significant if the p value is less than .05. After running the analysis, a p value $< .001$ was obtained, demonstrating that there is a statistically significant increase in provider knowledge after completing the online learning module.

Outcomes

Interprofessional collaboration and communication is a crucial component of improving provider interactions, clinical knowledge and overall patient outcomes. Having met the objectives of this project in the outlined timeframe, the results of this project demonstrated that

over a four-week period of implementing the online simulation-based educational learning module, participants showed an increased knowledge on interprofessional collaboration and communication and how it can effectively be used to implement an ERAS protocol for spine surgery. This was evidenced by the increased number of correct responses between the pre and post-module survey for each of the first three questions that pertained to this individual project (Appendix C). The increased number of correct responses for each of the first three survey questions (Appendix A) identified that participants improved their knowledge with identifying interventions in the pre-, peri-, and post-operative periods of care towards implementing an ERAS protocol for spine surgery. As for measuring the overall objectives of the group DNP project, SBE was demonstrated to be a viable and effective educational strategy towards improving knowledge through the example of interprofessional collaboration and communication. The mean score of correct responses increased from 5.73 in the pre-module period to 8.13 in the post-module period (Appendix B).

Discussion

In evaluating the project as a whole, this DNP group was pleased that despite the numerous difficulties that were presented throughout the COVID-19 pandemic, the creation and implementation of an interactive and informative online simulation-based educational learning module was achieved. With the guidance of the CCC anesthesia program directors, DNP director and individual chairs, the group was able to successfully incorporate three individual projects into a cohesive singular project that was effective in achieving its anticipated outcome. This DNP student would consider initially creating and developing a project for implementation that could be focused on improving healthcare provider education via SBE. Understanding the efficacy of SBE, and the fact that it has become such a crucial component of healthcare-based

education, this DNP student believes that SBE would be the best and most effective means of introducing new information to healthcare providers who are in contact with patients on a daily basis.

Evaluating the project in relation to meeting the needs of anesthesia students and providers, this DNP student has learned that there is a fair amount of information about implementing an ERAS protocol for spine surgery that is not fully understood. While the module effectively demonstrated that an online simulation-based educational learning module will improve interprofessional collaboration and communication, it also uncovered that not much is understood about the specific ERAS spine protocol interventions that are performed during the pre-, peri-, and postoperative periods of anesthesia care. However, this project also demonstrated that SBE will increase provider knowledge on ERAS protocols and how they are used as an effective means of improving overall patient outcomes. Having demonstrated these effects, SBE would continue to be a viable means of providing continuing education for anesthesia providers about ERAS protocols, as well as other pertinent topics related to patient care and anesthesia practice.

CHAPTER 7. IMPLICATIONS FOR NURSING PRACTICE

Implications for Practice

This project demonstrated the importance of SBE as a viable and effective educational strategy towards teaching and educating healthcare professionals about real-life clinical scenarios. Through the utilization of an online simulation-based educational learning module, participants in this project were able to improve their clinical knowledge on ERAS protocols for spine surgery via simulated scenarios that presented the information through the example of interprofessional collaboration and communication. The most recent literature has suggested that these tools of SBE have significantly improved collaboration and communication between healthcare professionals. This would signify to future nursing practice that projects of this nature would not only serve as an effective means of improving interactions between healthcare professionals, but also provide an open and unbiased channel of communication in which new information and best practices can be shared.

Strengths

In completing the project, there were numerous strengths that could be identified. Strengths included expressed interest on behalf of staff with all different levels of experience to participate in completing the learning module. Another strength of the project was that it was housed in a singular location, which provided ease for completion and allowed the participant to stop and continue at their convenience. Finally, the survey only consisted of nine questions, none of which were typed responses. This was purposeful in order to maintain participant engagement while simultaneously focusing their attention on key learning points that would improve their professional practice.

Limitations

The COVID-19 pandemic created unforeseen limitations to the project. These included inaccessibility to numerous resources throughout all stages of the DNP project process, being put on hold by institutional IRBs, and having to be creative in order to create a singular group DNP project out of multiple individual projects. Furthermore, the project had to be completed and implemented in a socially distanced manner in order to maintain the safety of each participant involved. Unfortunately, these limitations of the pandemic state could not be mitigated. However, the results can still be used in order to encourage future projects of a similar nature.

