2020

# Identifying Attitudes and Knowledge Deficits Regarding Constipation in the Neurosurgical Patient: A Quality Improvement Project

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# Identifying Attitudes and Knowledge Deficits Regarding Constipation in the Neurosurgical Patient: A Quality Improvement Project

Presented in Partial Fulfillment of the
Requirements for the Degree of
Doctor of Nursing Practice

Nova Southeastern University
Health Professions Divisions
Ron and Kathy Assaf College of Nursing

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2019

## Abstract

**Background:** Constipation is a common problem in hospitalized patients worldwide. The providers' lack of knowledge of the complications that can occur from constipation lead to increased discomfort and increased healthcare costs.

**Purpose:** The purpose of this evidence-based practice education intervention was to improve neurosurgical health providers' knowledge and attitudes on constipation prevention in neurosurgical patients.

**Theoretical Framework:** Kolcaba's Comfort Theory was used to guide this project.

**Methods:** A pre- and post-test survey design guided this project. The physicians, nurse practitioners, and nurses completed a pre-test and post-test survey on prevention of constipation in the neurosurgical patient before and after the educational session. Retrospective and prospective data from neurosurgical patients' charts were collected before and after the educational sessions and were analyzed to determine if the educational sessions decreased hospital length of stay, emergency room visits, and re-admission rates.

**Results:** There was overall improvement in knowledge of RNs, APRNs, and neurosurgeons as well as significant improvement of attitudes in three critical areas concerning how the participants feel towards constipation prevention and management. There was no significant improvement in patient outcomes.

**Conclusion:** The findings from the project indicated that participants gained significant knowledge from the education session ($p = 0.016$). The educational sessions can be applied to providers of other patient populations. Although the patient outcomes did not significantly

improve ($p = 0.089$), findings from the project revealed a lack of hospital protocol for nurses to perform digital rectal exams. A protocol is currently in the process of being developed.

**Acknowledgements**

First, I would like to thank my project chair, Dr. Marcia Derby-Davis, as well as one of my mentors Dr. Kelly Henson-Evertz, for the countless hours of guidance and advice throughout this process. There were times I wanted to give up, but you both contributed greatly in helping me get through this journey. Although there were many obstacles during this experience, you both helped me navigate through each step of the way.

I would also like to extend an enormous 'thank you' to my mentor, Dr. Daphnie Bharadwa, who advised, educated, and guided me throughout the entire project. She was enthusiastic about my project from the beginning and provided positive reinforcement throughout every stage. She became invested in my project and assisted in the design, planning, and implementation of the project.

I would like to thank my brother, Thomas, who advised me throughout all of the statistical portions of the project. Without you, I would still be trying to log on to SPSS. Your help throughout this journey has been priceless.

Last but certainly not least, I would like to express the appreciation I have for my husband, Pete, for supporting me throughout this rigorous journey. My amazing children, Kayla, Alex, and Nicky are the reason I work so hard. I want you all to know that anything is possible, and you can do amazing things in this life if you put in the effort. Thank you for being understanding when I had to take time away from you all while I juggled home-life, school, and work. I appreciate and love you all more than you know.

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## Chapter One: Nature of Project and Problem Identification

Constipation is a common symptom in people worldwide. The severity of constipation varies from person to person. According to Lee (2015), the condition can have significant effects on the patient's quality of life as well as cost implications to patients and healthcare systems. Constipation in the long-term care patient and in primary care settings has been well-studied, and many constipation prevention approaches have been instituted in these patient populations. According to Smith, Stimson, and Stevens (2018), there is a lack of bowel protocol implementation in the acute inpatient setting, specifically the traumatic injury patient and the neurosurgical patient.

The neurosurgical patient population includes individuals who have sustained traumatic brain or spinal cord injuries, have brain and spinal tumors, sustained spontaneous intracranial hemorrhages, or those who have undergone elective brain and spinal surgeries. Most of these patients are admitted to the intensive care unit (ICU) on admission for close observation. Many of these patients have other injuries along with significant medical comorbidities. The neurosurgical patient is often bedridden for extended periods, which leads to increased risk for many acquired issues including constipation (Su Fee Lim & Childs, 2013). There is a lack of uniformed regimens in place for the treatment and prevention of constipation in the neurosurgical patient. Due to other perceived more significant problems with neurosurgical patients, constipation may not be dealt with until significant problems arise. The effect on patients suffering from constipation and the cost of treating constipation is compelling. According to a study conducted by Smith et al. (2018), decreased gastrointestinal function can

delay ventilator weaning, increase length of ICU and hospital stay, and increase readmission rates.

According to Owens (2016), the mean overall cost of patients with constipation was $12,413 higher than those without constipation due to healthcare utilization in a study conducted over a 12-month period. Studies show that there is an overall feeling of dissatisfaction among providers regarding the bowel management of intensive care patients within their healthcare system (Knowles, McInnes, Elliott, Hardy, & Middleton, 2013; Smith et al., 2018), therefore, it is important to develop a multidisciplinary approach to bowel management that benefits the patients at highest risk for developing complications from constipation.

## Problem Statement

Constipation in hospitalized patients with neurosurgical etiology leads to complications, increases length of hospital stay, and increases risk of emergency room visits and readmission rates.

## Purpose Statement

The purpose of this evidence-based practice education intervention was to improve neurosurgical health providers' knowledge and attitudes on constipation prevention in pre- and post-operative neurosurgical patients.

## Project Objectives

The Doctor of Nursing Practice (DNP) project was guided by the following objectives:
Objective 1: Conduct a pre-test survey to determine the knowledge and attitudes of providers and nurses towards the management of constipation in the neurosurgical patient.
Objective 2: Conduct a retrospective chart review of all patients admitted under the neurosurgical service to evaluate the number of bowel movements the patient had during the

hospital admission, length of hospital stay, whether discharge was affected by constipation, emergency department visits after discharge relate to constipation, and readmissions related to constipation.

Objective 3: Develop a training program about constipation and its effects on the neurosurgical patient using a PowerPoint presentation.

Objective 4: Educate physicians, nurse practitioners, and registered nursing staff in the neurosurgical ICU and neurosurgical medical floor on prevention and management of neurosurgical patients with constipation.

Objective 5: Conduct a post-test survey after the educational training sessions to determine the knowledge gained and change in attitudes of nurses and providers towards the prevention and management of neurosurgical patients with constipation.

Objective 6: Perform a prospective chart review of the neurosurgical patients after the education session to evaluate for change in the number of bowel movements the patient had during the hospital admission, length of hospital stay, whether discharge was affected by constipation, emergency department visits after discharge relate to constipation, and readmissions related to constipation.

Objective 7: Measure the outcomes of the quality improvement project.

Objective 8: Disseminate the findings to the stakeholders.

## Theoretical Framework

### Kolcaba's Comfort Theory

The Comfort Theory is a middle-range nursing theory that was developed by Katherine Kolcaba in 1994 (Derya & Pasinlioglu, 2017). Comfort is a broad term to describe the patient's view of feeling satisfied or having a sense of well-being. Kolcaba viewed the essence of comfort

in two distinct phases. In the first phase, Kolcaba described three comfort levels: relief, ease, and transcendence (Krisnsky, Murillo, & Johnson, 2014). For example, the patient can experience "relief" from being given analgesics in the post-operative period following surgery. The alleviation of anxiety can be an example of the sense of "ease". Lastly, "transcendental" comfort can be described as overcoming a challenge for example, in physical or occupational therapy. All three aspects of comfort can be applied to physical satisfaction, but it is important to recognize that Kolcaba expands her theory beyond physicality.

Kolcaba described four contexts of holistic human experience in differing aspects of therapeutic circumstances in the second phase of her theoretical framework (Boudiab & Kolcaba, 2015). According to Boudiab and Kolcaba, "the four concepts are physical, psychospiritual, environmental, and sociocultural" (p. 271). Physical comfort includes the subjective feelings experienced on behalf of the patient. According to Derya and Pasinlioglu (2017), physiological state can pertain to factors such as nutritional states, the stability of bowel functions, and homeostasis. Psychospiritual state refers to internal awareness such as self-esteem and an individual's relationship with higher beings (Boudiab & Kolcaba, 2015). The extraneous setting of the patient describes the environmental connection to comfort and sociocultural relation to comfort (Derya & Pasinlioglu, 2017).

A major part of the nursing process is evaluating the comfort needs of the patient, forming nursing interventions directly geared towards that comfort need, and evaluating the success of the intervention following implementation (Boudiab & Kolcaba, 2015). Kolcaba's Comfort Theory includes all aspects of this nursing process. The theory guides the researcher from making a calculated assessment of patient needs to designing an intervention process to undertake the problem, and analysis of the patient's comfort after the implementation. It is

important not only to identify the patients' comfort needs but to follow through with an action plan to provide comfort and assess the outcome. As with most nursing interventions, it is important to assess not only the objective consequences but also the subjective results.

**Application of the Theory**

Kolcaba's three comfort levels can be achieved by avoiding constipation in the neurosurgical patient. Relief, ease, and transcendence are achieved by establishing normal bowel movement patterns and preventing constipation related to opioid medication, immobility, and dehydration. As part of Kolcaba's Comfort Theory, it is important to assess the patient's comfort to ascertain if constipation is already a problem. This can be achieved by palpating and percussing the abdomen, assessing residual of gastric contents if an oral or nasogastric tube is present, and assessing for stool impaction. However, assessing for comfort may be a difficult task in some neurosurgical patients. In the acute phase, some neurosurgical patients may be intubated or sedated, or have injuries that inhibit them from communicating. There are other objective ways to assess comfort. Comfort can be assessed by evaluating vital signs for spikes in blood pressure or heart rate contributing to pain felt by the patient, non-verbal communication such as grimacing during assessments and interventions, and agitation related to discomfort in the intubated patient (Boudiab & Kolcaba, 2015).

After subjective and objective data are collected, the healthcare team can then design an intervention strategy to address the discomfort (Boudiab & Kolcaba, 2015). The nurses and providers can collaboratively evaluate for the best intervention that can be used to prevent discomfort related to constipation in the neurosurgical patient. According to Boudiab and Kolcaba (2015), the intervention can be called a comfort measure if the intervention alleviates the discomfort and is effective.

**The Stetler Model**

This Stetler model assists practitioners to link research findings to practice for evidence-based clinical practice (Stetler, 2001). According to Stetler (2001), the critical-thinking and decision-making steps of the model are designed to promote the effective use of research findings and translation of those findings into practice to provide positive outcomes.

The model has five phases: (I) preparation, (II) validation, (III) comparative evaluation and decision-making, (IV) translation and application, and (V) evaluation (Stetler, 2001). Phase I, the preparation phase, requires the clinician to determine a purpose or problem of significance. During this phase, the practitioner searches, sorts, and selects sources of research evidence as well as defines purpose and measurable outcomes of the project (Stetler, 2001). Phase II, the validation phase, is necessary to assess substance of the existing research and its application to the current project and whether to accept or reject the study. The practitioner performs detailed analysis and completes a synopsis of the research to determine whether the evidence applies to the particular problem involved. Phase III, comparative evaluation and decision-making, includes synthesizing findings and evaluating criteria for fit of setting, feasibility, substantiating evidence and determining how the evidence fits with current practice (Stetler, 2001). At the end of Phase III, the clinician must decide whether to use the research findings. In phase IV, the translation and application phase, the consideration will take place on how to integrate the literature research findings into the practice setting. By the end of phase IV, the clinician should know how the research findings will transform practice. Phase V, the evaluation phase, involves assimilation of the goal for use of the information and includes both formative and summative data to assess achievement of the goal (Stetler, 2001). Once phase V is complete, a decision is

made whether to implement the change formally, informally, individually or institutionally (Stetler, 2001).

### Application of the Model

Evaluating each neurosurgical patient for the need for constipation prevention interventions early in the admission process decreases complications, length of hospital stay and re-admission rates. The five phases of the Stetler model were applied to this DNP project. Phase I consisted of the literature review process. It is valuable to research other quality improvement projects that have been done for similar clinical problems.

In phase II, the studies and literature that were assessed in phase I were analyzed and those that did not meet standards were excluded. In phase III, a comparative evaluation was done with all studies and the decision was made whether to use the findings. It was imperative that the research findings were recently published and from reputable sources in order to be deemed reliable. In phase IV, it was determined that educating the providers of neurosurgical patients was to be used in the neurosurgical ICU and neuro-medical floor. For phase V, the decision was made to implement this formally as part of the early education for the neurosurgical ICU and neuro-medical floor registered nurses.

## Significance of the Project

### Practice

Constipation increases length of hospital stay and readmission rates in the neurosurgical patient. Nurses and providers should stay informed on current medications that cause constipation, proper assessesment of bowel disturbances, and medications to prevent and treat constipation. The studies conducted using various bowel regimen protocols have had favorable outcomes and support practice changes. The findings from this DNP project have positively

transformed clinical practice by increasing knowledge and changing the attitudes of the registered nurses (RN), advanced practice registered nurses (APRN), and physicians who care for neurosurgical patients.

**Healthcare Outcomes**

According to Ross-Adjie, Monterosso and Bulsara (2015), the administration of a uniform bowel protocol in post-orthopedic surgery patients resulted in reduced time to return to normal bowel function. The adherence to constipation prevention strategies has increased by improving the knowledge and attitudes of healthcare providers who care for neurosurgical patients. Although the patient population in the study conducted by Ross-Adjie et al. (2015) were orthopedic cases, the findings revealed that bowel management protocols can easily be used universally to prevent constipation in different patient populations. The nurses and providers must be proactive and ensure that their patients are on the proper constipation prevention medications, especially for the post-operative, neurosurgical patients to prevent complications.

**Healthcare Delivery**

The findings from this DNP project have affected health care delivery in a positive way by changing practices within the neuroscience department. According to Knowles et al. (2013), constipation prevention techniques are imperative in the health care setting to avoid complications associated with bowel function. The education sessions for neurosurgical nurses and providers can be easily implemented in many healthcare arenas. The RNs, APRNs, and physicians were educated on the effects of constipation, assessment skills of the gastrointestinal system, and constipation prevention techniques. Educating the providers and multidisciplinary teams on the complications of constipation in the hospital setting will improve adherence to constipation prevention techniques (Ross-Adjie et al., 2015). Constipation rates and

constipation-related complications will continue to decrease secondary to educating providers on constipation prevention strategies with continuous adherence of improved assessment skills and prevention techniques.

**Healthcare Policy**

The quality improvement project has implemented an education training session for the nurses and providers of neurosurgical patients in a tertiary hospital in southeast Florida in an effort to decrease constipation rates during the acute phase of care and to avoid constipation related increased lengths of stay and/or readmissions to the hospital. The education sessions have given the nurses and providers the confidence and knowledge to advocate for interventions related to constipation prevention and treatment. The findings from this DNP project have provided valuable evidence that can be incorporated into the hospital system and be used to evaluate adult patients who are risk for developing constipation. According to Oczkowski, Duan, Groen, Warren, and Cook (2017), bowel care for hospitalized patients, especially those in the ICU, has been a routinely neglected problem leading to complications such as bowel obstruction, feeding intolerances, difficulty with mechanical ventilation, and increased hospital length of stay.

## Summary

Patients are at a high risk of experiencing constipation. Patients who are suffering from neurosurgical problems are even at higher risk for developing constipation due to immobility, decreased level of consciousness, increased opioid use, and other contributing factors (Turan & Kaya, 2014). There is a lack of uniformed regimens in place for the treatment and prevention of constipation in the neurosurgical patient. According to Turan and Kaya (2014), constipation can be prevented in the neurosurgical patient with effective assessment techniques, preventive

modalities, and early diagnosis of constipation. Ensuring that the neurosurgical patient is on constipation prevention medications in the acute phase can decrease constipation and therefore decrease complications, decrease hospital length of stay, and prevent readmissions related to bowel problems. Educating the physicians, APRNs, and RNs about the effects of constipation has increased knowledge and improved attitudes towards constipation prevention strategies and has the potential to decrease the incidence of constipation in the neurosurgical patient, therefore improving patient comfort, preventing increased length of hospital stay, and decreasing hospital emergency room visits and readmissions related to constipation.

## Chapter 2: Review of Literature

Constipation is a common problem throughout healthcare. According to Turan and Kaya (2014), the neurosurgical patient is at a higher risk of developing constipation secondary to the injury, immobility, nutritional deficiencies due to self-feeding difficulties, and dehydration. There is a lack of uniformed bowel regimen implementation in the neurosurgical patient population. According to Owens (2016), the financial burden to healthcare systems is significantly higher in those patients who suffer from constipation during their hospitalization. Several studies on patients that are critically ill in the intensive care unit, but little literature exists regarding constipation prevention strategies in the neurosurgical patient. The goal of educating nurses and providers regarding constipation in the neurosurgical patient was to increase adherence to constipation prevention strategies during the admission phase to prevent complications, extended hospital stays, and reduce readmissions.

### Literature Search

A thorough search approach was carried out using Medical Literature Analysis and Retrieval System Online (MEDLINE), Cumulative Index of Nursing and Allied Health Literature (CINAHL), and Ovid Technologies (OVID) followed by an examination of the words contained in the titles. The abstracts were also investigated to search for key terms related to the problem. A review of the reference lists of all articles was analyzed to search for additional related studies that could augment the project. Many of the articles in the reference lists are outdated and therefore could not be used. The initial key words that were used included: neurosurgery, neurosurgical, spine surgery, spine injury, spinal cord injury, traumatic brain injury, TBI, head injury, intensive care unit, ICU, constipation, fecal impaction, bowel paralysis,

bowel protocol, bowel regimen, bowel program, stool scale, bowel care, and prevention of constipation.

This review included studies that were conducted from January 2013 to July 2018. The review included only studies in the English language that have been peer- reviewed. The studies that were chosen for review included those that evaluated bowel management approaches in adults of 15 years of age or greater who were admitted into the critical care area. Sixty-five articles using inclusion criteria were identified and reviewed. Only one of the articles found was directly related to neurosurgical patients. Ten studies were selected for final review based on the nature of the study and relevance to the proposed DNP project. See Appendix D for the literature review matrix.

## Constipation in the Hospital Setting

Constipation is a common problem in the hospital setting. According to researchers, Turan and Kaya (2014), a few of the reasons for the high incidence of constipation in the hospital setting is postponing the urge to defecate due to being in the hospital environment, eating low fiber foods, immobility, decreased level of consciousness, and medications. A two-phase quantitative exploratory study consisting of a retrospective audit and a prospective survey conducted by Houghton, Horgan, and Boldy (2014), aimed to measure cost, health education, and multidisciplinary collaboration of hospitals compared to nurse-led clinics in the management of constipation. Findings from the study indicated that the implementation of a nurse-led management program for inpatient idiopathic childhood illness resulted in decreased costs due to early recognition and aggressive treatment of patients with constipation. It was calculated that nurse-led clinic consultations saved $940 per child.

A noted weakness in the study was that the survey used in this exploratory study was not formally validated and the sample size of the phase two portion of the study was small; therefore the findings cannot be generalizable to the population.

## Constipation with Surgical Patients

Surgical patients are at a higher risk of constipation than the average hospitalized patient. According to several studies, constipation in the post-operative phase occurs for several reasons including anesthesia, narcotics, decreased physical mobility, and pre-operative fasting (Rhodes, Loman, & Bultas, 2016; Ross-Adjie et al. 2015; Trads, Deutch, & Pedersen, 2017). Studies have evaluated the effectiveness of different bowel protocol strategies in surgical patients with positive outcomes (Rhodes et al., 2016; Ross-Adjie et al., 2015).

Ross-Adjie et al. (2015) performed a randomized controlled trial (RCT) evaluating the effect of a bowel protocol in 331 patients who underwent total hip and total knee replacements over a 13- month period. The hospitals were randomized rather than the patients which included two intervention hospitals and five control hospitals. The researchers recruited patients that were 18 years or older and were able to read and understand English, had normal bowel function prior to admission, and were able to give informed consent. Data collection was taken during pre-admission office visit, inpatient admission, and after discharge. The patients were educated using the Bristol Stool Scale and asked to self-report a stool number for the prior 24 hours. This number was also documented by nurses every day at a specific time. The nurses were required to attend comprehensive education sessions with the researchers. In addition to the education sessions, the staff was provided with an information sheet, and a trial liaison was made available at each hospital as a resource for the nurses.

After the education period, Ross-Adjie et al. (2015) started the patients in the intervention group on the Murdoch Bowel Protocol, whereas the control group was given the normal hospital bowel regimen, if any was available. The results concluded that 57.1% ($n$ = 97) of control patients reported constipation in the post-discharge interview versus 31.2% ($n$ = 50) of the intervention group patients reporting constipation ($p \leq 0.001$). The strengths of this study include a significant patient population and the results came from several different institutions.

In a similar study conducted by Rhodes et al. (2016), comparing two postoperative bowel regimens in children with scoliosis repair, a retrospective review of 36 charts was performed to analyze the stool outcomes in those patients treated with polyethylene glycol 3350 (PEG) or mineral oil (MO) after spinal fusion. It was found that more participants refused one or more times in the PEG group. Only four of the 20 patients (10%) in the PEG group had a bowel movement (BM) before discharge versus four of the 16 patients (25%) in the MO group who had a BM before discharge (Fisher's exact test, $p$ = 0.374).

Trads et al. (2017) reported that constipation is one of the most frequent hospital complications and a frequently used nursing diagnosis. Trads et al. (2017), performed a quasi-experimental study to test the efficacy of a nursing intervention based on active patient involvement as a means to prevent constipation after hip surgery. A total of 155 patients completed the study, which included an admission interview including a constipation risk assessment and, on that basis, an individualized nursing care plan was made. Patients in the control group received standard care. After 30 days, there was significantly lower incidence of constipation in the intervention group than in the control group ($p$ = 0.042).