Other limitations in the implementation of this DNP project included the limited response rate by providers and a four-week timeframe for project implementation. As such, only a convenience sample of fifteen participants was obtained, which is also recognized as an example of sampling bias. Possible reasons for this may be a direct result of the burden brought on by the COVID-19 pandemic. However, these barriers may be improved in the future by extending the implementation period beyond four weeks and by reaching out to more potential participants through a broader means of communication. In lieu of recruiting participants on an individual basis, broader participation could have been obtained though network communication via obtaining permission to send emails through individual hospitals, nurse anesthesia programs, the Pennsylvania Association of Nurse Anesthetists and the American Association of Nurse Anesthetists.

DNP Essentials

DNP *Essential I* addresses the scientific underpinnings for practice. This was achieved through an extensive review of the literature that existed on the subjects of ERAS protocols for spine surgery, SBE, and interprofessional collaboration and communication. In doing so, this

student's knowledge and skills associated with each subject grew, leading to a written DNP proposal and subsequent DNP project for implementation into nursing practice.

DNP *Essential II* evaluates organizational and systems leadership for quality improvement and systems thinking. In meeting this essential, objectives included increasing the skills, knowledge, and abilities of anesthesia providers with regards to the aforementioned subjects identified in DNP *essential I*. In performing a needs and stakeholder assessment to determine the feasibility of this project, an evidence-based intervention was developed in the form of an online simulation-based educational learning module to effectively translate research into practice. In order to conduct these assessments, meetings were held with various personnel in order to identify both the existing peer support structure and the areas in need of an improvement project.

DNP *Essential III* focuses on clinical scholarship and analytical methods for evidence-based practice. This was achieved through the thorough process of critically appraising the literature and other research that was associated with the DNP project. Other objectives included completing the CITI training certificate, designing an implementation plan to evaluate the outcomes of the project into practice, applying relevant findings to develop a practice guideline that would improve practice, and using information technology in order to collect appropriate and accurate data for analysis.

DNP *Essential IV* concentrates on information systems-technology and patient care technology for the improvement and transformation of healthcare. In meeting this essential, objectives included building personal experience with information and technological systems that were capable of not only supporting the DNP project, but also with collecting and analyzing post-intervention data to determine the effectiveness of interventions. Programs that were used

included the Wix website to distribute the surveys and learning module to project participants. Microsoft Excel to collect data and generate charts. IBM SPSS to perform data analysis. Microsoft PowerPoint to create an informational presentation and Apple iMovie to edit the final learning module.

DNP *Essential V* discusses healthcare policy for advocacy in health care. It is understood that policy plays a key role in addressing health disparities, the delivery of care and the quality of care. In meeting this essential, there was active participation in the education of anesthesia providers towards advocating for policies and methods of staff communication that were aimed at improving overall patient outcomes. Leadership was further demonstrated through the education of a proposed ERAS protocol for spine surgery. Through the critical analysis of current healthcare policy and stakeholder involvement, the project evaluated and developed a new health policy towards improving healthcare delivery in the form of an online simulation-based educational learning module.

DNP *Essential VI* focuses on interprofessional collaboration for improving patient and population health outcomes. This essential was met though the collaboration of working with every individual who was involved in the DNP project process. Communicating with our program directors, DNP chairs and CRNA mentors in the clinical setting, there was an ongoing discussion with regards to current practice guidelines and standards of care within the healthcare setting. In completing a group project, each member lead a collaborative effort with regards to their individual project. This was achieved by effectively employing the necessary leadership skills that are involved with setting up and leading interprofessional teams to carry out the project, meeting with key stakeholders, and organizing an effective plan of implementation that results in improved inter-collaboration among healthcare providers.

DNP *Essential VII* evaluates clinical prevention and population health for improving the nation's health. In meeting this essential, evaluation of a need to implement an ERAS protocol for spine surgery was identified towards improving patient outcomes. Further analysis of national and institutional statistics identified that spine surgery is being performed at increasing rates every year. Understanding that ERAS is a leading example of pathway-based, perioperative care that will promote optimal surgical recovery, the project synthesizes concepts and evaluates the best strategies that can be used in order to improve the health status and outcomes of patients within this population.

DNP *Essential VIII* explores advanced practice nursing. In utilizing the evidence-based practice process to carry out this DNP project, identification and selection of the most appropriate interventions were selected in order to provide the best care towards improving overall patient outcomes. As a prospective DNP graduate, the expectation is that we are able to implement and evaluate therapeutic interventions in the nursing sciences that will have a measureable impact to clinical practice and academia. Possessing advanced skills in critical thinking and decision making allows the advanced practice nurse to not only impact clinical practice and health care policy, but also serve as a mentor and leader within the profession.