The findings of the studies provide evidence that there is an increased incidence of constipation in the post- operative patient, regardless of surgery type, although orthopedic

surgeries have an increased risk given the higher risk of mobility impairment (Rhodes et al., 2016; Ross-Adjie et al., 2015; Trads et al., 2017). Anesthesia and narcotic use can decrease gut mobility, leading to increased risk of constipation. Increasing fluid intake and encouraging diets high in fiber along with increasing mobility are all nurse- led interventions that have shown significant effects on decreasing constipation after surgery (Rhodes et al., 2016; Trads et al., 2017).

The study conducted by Ross-Adjie et al. (2015) had a large patient population in its multisite cluster RCT whereas the other two studies were not RCTs and had much smaller patient populations and, therefore, were weaker in comparison (Rhodes et al., 2016; Trads et al., 2017). A weakness that was noted is there was little to no follow- up after discharge in all three studies. Patient refusal or non-compliance was evident in all three studies. According to Rhodes et al. (2016), there was a greater refusal to take PEG versus the MO group, which they concluded may be due to the preparation method.

## Constipation in Critical Care Patients

It is well known that critically ill patients are at risk of constipation for many reasons including dehydration, continuous or intermittent administration of sedatives or analgesics, decreased mobility, mechanical ventilation, or their underlying illnesses (Guardiola, Llompart-Pou, Ibanez, & Raurich, 2016; Knowles et al., 2013; Oczkowski et al., 2017; Smith, et al., 2018). Many studies have been conducted evaluating the effectiveness of different bowel protocols in the critical care patient. This patient population is especially at risk for the adverse effects of constipation such as feeding intolerances (Oczkowski et al., 2017; Smith et al., 2018), delirium (Fushimi et al., 2017; Knowles et al., 2013), increased duration of mechanical ventilation

(Guardiola et al., 2016; Knowles et al., 2013; Oczkowski et al., 2017; Smith et al., 2018), and increased hospital stay (Guardiola et al., 2016; Knowles et al., 2013; Oczkowski et al., 2017).

Smith et al. (2018), and Knowles et al. (2013) both conducted quantitative studies to evaluate the effectiveness of bowel protocols using a stool softener with a stimulant agent in the critically ill patient. The two studies had similar number of participants in the pre-implementation (166 versus 101) and post-implementation (107 versus 116) groups. Both studies collected data using a retrospective chart review for the pre- and post-implementation groups. Knowles et al. (2013), did not find significant differences in the incidence of constipation between the pre- and post-implementation groups however Smith et al. (2018), found that those patients that were started on the high-intensity bowel protocol averaged one BM every two days whereas standard hospital bowel protocol averaged one BM every three days. Neither study found a decrease in hospital length of stay.

Oczkowski et al. (2017) conducted a systematic review to ascertain if bowel protocols had positive outcomes when implemented in the critically ill patient. The study was conducted to address the question of whether initiating a bowel protocol in the ICU compared to those in control groups with either placebo or no bowel protocol in regards to impacting "constipation, feeding intolerances, and duration of mechanical ventilation" (Oczkowski et al., 2017, p. 719). The participants included those patients who were admitted to ICU, were at least 18 years of age, and patients requiring mechanical ventilation. The data were collected using DistillerSR and were entered into RevMan for analysis. A total of 5,072 articles were found in the initial search but only four eligible RCTs were used for the review. The primary outcomes concluded that there was no statistically significant reduction in constipation, feeding intolerance, and duration of mechanical ventilation with the use of a bowel protocol. The researchers noted the quality of

evidence as low to moderate and was limited due to the small number and size of applicable studies.

A double-blind, prospective, randomized comparison study was conducted by Fushimi et al. (2017) to investigate the effect of two different glutamine supplements on bowel movements in the critically ill elderly patient. One glutamine supplement had slightly higher fiber and electrolyte content that the other. The study included 25 subjects aged at least 75 years of age. Statistical analysis was carried out using the Mann-Whitney test for differences between the two groups and was considered statistically significant. The glutamine supplement with the higher fiber and electrolyte content reported a higher incidence of normal BM consistency as reported by the patient. Although this study did not test the efficacy of laxative type medications, the two types of glutamine supplements did differ in amount of fiber and electrolyte content, which proves to be beneficial for the patient.

Although some of the previous studies discussed did not provide data suggesting improved patient outcomes using bowel protocols, a study conducted by Guardiola et al. (2016) provided positive results using PEG as prophylaxis on day one of mechanical ventilation in ICU. The quasi-experimental study design consisted of three phases: the observational phase, treatment phase, and prophylaxis phase. In the treatment phase, the initiation of PEG was started on day four and was administered every six hours via feeding tube whereas in the prophylaxis phase the same regimen was started on day one. Data were analyzed using SPSS and a $p$ value of 0.05 was considered statistically significant. Sixty-three patients were observed in the observational phase, 70 patients in the prophylaxis phase, and 64 patients in the treatment phase. Clinical data were analyzed, and there was no significant difference in the patients other than age. Failure to pass stool with intermittent PEG administration occurred in 16 out of 64 patients

(25%) in the treatment group versus six out of 70 patients (8.6%) in the prophylaxis group. The time to achieve the first stool was significantly sooner in the prophylaxis group when compared to the treatment group; four days versus seven days ($p < 0.001$). This study shows promising results in preventing constipation in the critically ill patient.

Although data suggest that critically ill patients are at increased risk of constipation, the lack of concrete overwhelmingly positive data is still lacking. Knowles et al. (2013), Oczkowski et al. (2017), and Smith et al. (2018) conducted research studies on the effectiveness of a bowel protocol in the critical phase of care and did not have improved outcomes; however, one study increasing fiber and electrolyte supplements to tube feedings did have positive outcomes (Fushimi et al., 2017). The study conducted by Guardiola et al. (2016), using PEG administration rather than MO medication, proved effective, resulting in significantly less time to pass the first stool after a critical event.

In terms of sample size, a major strength of the studies by Guardiola et al. (2016), Smith et al. (2018) and Knowles et al. (2013) is that they provided a large sample size. However, the study conducted by Knowles et al. (2013) did have some difficulties in changing clinicians' behaviors and attitudes towards bowel protocol implementation and found that some clinicians were not following the protocol at all times. In addition, the study conducted by Fushimi et al. (2017), only recruited 25 participants, and ultimately only 22 patients completed the study which is not an adequate sample size.

## Constipation in Neurosurgical Patients

Neurosurgical patients are patients who have undergone brain and spine surgery or have injury to the brain and spine. This patient population is at risk for constipation for reasons similar to all critically ill patients, in addition, have specific physiological sequela that puts them at a

higher risk. A study conducted by Todd and Woodward (2018) explored the experiences of nurses providing bowel care to patients after spinal cord injury using a qualitative study design. The authors used semi-structured interviews to assess four main areas: (a) unpleasantness of task; (b) perceived patient experience; (c) motivation and avoidance; and (d) barriers to care. Eleven nurses were interviewed, with findings indicating an overwhelming feeling of unpleasantness of per rectum examination to assess for bowel impaction, but the nurses accepted its physiologic need and importance.

The four themes were examined. The majority of the nurses discussed unpleasantness in task and perceived unpleasantness for the patient. The study found that the patients' perceived feelings towards bowel care was extremely important to the nurses. Few nurses expressed avoidance of care secondary to their confidence level in providing adequate bowel care. Several nurses stated that time constraint was a barrier to care due to having limited time for bowel training. There was also an overwhelming expression that training was variable and was a barrier to care. Several nurses expressed that increased knowledge and training would make the whole process of bowel care easier to manage.

## Bowel Protocol Implementation

Many researchers agree that attention to bowel issues is often neglected in the hospitalized patients, especially in the critical care setting where there are other more acute problems (Oczkowski et al., 2017; Ross-Adjie et al., 2015; Smith et al., 2018). The development of a uniformed bowel regimen for all hospitalized patients would be ideal. A reasonable number of studies have evaluated the effectiveness of bowel protocols on surgical and critically ill patients; however, some of those studies did not have statistically significant decreases in constipation or length of stay when comparing no protocol to uniformed protocols (Knowles et

al., 2013; Rhodes et al., 2016). For instance, the study by Knowles et al. (2013) used a stool softener plus stimulant on day one, while the study by Rhodes et al. (2016) used PEG in one group versus MO in the other and saw no significant positive outcome. On the other hand, there have been studies that have shown positive results with the implementation of a uniform bowel protocol and have shown less time to return to normal bowel function and slight decreases in length of stay (Fushimi et al., 2017; Guardiola et al., 2016; Ockowski et al., 2017; Ross-Adjie et al., 2015). One study implementing tube feeds with higher concentration of fiber and electrolyte showed decreased incidence of stool hardening in the elderly patient recovering from acute illness (Fushimi et al., 2017).

**Gaps in Literature**

The major gaps in literature seen throughout these studies is need for increased education regarding constipation and lack of clinician and patient compliance. The study conducted by Houghton et al. (2014) illustrates the real need to improve multidisciplinary collaboration between hospital multidisciplinary team and the primary care team in the prevention of constipation while the qualitative study conducted by Todd and Woodward (2018), noted that there is an avoidance of bowel care in a few of the nurses interviewed. The study also concluded that there is a lack of uniformed training on bowel assessment and intervention techniques (Todd & Woodward, 2018).

Compliance can be an issue when presenting a new practice on the part of the patient or the clinician. The study conducted by Knowles et al. (2013) revealed that some clinicians were resistant to change. In addition, the study conducted by Rhodes et al. (2016), showed a decreased compliance with PEG due to preparation method. Increasing patient compliance and protocol adherence is an area that needs to be focused on. Nurse and clinician attitudes and

feelings about constipation and implementation of new or different bowel protocols are also areas that need to be addressed in future research.

## Summary

Constipation is a problem that affects many people. The occurrence of constipation occurs more frequently in those people who are hospitalized. Patients who are suffering from neurosurgical problems are even at higher risk for developing constipation due to immobility, decreased level of consciousness, increased opioid use, and other contributing factors. Many of these patients are admitted to the ICU, and many patients are placed on mechanical ventilation for an extended amount of time. There is limited data available on preventing constipation in the neurosurgical patient; however, there are several up-to-date studies available on prevention strategies for constipation in the critically ill patient and these results can easily be applied to the neurosurgical patient in most instances. After reviewing the literature, further research is needed using bowel protocols in the critically ill patient, and more specifically, the neurosurgical patient.

# Chapter 3: Methods

Constipation is an issue for many hospitalized patients; however, it is especially prevalent in the neurosurgical patient due to prolonged bedrest, physical limitations, inability to self- feed, among many other reasons. Implementing prevention strategies early in the admission process will not only bring comfort to the patients but will also prevent complications such as extended hospital length of stay, emergency room visits related to constipation, and increased readmission rates related to altered bowel function. According to Peng, Liang, Sibbritt, and Adams (2016), constipation is an economic burden not only to hospital systems, but it also contributes to the financial burden of patient finances related to medications, hospital visits, and primary care visits every year.

The purpose of this evidence-based practice education intervention was to improve neurosurgical health providers' knowledge and attitudes on constipation prevention in pre- and post-operative neurosurgical patients.

## Project Design

This quality improvement project utilized a pre-test and post-test survey design to measure the knowledge and attitudes of physicians, APRNs and nurses towards the management of neurosurgical patients with constipation. An additional component of the DNP project incorporated conducting a retrospective review of all patients admitted to the neurosurgical service within an 8-week period to evaluate the extent of constipation and constipation- related issues. After the education session was completed, a prospective chart review was completed to evaluate if the education session led to decreased incidence of constipation and complications from constipation. The outcomes were then assessed to provide the data necessary to evaluate if

the education session decreased constipation and constipation- related issues in the neurosurgical patient.

## Instrumentation

In addition to the demographic survey (Appendix E), the participants were asked to complete the *Knowledge and Attitudes Towards Constipation Survey,* which was adapted from the *Knowledge and Theory of Planned Behaviour (TPB) Survey* created by Knowles et al. (2013) (Appendix F). The demographic survey consisted of six questions, and the *Knowledge and Attitudes Towards Constipation Survey* consists of 37 questions. It was estimated that the completion of the paper survey would take approximately 15 minutes.

The demographic survey provided information about the characteristics of the participants of physicians, APRNs and RNs who work with patients in the neurosurgical ICU and neuro-medical floor. The survey consisted of six questions that were designed to gather information about the participants.

The survey tool that was used to evaluate the physicians', APRNs', and nurses' attitudes and knowledge about constipation is adapted from the *Knowledge and Theory of Planned Behaviour (TPB) Survey* created by Knowles et al. (2015) and was used in a similar study evaluating nurses before and after a bowel regimen implementation program. The tool is considered internally consistent and reliable with a Cronbach's alpha coefficient of 0.7, which is considered acceptable (Knowles et al., 2015). Permission was granted by Knowles et al. (2015) to adopt and adapt the TPB survey to use in this DNP project. See Appendix G for evidence of the author's authorization. The survey instrument contains 37 questions. The survey contains three sections. Section one was designed to test the knowledge of bowel management in the neurosurgical patient. This section contains 11 questions. Questions one through 10 require true

and false responses, and question 11 has multiple choice options. Section two was designed to test the knowledge and attitudes of the participants regarding assessing the bowel function of the neurosurgical patient. This section has 17 questions and uses a seven-point Likert scale. Section three is designed to test the knowledge and attitudes regarding the physicians', APRNs', and nurses' roles and responsibilities in relation to bowel management in the neurosurgical patient.

Following the pre-test survey, a 30- minute education session was presented to the physicians, APRNs, and RNs in the neurosurgical ICU and neuro-medical floor on the management of neurosurgical patients with constipation. The education training sessions were to take place at 7:30 am and at 7:30 pm from Monday through Friday for two consecutive weeks to ensure the participants have an opportunity to attend. A post-test survey after the educational training session was then conducted to determine the knowledge gained and the change of attitudes of the physicians, APRNs, and nurses towards the management of neurosurgical patients with constipation.

## Setting

The specific location for this DNP project encompassed the patients in the inpatient sector at a large public, non-profit hospital in South Florida, who were admitted for a neurosurgical issue. The community hospital is a 1014- bed institution that cares for many diverse illnesses. It includes an ICU dedicated to neurosurgical patients on the second floor that has 24 available beds, and a neuro-medical unit on the seventh floor has 44 beds available for neurosurgical patients. This location was chosen as the quality improvement project site because this site cares for a large number of neurosurgical patients and is a level one trauma center.

## Participants

The neurosurgeons, neurosurgical APRNs, and the RNs participated in the pre- and post-surveys evaluating knowledge and attitudes towards constipation in the neurosurgical patient. The nurses in the neurosurgical ICU and neuro-medical floor had nurses with varying years of experience from less than one year to over 30 years of experience. The physicians consisted of neurosurgeons with one to 32 years of neurosurgical experience. The APRNs were neurosurgically trained and had one to five years' experience.

### Sample Size

At the time of the implementation of the project, there were 60 staff nurses between the neurosurgical ICU and neuro-medical floor. There were seven neurosurgeons and six neurosurgical APRNs. The sample size for participants who took part in the education training program was 50 and the participants were recruited by convenience sampling. A power of analysis was calculated using a population of 60, confidence level of 95%, and margin of error of 5%, which revealed an ideal sample size of 50. The study population was considered sufficient to provide reliable means and standard deviations.

Convenience sampling was used to identify potential charts for retrospective and prospective chart reviews. According to Emerson (2015), convenience sampling is a method that researchers use that adopts nonrandom sampling in which participants are chosen based on those that fit criteria of the investigation. The projected sample size of the retrospective and prospective chart review was 30 charts.

**Inclusion Criteria**

The inclusion criteria for the participants who participated in the pre- and post-test survey included all staff nurses, neurosurgeons, and neurosurgical nurse practitioners that care for neurosurgical patients in the neurosurgical ICU or the neuro-medical floor.

The inclusion criteria for the retrospective and prospective chart reviews consisted of those patients diagnosed with a neurosurgical problem who are at least 18 years of age. The patient must have a length of stay of at least three days.

**Exclusion Criteria**

Nurses were excluded from the education session if they were not staff nurses such as per diem, staff relief, and/or float nurses as their schedules vary and they may not be available to participate. RNs, neurosurgeons, and neurosurgical APRNs that were on vacation were excluded from participating in the DNP project.

Patients' charts were excluded from the retrospective and prospective chart reviews if they had gastrointestinal issues such as recent gastrointestinal surgery, gastrointestinal perforation, gastrointestinal obstruction or ileus, diarrhea, or unable to tolerate oral or tube feeding intake. Patient's charts were excluded if they were less than 18 years of age. Patients' charts were excluded for review if there were strict orders for nothing by mouth (NPO) for more than three days during the hospital admission. Finally, patients' charts were excluded if they were unidentified, such as an unknown traumatic injured patient.

**Recruitment Process**

The first part of the DNP project incorporated the recruitment of nursing staff, neurosurgeons, and neurosurgical nurse practitioners to participate in the education sessions. Flyers were placed throughout the ICU, neuro-medical floor, and the Office of Neurosurgery

with dates and times of education sessions (see Appendix H). The education sessions were open to all RNs in the neurosurgical ICU and neuro-medical floor as well as the neurosurgeons and neurosurgical APRNs. There was no monetary compensation for participation in this DNP project; however, 1.0 continuing education unit (CEU) hour was provided for the RNs and APRNs through the nursing education department in the hospital. Offering CEU hours for nurses is one way to improve participation.

There was no recruitment needed for the retrospective and prospective chart reviews. The charts of the patients that met inclusion and exclusion criteria were evaluated. After the education session, the prospective chart review began.

## Data Analysis

The International Business Machines (IBM) Statistical Package for the Social Sciences (SPSS) software, version 26, was used to analyze all the data. The outcomes that were assessed for the provider education portion were differences in knowledge and change in attitudes regarding constipation before and after the education session. The outcomes that were evaluated during the retrospective and prospective chart reviews were the differences in constipation rates, phone encounters related to constipation, length of hospital stay, number of emergency room visits, and readmissions related to constipation.

### Descriptive Statistics

In the DNP project, constipation was evaluated using descriptive analysis to assess the mean rate of constipation in the retrospective and prospective groups. Descriptive statistics were also used to evaluate the mean length of hospital stay, mean number of phone encounters regarding constipation, mean number of emergency room visits, and mean rate of readmissions related to constipation between the two groups. Descriptive analysis was used to evaluate the

demographic data of the RNs, neurosurgeons, and APRNs, which evaluated the gender and age groups of the participants, as well as highest level of education and number of years caring for neurosurgical patients in addition to the total number of years practicing with the participants current license.

### Inferential Statistics

An independent *t*-test was conducted to compare hospital length of stay, emergency room visits, and readmission rates between the retrospective and prospective groups. A *p*-value of less than 0.05 was considered statistically significant. Inferences from this data were used to determine if the education sessions could lead to decreased constipation and complications in other populations, other than the neurosurgical patient. The providers' knowledge and attitudes in the pre-test and post-test survey were analyzed using a paired *t*-test.

## Ethical Considerations

The DNP project adhered to all ethical and legal principles. All policies for protection of human subjects mandated by Nova Southeastern University Institutional Review Board (IRB) were followed. All information obtained for this DNP project was compliant with HIPAA regulations. No identifiable information was used during the data collection process.

## Confidentiality

One of the most important aspects of data protection is confidentiality. According to Huser and Shmueli-Blumberg (2018), HIPAA protects most personal identifiable data retrieved from medical records used in clinical trials. Safeguarding identifiable information that the participants are entrusting the researchers with is of utmost importance. One specific way confidentiality was maintained included replacing medical record numbers with randomly produced numerical values, and the document containing the medical records and study

identifying number was locked in the researcher's office in a locked filing cabinet that only the researcher had access to. According to Turcotte-Tremblay and McSween-Cadieux (2018), disregard for confidentiality could be detrimental to participants, inhibit the relationship of trustworthiness between the participant and researcher, and can impair the reputation of the parties involved.

## Fidelity

Another way to provide protection of research participants is by ensuring fidelity. Feely, Seay, Lanier, Auslander, and Kohl (2018), defined fidelity in research as implementing the project the way it was intended and to perform the project in a trustworthy fashion. According to Dewing et al. (2013), a failure of fidelity is a prominent challenge in practice settings where evidence-based interventions are transplanted into quality improvement projects. To safeguard participants, the DNP project mimicked research projects that have had positive outcomes in similar clinical settings. The survey tool was derived from the studies conducted by Knowles et al. (2013) and Smith et al. (2018) and uses aspects of educational training sessions as these two studies provided good outcomes in similar patient populations.

## Beneficence

According to Giles, De Lacey, and Muir-Cochrane (2018), beneficence means to "maximize benefits while minimizing potential harm" (p. 1215). The DNP project promoted the improvement of bowel function and prevention of constipation by increasing knowledge and attitudes of nurses and providers regarding constipation. The education sessions encouraged nurses and providers to advocate for their patients in regards to constipation prevention.

## Non-Maleficence

Beneficence and non-maleficence can be difficult to distinguish. The major difference, according to Esposito (2017), is that beneficence implores the healthcare professional to help others, whereas non-maleficence urges the caretaker to not cause harm. The two principles should work hand in hand to promote positive outcomes for the patient. All participants were assured that they had the right to withdraw from the DNP project at any time. To provide full disclosure of all aspects of the project, a cover letter and consent form (Appendix A) were provided and read by each participant and reiterated the project process and purpose.

## Risk Versus Benefit

The risks and benefits of the project should be assumed and laid out for the participants before they sign consent. According to Gopichandran et al. (2016), it may be difficult to define to what extent individuals should be subjected to risk for the benefit of others, but it is the responsibility of the researcher to expose all potential risks and allow the participant to decide if they want to participate.