CHAPTER 8. SUMMARY OF PROJECT

Conclusion

The use of an online simulation-based educational learning module proved to be an effective means of improving knowledge on interprofessional collaboration and communication when implementing an ERAS protocol for spine surgery. The strength and quality of the literature on SBE demonstrates that its methods can be used among healthcare professional towards significantly improving collaboration and communication. Additionally, the application of ERAS to spine surgery is an emerging practice within the field of anesthesia that is demonstrating improved surgical outcomes. By improving knowledge on interprofessional collaboration and communication through one of the many tools of SBE, stakeholders will begin to learn about, endorse and support new concepts of clinical practice that are presented to them. Hopefully, this will lead to the application and usability of new assessments and guidelines, including the proposed implementation of an ERAS protocol for spine surgery.

Dissemination Plans

Initial dissemination of this project took place on April 15th, 2021 at CCC. CCC staff, nursing professionals and students were invited to attend the in-person/online event. Further dissemination of this project and its results is anticipated to occur through the submission of the learning module for continuing education (CE) credits to anesthesia staff at LVHN. With project results demonstrating effectiveness in its anticipated outcomes, the next step for this DNP group is to work with the clinical educator for anesthesia staff at LVHN in order to obtain approval for 1 hour of Class A CE credit. In discussion with numerous anesthesia staff, their eagerness to view the learning module for CE credit is very strong.

Future Implications

Plans for sustainability of this quality improvement project would include continued stakeholder support and engagement in the ideas presented, continued feedback on its applicability to anesthesia practice, and the appointing of change champions who will facilitate long-term compliance. The review of emerging and new data on this topic should also be periodically reviewed. If there is mounting evidence that is of high strength and quality, revisions to the interventions suggested in this DNP project should be made, presented, and evaluated by the appropriate stakeholders.

Future extension of this quality improvement project would include evaluating the effectiveness of implementing an institution-specific ERAS protocol for spine surgery. Understanding the significant impact that ERAS protocols have played towards improving overall patient outcomes, new quality improvement projects could evaluate their effectiveness in improving patient satisfaction scores, pain scores, postoperative complications, narcotic consumption, and overall length of hospital stay.

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Appendix A

1. **Which multimodal intervention for spine surgery has demonstrated the property of reducing spinal cord edema?**

A. Ketamine
B. Toradol
C. Lidocaine
D. Dexmedetomidine

2. **Select all appropriate interventions when performing ERAS for spine surgery. (Select 3)**

A. 15mg of Toradol at the end of surgery
B. N2O to enhance depth of anesthesia
C. Scheduled oxycodone for postoperative pain management
D. TIVA with Propofol
E. Ketamine 0.25 mg/min infusion
F. Carbohydrate loading 6 hours before surgery

3. **During the intraoperative phase of anesthesia care, the primary objective of ERAS for spine surgery is to...**

A. Limit the amount of narcotics that we administer to patients
B. Reduce the overall surgical stress response
C. Promote early oral intake and ambulation after surgery
D. Maximize physical and functional status

4. **You are with your student as they are having difficulty intubating. Which action and response would be most effective?**

A. You stop them immediately and take over the procedure stating, "you need more practice before I let you try this on a person again."
B. You assess the situation to determine the cause of the difficulty and say, "o.k. You have time. What do you see? What can we change to help you have a better view?"
C. Joke with the patient to try to decrease the tension and redirect the attention away from the student to ease anxiety.
D. Take over for the student and state, "don't worry, it gets easier."

5. **You meet with your student for the first time in the morning before surgery. You discuss the day, the cases, and any questions the student might have. The student, in turn, feels at ease going into the day and confident in their preparation. This type of communication is known as…**

A. Assertive Communication
B. Validation
C. Therapeutic Communication
D. Verbal Communication

6. It is the end of the day and your student hands you their evaluation for the day. The most appropriate action is…

A. Take the evaluation and fill it out at a later date
B. Tell the student they did a good job today and for them to put the evaluation in your mailbox
C. Sign your name on the bottom and tell the student to fill out the rest
D. Sit down with the student and discuss the pros and cons for the day, giving them feedback both verbally and on the evaluation

7. The use of structured or standardized template

A. Is not necessary because the receiver can look up all the information before
B. Aids in delivering a faster handoff
C. Should only be utilized when the patient is an ASA 3 or higher
D. Ensures consistency in information communicated between the sender and receiver.