The DNP project had minimal risk to the participant other than the loss of confidentiality. The benefit to patients included decreased pain from constipation or bowel obstruction, increased comfort during the patient's hospitalization, decreased length of hospitalization, and decreased readmissions and emergency room visits. The benefit of decreased cost to the patient and the healthcare system were related to decreased length of hospitalization, decreased readmission rates and decreased emergency room visits related to constipation.

## Risk Minimization Plan

Although the participants in the DNP project were exposed to minimal risk, it was still important to provide a plan to minimize risk to potential participants. The plan included the use of strict exclusion and inclusion criteria.

## Data Storage

The providers surveys were scanned into the researcher's computer which was protected by a six-digit password log-in code. The paper survey was stored in a locked filing cabinet in the researcher's office with the researcher having the only accessible key. The data from the survey were inputted into IBM SPSS for data analysis, which is located on the secured computer in the researcher's home office. The patient data was secured in a similar fashion with no identifiable information collected. The patients' names were not used. The patients were assigned a random number for identification purposes. All unidentifiable information was uploaded to IBM SPSS for data analysis and stored in the same filing cabinet in the researcher's home.

## Project Phases/Objectives

The Doctor of Nursing Practice (DNP) project was guided by the following:

**Objective 1:** Conduct a pre-test survey to determine the knowledge and attitudes of neurosurgeons, neurosurgical nurse practitioners, and nurses towards the management of constipation in the neurosurgical patient.

After IRB approval was obtained, the first phase of the quality improvement DNP project began. The first phase started in May 2019 and consisted of providing the RNs, neurosurgeons, and neurosurgical APRNs with a pre-test to determine the knowledge and attitudes of the participants towards constipation in the neurosurgical patient. The data collected from the surveys was uploaded into IBMs SPSS program version 26. Those participants were then

educated by the DNP student on the subject. After the 30- minute education session, the participants were provided with a post-test survey to evaluate knowledge regarding bowel management practices in the neurosurgical patient, knowledge on performing a proper assessment of bowel function in the neurosurgical patient and the providers' roles and responsibility in relation to bowel management practices for the neurosurgical patient. The pre-test results were uploaded into IBMs SPSS program version 26 to be used with the post-test survey results to determine the mean difference before and after the education session.

**Objective 2:** Conduct a retrospective chart review of all patients admitted under the neurosurgical service.

The charts of all neurosurgical patients who were admitted to the hospital in the previous eight weeks were evaluated for evidence of constipation, length of hospital stay, telephone encounters related to constipation, number of subsequent emergency room visits, and readmission rates. Data were uploaded in IBMs SPSS software version 26 to be used for statistical analysis with the prospective chart review.

**Objective 3:** Develop a training program about constipation and its effects on the neurosurgical patient using a PowerPoint presentation.

An education program was developed using Microsoft PowerPoint program on the importance of bowel assessment and management in the hospitalized patient, complications of constipation, and case studies exemplifying the complications that can occur without proper bowel management prevention tactics in place.

**Objective 4:** Educate neurosurgeons, neurosurgical nurse practitioners, and registered nursing staff in the neurosurgical ICU and neurosurgical medical floor on the management of neurosurgical patients with constipation.

The neurosurgeons, APRNs and nurses who participated in the pre-test survey were then educated by the DNP student on the importance of bowel management in the hospitalized patient, complications of constipation, and case studies exemplifying the complications that can occur without proper bowel management prevention tactics in place. The information was disseminated using the PowerPoint program.

**Objective 5:** Conduct a post-test survey after the educational training sessions to determine the knowledge gained and attitudes of providers towards the management of neurosurgical patients with constipation.

The providers who participated in the pre-test survey and attended the training session were given the post-test survey to determine the knowledge gained from the educational training session. The data collected were added to IBM SPSS version 26. A paired *t*-test was used to analyze for differences in pre-test and post-test data.

**Objective 6:** Conduct a prospective chart review of the patients admitted under the neurosurgical service.

The charts of 30 neurosurgical patients who were admitted to the hospital in the subsequent eight weeks after the training session were evaluated for evidence of constipation, length of hospital stay, number of phone encounters related to constipation, number of subsequent emergency room visits, and readmission rates. Data were uploaded in IBMs SPSS software version 26 for statistical analysis which was compared to the retrospective group.

**Objective 7:** Measure the outcomes of the education session.

The retrospective patient data was compared to the prospective chart review group data using IBM SPSS. Rate of constipation, length of hospital stay, number of phone encounters, number of subsequent emergency room visits, and readmission rates were calculated using

descriptive statistics to find mean values for both the retrospective and prospective groups. An independent *t*-test was used to compare hospital length of stay, number of phone encounters, emergency room visits, and readmission rates between the two groups. A *p*-value of less than 0.05 was considered statistically significant.

**Objective 8:** Disseminate the findings to the stakeholders.

The findings from the provider pre- and post- test surveys and the patient data were presented to the stakeholders including the neurosurgeons, neurosurgical nurse practitioners, trauma team, and critical care teams.

## Timeline

The time required to educate all 50 participants including neurosurgeons, neurosurgical APRNs and RNs regarding their knowledge and attitudes towards constipation in the neurosurgical patient was two weeks. This amount of time was sufficient to provide pre- and post-test surveys and education sessions to all participants working in the neuro ICU and the neuro-medical floor. Each survey took no more than 15 minutes to complete and the education session lasted approximately 30 minutes.

The retrospective review evaluate 30 inpatient neurosurgical patients in the previous eight week period and evaluated for constipation and constipation related complications in the neurosurgical patient. The prospective charts were reviewed for eight weeks. The data were collected daily during this phase.

## Budget

The DNP project required an expenditure of $489.16. That value was derived from the necessity of two technological systems including IBMs SPSS software version 26 and Microsoft Office package including PowerPoint and Word. In addition, paper and pens were required to

provide the pre- and post-surveys for the participants. The cost of travel to and from the intervention hospital is also included in the budget proposal. In addition, food incentives were used as a way to increase participation. See Table 1 for projected project budget.

Table 1

*Budget Proposal*

| Item | Quantity | Cost |
|---|---|---|
| Microsoft Office Package | 1 | $100 |
| IBM SPSS | 1 | $35 |
| Copy Paper | 8 ream case (#4,100) | $37 |
| Pens | 1 bulk package (#144) | $14 |
| Travel | | $200 |
| Mini Donuts | 100 | $80 |
| Subtotal | | $386 |
| Tax | | $23.16 |
| Total | | $489.16 |

## Site Support

The Chief Medical Research Officer within the Office of Human Research at the intervention hospital worked closely with the researcher and stakeholders to assist in the development of a project that could be feasible and improve quality of care for patients. The necessary steps including background check, immunization requirements, and proof of licensure were all provided via Complio.com as required by the intervention hospital.

## Outcome Measures

The outcomes for this DNP project were evaluated using the following measures:

**Outcome 1:** Conduct a pre-test survey to determine the knowledge and attitudes of neurosurgeons, neurosurgical APRNs, and nurses towards the management of constipation in the neurosurgical patient. This objective was measured by providing the participants with an adapted version of the *TPB survey* created by Knowles et al. (2015) which evaluated the baseline knowledge and attitudes of the participants towards constipation in the neurosurgical patient.

**Outcome 2:** Conduct a retrospective chart review of all patients admitted under the neurosurgical service. This outcome was measured by reviewing all neurosurgical cases in an eight week period to determine the number of neurosurgical patients with constipation, the number of days added to the patient's hospital stay related to complications of constipation, the number of phone encounters related to constipation, emergency room visits related to constipation and readmission rates related to constipation in the neurosurgical patient.

**Outcome 3:** Develop a training program about constipation and its effects on the neurosurgical patient using a PowerPoint presentation. This outcome was measured by creating an educational program for the neurosurgeons, neurosurgical APRNs, and RNs that highlighted the importance of bowel management in the neurosurgical patient, complications of constipation, and case studies presenting the complications that can occur without proper bowel management strategies in place.

**Outcome 4:** Educate the neurosurgeons, neurosurgical APRNs, and registered nursing staff in the neurosurgical ICU and neurosurgical medical floor on the management of neurosurgical patients with constipation. This outcome was measured by educating at least 50 nurses and providers on the importance of bowel management in the neurosurgical patient, complications of

constipation, and case studies presenting the complications that can occur without proper bowel management strategies in place using the PowerPoint presentation.

**Outcome 5:** Conduct a post-test survey after the educational training sessions to determine the knowledge gained and attitudes of neurosurgeons, neurosurgical APRNs and nurses towards the management of neurosurgical patients with constipation. This outcome was measured by providing the participants with the post-test survey to determine if there is an increase in knowledge and a change in attitudes towards constipation in the neurosurgical patient. A paired *t*-test was used to analyze the difference in the pre-test and post-test surveys.

**Outcome 6:** Conduct a prospective chart review of the patients admitted under the neurosurgical service. This outcome was measured collecting data to determine evidence of constipation, length of hospital stay, number of phone encounters related to constipation, number of subsequent emergency room visits, and readmission rates. The data was uploaded into IBMs SPSS system version 26.

**Outcome 7:** Measure the outcomes of the education session. This outcome was measured by using an independent *t*-test to compare hospital length of stay, emergency room visits, and re-admission rates between the two groups.

**Outcome 8:** Disseminate the findings to the stakeholders. This outcome was met by providing the stakeholders with findings from the participants and chart reviews.

## Summary

Although data suggests that critically ill patients are at increased risk of constipation, the lack of concrete overwhelmingly positive data is still lacking. Many researchers agree that attention to bowel issues is often neglected in the hospitalized patient, especially in the critical care setting where there are other more acute problems (Oczkowski et al., 2017; Ross-Adjie et

al., 2015; Smith et al., 2018). The goal of the project was to decrease constipation in the neurosurgical patient in anticipation of decreasing hospital length of stay, emergency room visits, and readmission rates secondary to constipation by improving the knowledge and attitudes of nurses and providers regarding constipation in the neurosurgical patient.

## Chapter Four: Results and Discussion

Even though constipation prevention strategies exist in hospital settings, there have been challenges in the setting of acutely ill patients. Neurosurgical patients are at an increased risk for constipation. The neurosurgical patient is one that has sustained traumatic injuries to the spine or brain, sustained spontaneous intracranial hemorrhages, or those who have undergone elective brain and spine surgery. Many traumatic neurosurgical patients have other injuries aside from the brain and spine injury. The neurosurgical patient is often bedridden for extended periods, which leads to an increased risk for many acquired issues including constipation (Su Fee Lim & Childs, 2013). Educating providers, including RNs, neurosurgical APRNs, and neurosurgeons, on the prevention and management of constipation in neurosurgical patients may have positive outcomes for patients, the hospital system, and nursing practice. The purpose of this chapter is to describe the outcomes of the DNP project as well as its implications for nursing practice according to the DNP Essentials.