8. What does the I-PASS acronym stand for?

A. I: Illness severity P: Patient summary A: Action list S: Situation awareness and contingency planning S: Synthesis by receiver
B. I: Introduction P: Positioning during surgery A: Antibiotics S: Summary of anesthetics S: Summary of Fluids
C. I: Introduction P: Patient Summary A: Antibiotics S: S: Summary of anesthetics S: Summary of Fluids
D. I: Illness severity P: Positioning during surgery s A: Action list S: Summary of anesthetics S: Synthesis by receiver

9. The IPASS handoff system has been shown to

A. Increase efficiency
B. Decreases time spent during handoffs
C. Decrease medical errors and near misses
D. All of the above

Appendix B

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Pretest	5.73	15	1.163	.300
	Posttest	8.13	15	.915	.236

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	Pretest & Posttest	15	.371	.173

Paired Samples Test

		Paired Differences					t	df
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper		
Pair 1	Pretest - Posttest	-2.400	1.183	.306	-3.055	-1.745	-7.856	14

Paired Samples Test

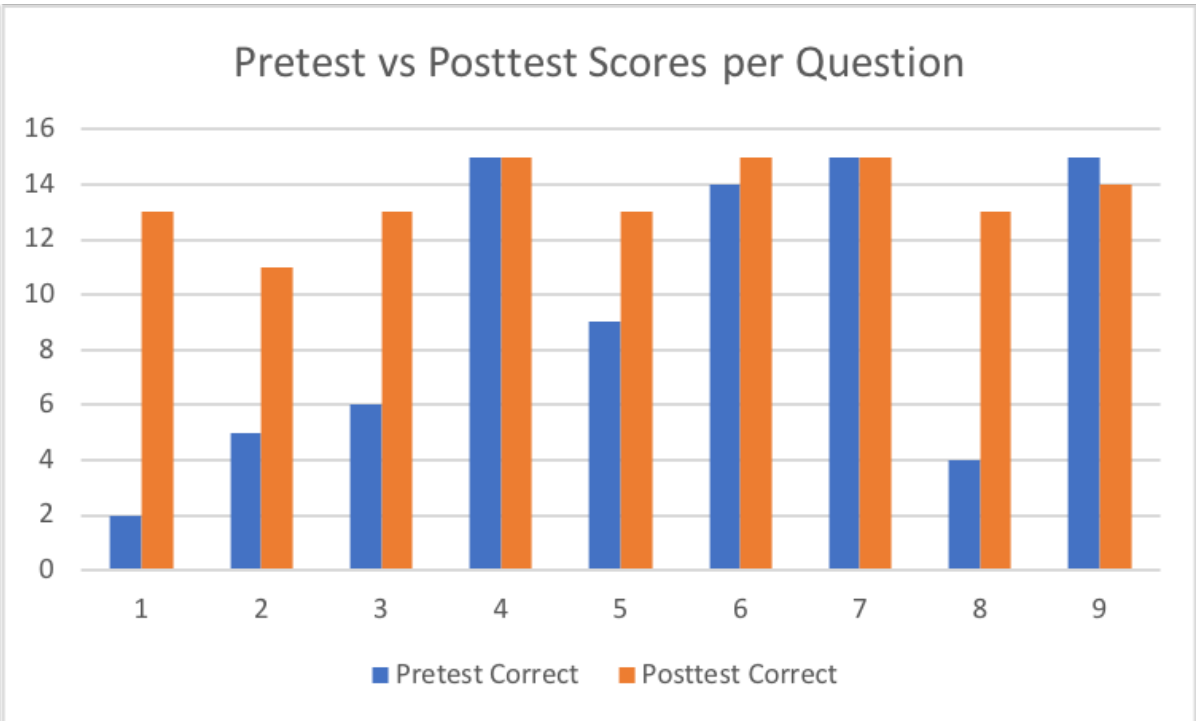
		Sig. (2-tailed)
Pair 1	Pretest - Posttest	.000

Paired Samples Effect Sizes

			Standardizer[a]	Point Estimate	95% Confidence Interval Lower	Upper
Pair 1	Pretest - Posttest	Cohen's d	1.183	-2.028	-2.916	-1.118
		Hedges' correction	1.216	-1.973	-2.837	-1.087

a. The denominator used in estimating the effect sizes.
Cohen's d uses the sample standard deviation of the mean difference.
Hedges' correction uses the sample standard deviation of the mean difference, plus a correction factor.

Appendix C


Pretest vs Posttest Scores per Question
16
14
12
10
8
6
4
2
0
1
2
3
4
5
6
7
8
9
Pretest Correct
Posttest Correct