### Participant Demographics

The participants of the DNP project included RNs, APRNs, and neurosurgeons who care for neurosurgical patients. There were 51 participants ($N = 51$) which included RNs, APRNs, and neurosurgeons (see Table 2). There were 39 female participants ($n = 39$) and 12 male participants ($n = 12$). Eighteen percent of the participants were ages 20-29 years old, 35% were 30-39 years old, 24% were 40-49 years old, 20% were 50-59 years old, and 4% were 60-69 years old. Of the 51 participants, RNs accounted for 75% ($n = 38$), 18% ($n = 9$) were APRNs, and 7% ($n = 4$) were physicians. Years of experience ranged from one year to 34 years. Ninety-two percent of the participants were full-time employees of the hospital, while 8% were part-time employees.

Table 2.

*Demographic Composition of Sample*

| | *n* | % |
|---|---|---|
| **Gender** (*N*=51) | | |
| Female | 39 | 76.5 |
| Male | 12 | 23.6 |
| **Age Range** | | |
| 20-29 years | 9 | 17.6 |
| 30-39 years | 18 | 35.3 |
| 40-49 years | 12 | 23.5 |
| 50-59 years | 10 | 19.6 |
| 60-69 years | 2 | 3.9 |
| **Education** | | |
| RN | 38 | 74.5 |
| APRN | 9 | 17.6 |
| MD/DO | 4 | 7.8 |
| **Employment Status** | | |
| Full-time | 47 | 92.1 |
| Part-time | 4 | 7.8 |

## Expected Outcomes

The DNP project was guided by the following objectives:

### Objective 1

Conduct a pre-test survey to determine the knowledge and attitudes of neurosurgeons, neurosurgical nurse practitioners, and nurses towards the management of constipation in the neurosurgical patient.

### Objective 2

Conduct a retrospective chart review of patients admitted under the neurosurgical service.

**Objective 3**

Develop a training program about constipation and its effects on the neurosurgical patient using a PowerPoint presentation.

**Objective 4**

Educate neurosurgeons, neurosurgical nurse practitioners, and registered nursing staff in the neurosurgical intensive care unit (ICU) and neurosurgical medical floor on the management of neurosurgical patients with constipation.

**Objective 5**

Conduct a post-test survey after the educational training sessions to determine the knowledge gained and change in attitudes of providers towards the management of neurosurgical patients with constipation.

**Objective 6**

Conduct a prospective chart review of the patients admitted under the neurosurgical service.

**Objective 7**

Measure the outcomes of the patient data to determine if the education session had an effect on patient outcomes.

**Objective 8**

Disseminate the findings to the stakeholders.

## Evaluation of Outcomes

The following project objectives were met throughout the implementation phase and will be comprehensively discussed.

**Objective 1**

Conduct a pre-test survey to determine the knowledge and attitudes of neurosurgeons, neurosurgical nurse practitioners, and nurses towards the management of constipation in the neurosurgical patient.

**Outcome.** This objective was met by providing the participants with a pre-test survey, *Knowledge and Attitudes Towards Constipation Survey*, which was adapted from the *Knowledge and Theory of Planned Behaviour (TPB) Survey* created by Knowles et al. (2013). The survey consisted of three sections. Each participant was given a number which matched the post-test survey answer sheet. Section one consisted of 11 questions that evaluated the participants' knowledge of bowel management in the neurosurgical patient. Section two consisted of 17 questions that evaluated the attitudes towards the management of constipation in the neurosurgical patient. This section used a seven-point Likert scale. Section three consisted of eight multiple choice questions that evaluated the participants' knowledge of their roles and responsibilities in relation to bowel management in the neurosurgical patient. The average time for each survey to be completed was 14 minutes.

**Objective 2**

Conduct a retrospective chart review of patients admitted under the neurosurgical service.

**Outcome.** The charts of 30 neurosurgical patients previously admitted to the hospital, prior to the implementation phase of the project, were evaluated for length of stay, the number of days without bowel movements, whether discharge was positively or negatively affected by constipation, the number of telephone encounters that the neurosurgery service experienced related to constipation after discharge, emergency room visits after discharge, and readmissions

to the hospital related to constipation. This data was uploaded into IBM SSPS software version 26 to be compared with the findings from the prospective patient data set.

**Objective 3**

Develop a training program about constipation and its effects on the neurosurgical patient using a PowerPoint presentation.

**Outcome.** This objective was met by developing an educational training program using Microsoft PowerPoint on the importance of bowel management strategies in the hospitalized neurosurgical patient, complications of constipation, and case studies exemplifying the complications that can occur without proper bowel management prevention tactics in place. After performing an extensive literature review of current journal articles on the subject, the PowerPoint presentation was developed and approved by multiple stakeholders including the neurosurgeons, the nursing education department of the institution, the nurse managers, and the nurse educators of the neurosurgical ICU and the neurosurgical medical floor. The presentation consisted of 23 slides that provided an in-depth overview of the definition and causes of constipation, constipation statistics, signs and symptoms of constipation, gastrointestinal assessment, complications of untreated constipation, diagnostic tests to evaluate for constipation, and various treatment options.

**Objective 4**

Educate neurosurgeons, neurosurgical nurse practitioners, and registered nursing staff in the neurosurgical ICU and neurosurgical medical floor on the management of neurosurgical patients with constipation.

**Outcome.** This outcome was met. The participants were educated using the Microsoft PowerPoint presentation. The training sessions ranged from 27 minutes to 35 minutes in length

depending on the number of questions that were asked by the participants. Initially, the training session date and times were posted in break rooms and throughout the hospital units and the neurosurgery office. However, the first two scheduled training sessions did not produce an adequate number of participants. The participants reported that it was inconvenient to come to work an hour early or stay an hour late before or after their shift. Educating throughout the units during the participants' shifts vastly improved participation rate. This was accomplished by educating small groups of individuals throughout the day and night shift. In addition to 1.0 CEU provided by the education department of the hospital, mini doughnuts were provided as an incentive.

**Objective 5**

Conduct a post-test survey after the educational training sessions to determine the knowledge gained and change in attitudes of providers towards the management of neurosurgical patients with constipation.

**Outcome.** This outcome was met. The participants were given the *Knowledge and Attitudes Towards Constipation* post-test, which was comprised of the same questions as the pre-test in order to determine the knowledge gained and the change in attitudes from the educational training session. Each participant was given the survey with their assigned identifier. The average time for completion of the post-test survey was 12 minutes.

**Section 1: Knowledge of Bowel Management**

Section one of the pre- and post-survey evaluated if the education session increased the participants' knowledge regarding bowel management in the neurosurgical patient. A paired sample *t*-test was conducted to determine if there was an improvement in participant knowledge before and after the education session (see Table 3). The mean pre-survey score was 12.43 (*SD*

2.34) and the mean post survey score was 16.24 (*SD* 1.12). The interims of knowledge mean score was 3.80 (*SD* 2.44) with a *p* value of 0.000.

Table 3.

*Section 1 Grouped Comparative Mean Knowledge Regarding Bowel Management Paired T-test*

| | Mean | SD | *t* | *df* | Significance* |
|---|---|---|---|---|---|
| Pre-Training | 12.43 | 2.34 | 11.13 | 50 | 0.000 |
| Post-Training | 16.24 | 1.12 | | | |

*Note.* SD = standard deviation, *2-tailed, *$p \leq 0.05$

**Section 2: Attitudes Towards Management of Constipation**

Section two of the pre- and post-survey evaluated if the education session changed the participants' attitudes towards the management of constipation in the neurosurgical patient. This section used a seven-point Likert scale that ranged from one (strongly agree) to seven (strongly disagree) as adapted from the *Knowledge and Theory of Planned Behaviour (TPB) Survey* created by Knowles et al. (2015). A paired sample *t*-test was used to determine the group comparative mean of attitudes scores regarding the management of constipation in the neurosurgical patient (see table 4). The mean pre-training score was 2.96 with a *SD* of 1.80 and a post-training score of 2.74 with a *SD* of 1.84. The p- value was 0.268, which does not indicate statistically significant difference from pre to post training. Due to the outcome in the analysis and the lack of improvement in attitudes, a paired sample *t*-test was conducted, and each pre-survey question was compared with the corresponding question in the post-survey. Of the 17 questions, only three questions demonstrated a statistically significant improvement in attitudes towards management of constipation (see Table 5). Question nine evaluated if the participant plans to perform an assessment of bowel function on a neurosurgical patient at least once in a 12-hour shift for the duration of the admission. For question nine, the mean score of the participants

prior to the education session was 1.98 with a *SD* of 1.85 compared to a mean of 1.55 with a *SD* of 1.43 after the education session. There was a mean improvement in attitudes of 0.43 with a *SD* of 1.40 with a *p*- value of 0.03. Question 13 evaluated if the participants felt social pressures from professional colleagues to perform rectal exams on neurosurgical patients. For this question, the mean score of the participants prior to the education session was 5.59 with a *SD* of 1.69 compared to a mean of 4.67 with a *SD* of 2.54 after the education session. There was a mean improvement in attitudes of 1.02 with a *SD* of 2.42 with a *p*- value of 0.004. Question 16 assessed the participants' attitudes regarding performing a rectal exam on the neurosurgical patient. This question had five subcategories that included questions to evaluate if the rectal exam was (a) good practice, (b) helpful, (c) necessary, (d) satisfying, and (e) very easy. For question 16, the mean score of the participants prior to the education session was 3.36 with a *SD* of 2.03 compared to a mean score of 2.68 with a *SD* of 1.75 in the post-education group. For this question, there was an overall mean improvement in attitudes of 0.68 with a *SD* of 1.54 with a *p*-value of 0.004.

Table 4.

*Section 2 Grouped Comparative Attitude Question Means*

| | Mean | SD | *t* | *df* | Significance* |
|---|---|---|---|---|---|
| Pre-Training | 2.96 | 1.80 | 0.89 | 50 | 0.268 |
| Post-Training | 2.74 | 1.84 | | | |

*Note.* SD = standard deviation, *2-tailed, *$p \geq 0.05$, Likert scale= 1(strongly agree) to 7 (strongly disagree)

Table 5.

*Section 2 Grouped Comparative Attitude Question Means of Individual Questions*

| **Attitude Questions (*N* = 51)** | **Mean** | **SD** | ***t*** | ***df*** | **Sig.*** |
|---|---|---|---|---|---|
| **Question #1**<br>Of your last 10 patients, how many have you performed a GI assessment?<br>**Pre-Training**<br>**Post-Training** | 8.31<br>8.22 | 2.94<br>3.23 | 0.32 | 50 | 0.749 |
| **Question #2**<br>Social pressure from colleagues to perform assessment of bowel function**.**<br>**Pre-Training**<br>**Post-Training** | 4.69<br>3.98 | 2.25<br>2.29 | 1.73 | 50 | 0.090 |
| **Question #3**<br>I have complete control over performing a bowel assessment<br>**Pre-Training**<br>**Post-Training** | 1.94<br>1.84 | 1.56<br>1.39 | 0.65 | 50 | 0.520 |
| **Question #4**<br>I intend to perform a bowel assessment at least once a shift<br>**Pre-Training**<br>**Post-Training** | 1.84<br>1.73 | 1.76<br>1.51 | 0.80 | 50 | 0.428 |
| **Question #5a**<br>In my opinion, an assessment of bowel function is good practice<br>**Pre-Training**<br>**Post-Training** | 1.31<br>1.33 | 1.03<br>1.01 | -0.22 | 50 | 0.830 |
| **Question #5b**<br>In my opinion, an assessment of bowel function is helpful<br>**Pre-Training**<br>**Post-Training** | 1.25<br>1.43 | 0.89<br>1.08 | -1.93 | 50 | 0.060 |

| | | | | | |
|---|---|---|---|---|---|
| **Question #5c**<br>In my opinion, an assessment of bowel function is necessary<br>**Pre-Training**<br>**Post-Training** | 1.27<br>1.39 | 0.90<br>1.10 | -1.35 | 50 | 0.182 |
| **Question #5d**<br>In my opinion, an assessment of bowel function is satisfying<br>**Pre-Training**<br>**Post-Training** | 2.04<br>1.86 | 1.83<br>1.47 | 1.24 | 50 | 0.220 |
| **Question #5e**<br>In my opinion, an assessment of bowel function is very easy<br>**Pre-Training**<br>**Post-Training** | 1.57<br>1.41 | 0.80 | 1.38 | 50 | 0.172 |
| **Question #6**<br>I will perform a bowel assessment at least once a shift<br>**Pre-Training**<br>**Post-Training** | 1.86<br>1.65 | 1.82<br>1.68 | 1.06 | 50 | 0.297 |
| **Question #7**<br>There are factors outside of my control that prevent me from performing bowel assessment<br>**Pre-Training**<br>**Post-Training** | 5.06<br>4.57 | 2.31<br>2.56 | 1.47 | 50 | 0.147 |
| **Question #8**<br>People who are important to me professionally, think that I should perform a bowel assessment<br>**Pre-Training**<br>**Post-Training** | 1.88<br>2.24 | 1.48<br>1.90 | -1.66 | 50 | 0.104 |
| **Question #9**<br>I plan to perform an assessment of bowel function at least once a shift<br>**Pre-Training**<br>**Post-Training** | 1.55<br>1.98 | 1.43<br>1.85 | -2.20 | 50 | 0.033* |

| | | | | | |
|---|---|---|---|---|---|
| **Question #10**<br>I am confident knowing when my patient needs a bowel assessment<br>**Pre-Training**<br>**Post-Training** | 1.84<br>1.71 | 1.42<br>1.54 | 0.66 | 50 | 0.512 |
| **Question #11**<br>My colleagues think I should perform a bowel assessment at least once a shift<br>**Pre-Training**<br>**Post-Training** | 2.14<br>2.14 | 1.73<br>1.93 | 0.00 | 50 | 1.000 |
| **Question #12**<br>Of your last 10 patients, how many have you performed a PR exam?<br>**Pre-Training**<br>**Post-Training** | 1.45<br>2.12 | 2.40<br>2.97 | -1.38 | 50 | 0.172 |
| **Question #13**<br>I feel social pressure to perform PR exam<br>**Pre-Training**<br>**Post-Training** | 5.69<br>4.67 | 1.69<br>2.54 | 3.01 | 50 | 0.004* |
| **Question #14**<br>I have complete control over performing a PR exam<br>**Pre-Training**<br>**Post-Training** | 4.00<br>3.80 | 2.33<br>2.43 | 0.52 | 50 | 0.608 |
| **Question #15**<br>I intend to perform a PR exam<br>**Pre-Training**<br>**Post-Training** | 4.08<br>3.88 | 2.11<br>2.09 | 0.80 | 50 | 0.426 |
| **Question #16a**<br>In my opinion performing a PR exam is good practice<br>**Pre-Training**<br>**Post-Training** | 3.08<br>2.45 | 1.92<br>1.59 | 3.17 | 50 | 0.003* |
| **Question #16b**<br>In my opinion performing a PR exam is helpful<br>**Pre-Training**<br>**Post-Training** | 2.98<br>2.39 | 1.90<br>1.52 | 2.85 | 50 | 0.006* |

| | | | | | |
|---|---|---|---|---|---|
| **Question #16c**<br>In my opinion performing a PR exam is necessary<br>**Pre-Training**<br>**Post-Training** | 3.47<br>2.59 | 1.91<br>1.64 | 4.08 | 50 | 0.000* |
| **Question #16d**<br>In my opinion performing a PR exam is satisfying<br>**Pre-Training**<br>**Post-Training** | 4.08<br>3039 | 2.32<br>2.34 | 2.62 | 50 | 0.012* |
| **Question #16e**<br>In my opinion performing a PR exam is very easy<br>**Pre-Training**<br>**Post-Training** | 3.20<br>2.57 | 2.08<br>1.77 | 3.17 | 50 | 0.003* |
| **Question #17**<br>I will perform a PR exam<br>**Pre-Training**<br>**Post-Training** | 3.63<br>3.24 | 2.11<br>1.99 | 1.57 | 50 | 0.124 |

Note. SD= standard deviation, *$p \leq 0.05$, Likert Scale= 1 (strongly agree) to 7 (strongly disagree)

**Section 3: Knowledge Regarding Roles and Responsibilities Related to Bowel Management**

Section three of the pre- and post-survey evaluated if the education session increased the participants' knowledge regarding the roles and responsibilities in relation to bowel management practices in the neurosurgical ICU and neurosurgical medical floor (see Table 5). This section included eight multiple choice questions. A paired sample *t*-test was conducted to determine if there was an improvement in participant knowledge before and after the education session. The pre-education mean score was 5.76 with a *SD* of 1.394 compared to a mean of 6.31 with a *SD* of 1.334 in the post-education survey. There was a mean score of 0.549 improvement in the post-survey with a *SD* of 1.46 and a *p*- value of 0.010.

Table 6.

*Section 3 Group Comparative Mean of Knowledge Regarding Roles and Responsibilities t-test*

| | Mean | SD | *t* | *df* | Significance* |
|---|---|---|---|---|---|
| Pre-Training | 5.76 | 1.39 | | | |
| Post-Training | 6.31 | 1.33 | 2.69 | 50 | .010 |

Note. SD = standard deviation, *2-tailed, $*p \leq 0.05$

**Objective 6**

Conduct a prospective chart review of the patients admitted under the neurosurgical service.

**Outcome.** The charts of the first 30 neurosurgical patients that were admitted after the completion of the education sessions were evaluated for length of hospital stay, the number of days without bowel movements, whether discharge was affected by constipation, the number of telephone encounters that the neurosurgery service experienced related to constipation after discharge, emergency room visits after discharge, and readmissions to the hospital related to constipation.

**Objective 7**

Measure the outcomes of patient data to determine if the education session had an effect on patient outcomes.

**Outcome.** The findings from the retrospective and prospective patient chart reviews were used to analyze if the education session improved the way providers prevented and managed constipation. An independent *t*-test was conducted to evaluate for improvement using 30 patients. The mean length of stay for the retrospective group was 7.63 days whereas the mean length of stay for the prospective group was 7.17 with a *SD* of 3.58 and 2.69, respectively. The

length of stay did not significantly decrease in the prospective group ($p = 0.089$). The number of days without bowel movements was measured. The mean number of days without bowel movements in the retrospective group was 3.20 compared to 2.70 in the prospective group with a *SD* of 1.84 and 1.32, respectively. The number of days without bowel movements did not significantly improve in the prospective group ($p = 0.317$). The mean number of phone encounters related to constipation was 0.47 in the retrospective group and 0.43 in the prospective group with a *SD* of 0.68 and 0.50, respectively. The amount of phone encounters did not significantly improve in the prospective group ($p = 0.325$). The mean number of emergency room visits related to constipation was 0.33 in the retrospective group compared to 0.30 in the prospective group with a *SD* of 0.61 and 0.54, respectively. The number of emergency room visits after discharge related to constipation did not significantly improve ($p = 0.558$). The number of readmissions to the hospital were also evaluated. In the retrospective group the mean number of readmissions was 0.10 whereas the prospective groups mean number of readmissions was 0.07 with a *SD* of 0.31 and 0.25, respectively. The number of readmissions to the hospital did not significantly improve after the education session ($p = 0.358$).

**Objective 8**

Disseminate the findings to the stakeholders.

**Outcome.** This outcome was met by providing the neurosurgeons, neurosurgical APRNs, the trauma team, and the critical care team with statistical findings from the project. The stakeholders were impressed by the statistical significance in regard to knowledge and change in attitudes regarding constipation before and after the provided education sessions.

## Discussion

Following the education sessions, an overall improvement in knowledge and attitudes of the RNs, APRNs, and neurosurgeons was identified. With education being the key component of this project, it was expected that there would be an improvement in knowledge scores. Although there was not a statistically significant increase in all areas regarding the attitudes of providers towards constipation, the areas that did show statistically significant improvement are important elements. Specifically, question number nine of section two evaluated if the participant plans to perform an assessment of bowel function on a neurosurgical patient at least once in a 12-hour shift for the duration of the admission. In this section, there was a mean improvement in attitudes of 0.43 with a *SD* of 1.40 with a *p*- value of 0.03. Assessment of bowel function is a critical element of preventing and managing constipation (Turan & Kaya, 2014). Another component of the survey that showed statistically significant improvement concerned the participants' attitudes regarding performing a rectal exam on the neurosurgical patient. This question had five subcategories that included questions to evaluate if the rectal exam was (a) good practice, (b) helpful, (c) necessary, (d) satisfying, and (e) very easy. For this question, there was a statistically significant improvement in all five areas with an overall mean improvement in attitudes of 0.68 with a *SD* of 1.54 with a *p*- value of 0.004. The participants' confidence in understanding when a rectal exam is necessary will add to the participants ability to advocate for those patients who require a rectal exam to be included as part of the bowel assessment. According to Mitchell (2019), holistic assessment, including digital rectal exams, are an important aspect of care in the prevention and treatment of constipation.

Although there was statistically significant increase in participant knowledge regarding bowel management in the neurosurgical patient as well as some areas of statistically significant

improvement in attitudes related to constipation, there was not a significant improvement on patient outcomes in all areas. Despite the fact that there was a slight improvement in the mean length of stay, number of days without bowel movements, telephone encounters regarding constipation, emergency room visits, and readmissions related to constipation, the findings were not significant.

## Strengths

Overall, the education sessions were well understood by the providers and considered relevant to the complications that may affect the neurosurgical patient. The findings from the quality improvement project indicated that the participants gained significant knowledge from the educational sessions. The educational sessions could be applied to diverse patient populations, as constipation affects many different types of hospitalized patients. Findings also revealed that there was a lack of institutional- wide protocols in place for nurses to perform a digital rectal exam on a patient without a physician's order. According to the State of Florida Department of Children and Families (2018), every digital rectal exam requires a physician order unless the facility has a standard protocol for the procedure. It came to light that the nurses have been performing rectal exams on patients for many years without physician orders or a protocol in place. The issue was discussed with multiple leaders including the nurse clinicians for both units, the nurse managers, and the education department of the institution. After researching the hospital policies, it was confirmed that there was no such policy in place. Currently, the nurses must call for an order to perform a rectal exam. A protocol is currently being enacted that will allow trained nurses to perform rectal exams on certain patients for specific reasons throughout the entire healthcare system.

## Limitations

Some limitations of the quality improvement project included the reliance on nursing documentation for record of daily bowel movements. The outcomes of the survey highlighted that nurses, APRNs and physicians do not consider bowel assessment as an important skill. There was no increase in attitudes according to question five of section two of the survey, which evaluated the providers' attitudes towards the importance of assessing bowel function in the neurosurgical patient. In fact, there was a decline in the post-education survey regarding how important the bowel assessment is considered by providers. It was verbalized that the survey was long, and many of the participants felt that a number of the questions were very similar. The nurses felt that the entire process took far too long during a busy shift and therefore felt hurried. In a future study, it may be beneficial to decrease the number of survey questions to facilitate more deliberate and thoughtful responsive from participants.

In addition, the retrospective and prospective patient sample size ($N = 30$) may have been too small to be able to generalize the findings. Furthermore, the providers' input was not included when assessing the prospective patient data to correlate whether each provider was calling the attending physicians for necessary orders regarding bowel regimen in response to assessment findings. The retrospective and prospective patient data sets comprised multiple types of neurosurgical patients. For example, the retrospective group comprised of 66% of the patients suffering from brain injuries as compared to 53% of the prospective group. In a future study, it may be useful to compare either all brain injury or all spine injury patients to evaluate for significance in data from related groups. Although there was a statistically significant improvement in the knowledge areas of the quality improvement project, it is important to address the lack of improvement in the attitudes regarding constipation in order to increase

sustainability of the project. Positive outcomes will increase sustainability (Block et al., 2018). Providers are more likely to continue supporting a quality improvement project if it is successful. Etheridge, Couturier, Denis, Tremblay, and Tannenbaum (2014) confirmed that employees are more likely to support the project and continue to intervene in the desired manner if achievement is tangible.

## Implications for Nursing Practice

The American Association of Colleges of Nursing (AACN) drafted a set of eight *Essentials* with the intent to ensure that the needs of DNP programs were being met across the board. According to Polancich, James, Miltner, Smith, & Moneyham (2018), the DNP essentials was enacted to differentiate the clinical practice doctorate from the research doctorate degree. The DNP project met all eight *Essentials* as outlined by the AACN.

## Scientific Underpinnings for Practice

Nursing care is instrumental in the management of neurosurgical patients. The staff education provided the RNs, APRNs, and physicians with the skills necessary to prevent and recognize constipation in the neurosurgical patient. Educating staff and reviewing assessment skills meets the needs of the patient and therefor promotes a better relationship between patient and provider. In-depth research and rigorous literature reviews were required in order to develop the education necessary to improve outcomes. According to Bonfield, Fearnside, and Cramp (2018), a systematic literature review is a time-consuming process and requires the researcher to have a good baseline knowledge of the subject as well as the ability to critically appraise research.

Findings from the DNP project indicated that the educational intervention regarding constipation in the neurosurgical patient decreased the mean length of stay, number of days

without bowel movements, telephone encounters regarding constipation, emergency room visits, and readmissions related to constipation.

## Organizational and Systems Leadership

The findings from the DNP project identified that the institution did not have a policy/protocol for digital rectal exams for the patient. According to the State of Florida Department of Children and Families (2018), every digital rectal exam requires a physician order unless the facility has a standard protocol for the procedure. A digital rectal exam protocol is now being enacted and will be available as a standard protocol throughout the healthcare facility once administration has approved it and will be available throughout the large healthcare organization.

Initially, the education department did not want to develop a standard protocol for nurses to perform a digital rectal exam and wanted each and every digital rectal exam to have a physician order. The education department was informed that it is not always feasible to interrupt patient care to call a physician and wait for a call back to obtain the order. After multiple meetings with several department heads within the facility, the approval to begin developing a protocol was endorsed. As part of the protocol policy, the nurses will have to undergo education and skills training on the proper technique when performing a digital rectal exam. The PowerPoint education session used in the DNP quality improvement project will be utilized as part of the mandatory education requirement for the nurses.

## Clinical Scholarship and Analytic Methods

According to Sylvia and Terhaar (2014), the projects carried out by DNP degree-seekers require analytical and scholarly expertise surpassing the minimum abilities of appraising relevant literature. The DNP project was guided by the need to better address constipation in the

neurosurgical patient population. Descriptive and inferential statistics were used to analyze the data from the participants as well as the patient outcomes.

## Information Systems/Patient Care Technology

This essential was met through an educational PowerPoint presentation that was developed and used to enhance learning of RNs, APRNs, and physicians regarding constipation. The educational program is being used as part of the RN clinical ladder program within the institution. Several RNs have been trained on the proper way to present the PowerPoint presentation that will be used for ongoing education within the neurosurgical ICU and neuro-medical floor. These information systems were used in the development of the digital rectal exam protocol that is currently being enacted. Once fully approved, the protocol will be available for all to view on the institution's intranet system.

## Healthcare Policy for Advocacy in Healthcare

Advocacy is an important attribute throughout every level of nursing. The DNP student must act as an advocate and aim for improved care of patients and populations while attempting to decrease costs (Bartol, 2016). This DNP project aimed to decrease discomfort related to constipation in addition to improving healthcare costs to patients and institutions by preventing constipation related complications. All patients should be able to trust that nurses will advocate for them; however, some patient populations require a higher level of advocacy. The neurosurgical patient is often times cognitively altered and can be considered a vulnerable patient. It is important for the DNP provider to become well-versed on identifying and developing an attention to concerns impacting vulnerable populations and motivate others to promote changes in policies that can have positive effects on those individuals (Jones & Smith, 2014).

## Interprofessional Collaboration

Healthcare, in general, requires partnership. For instance, throughout all the phases of the quality improvement project, nurses, physicians, APRNs, dieticians, pharmacists, physical therapists, and nurse leaders provided valuable input towards the best way to assess, manage and treat neurosurgical patients who were at risk of complications such as constipation. The project involved a multidisciplinary team approach. In an attempt to enhance patient outcomes, it is essential for the DNP nurse to value and consider other perspectives (Hammatt & Nies, 2015). Throughout the DNP process, leadership skills were exhibited as well as the ability to provide evidence-based practice using a team approach.

## Clinical Prevention and Population Health

The DNP quality improvement project was geared towards the neurosurgical patient. Often, the neurosurgical patient is cognitively impaired and requires expert assessment skills to identify underlying issues that may be affecting the patient. One of the goals of the DNP project was to improve the assessment skills of the providers who work closely with neurosurgery patients in an effort to decrease complications. The DNP nurse has the opportunity to make positive influences on policies that can positively affect vulnerable populations, such as neurosurgical patients, by providing nurses with valuable knowledge and skill set in order to easily identify complications (Jones & Smith, 2014).

## Advanced Nursing Practice

Nursing is a dynamic profession in which the nurse can act in many different roles. However, one of the major facets of the nursing profession is education. Whether that involves educating staff, patients, or other multidisciplinary team members, education is a crucial role in nursing. During the DNP implementation phase, healthcare providers including RNs, APRNs,

and physicians were educated on up-to-date assessment skills, prevention techniques, and treatment options for constipation in the neurosurgical patient. Findings of the DNP project indicated that the participants had increased knowledge in multiple areas related to constipation prevention and management in the neurosurgical patient. Improvement in patient outcomes can occur by providing ongoing education, based on evidence in the literature, to neurosurgical patient caregivers, as well as providers in other healthcare areas.

## Final Conclusions

The purpose of the quality improvement project was to provide education to providers of neurosurgical patients in an effort to improve the outcomes of the neurosurgical population. The PowerPoint presentation provided an overview of the importance of bowel management strategies in the hospitalized neurosurgical patient, complications of constipation, and case studies exemplifying the complications that can occur without proper bowel management prevention tactics in place in an effort to increase the knowledge and improve the attitudes of providers towards constipation. The hope was that if the providers had increased knowledge and improved attitudes towards constipation in the neurosurgical patient, it would translate to improved patient outcomes. Although, there were significant improvements in knowledge and attitudes of the participants regarding constipation prevention and management, the patient outcomes did not significantly improve. Despite the limitations of the quality improvement project, the results and findings provided meaningful information to the providers, the healthcare organization, and patients. One major implication from the project is the development of a digital rectal exam protocol that will allow trained nurses to provide rectal exams without a physician's order. Health care leaders, including DNP nurses, must be cognizant of policies and

protocols that will help meet the needs of all patients, including the neurosurgical population in an effort to improve patient outcomes.

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# Appendix A

## Cover letter and Consent Form for Research Participation


**General Informed Consent Form**
**NSU Consent to be in a Research Study Entitled**

*Identifying Attitudes and Knowledge Deficits Regarding Constipation in the Neurosurgical Patient: A Quality Improvement Project*

**Who is doing this research study?**

College: Nova Southeastern University, Ron and Kathy Assaf College of Nursing

Principal Investigator: Denise Diaz, MSN, APRN

Faculty Advisor/Dissertation Chair: Dr. Marcia Derby-Davis PhD., RN

Funding: Unfunded

**What is this study about?**

The purpose of this quality improvement project is to evaluate the knowledge and attitudes of nurses and providers regarding constipation in the neurosurgical patient in the acute phase of hospitalization to evaluate if the knowledge gained from the educational training session decreased the incidence of constipation in an effort to decrease length of hospital stay, emergency room visits, and re-admission rates related to constipation.

**Why are you asking me to be in this research study?**

You are being asked to participate in a research study because, as a provider or registered nurse, you care for neurosurgical patients who are at risk for constipation.

This study will include about eighty participants.

**What will I be doing if I agree to be in this research study?**

While you are taking part in this research study, you will be given a pre-test survey regarding your knowledge and attitudes towards constipation. You will then participate in an educational training session. You will then take a post-test survey after the training session to evaluate your knowledge and attitudes towards constipation in the neurosurgical patient.

**Study time:** Study participation will take place during a two-week period. The sessions will be held twice a day; once in the morning and once at night for the two-week period. The pre-test survey, education session, and post-test survey will take approximately one-hour to complete.

**Study location:** All study procedures will take place in Hollywood, Florida. The education sessions will take place on the 2nd floor conference room.

Research Study Procedures - as a participant, this is what you will be doing:

Taking a 15 minute pre-test paper survey
Listening to a 30 minute PowerPoint education session presented by the researcher
Taking a 15 minute post-test paper survey

**Are there possible risks and discomforts to me?**

This research study involves minimal risk to you. Your participation in this study may involve the following risks: discomfort speaking about bowel habits.

As with all research, there is a chance that confidentiality of the information we collect from you could be breached – we will take steps to minimize this risk, as discussed in more detail below in this form.

**What happens if I do not want to be in this research study?**

You have the right to leave this research study at any time, or not be in it. If you do decide to leave or you decide not to be in the study anymore, you will not get any penalty or lose any services you have a right to get. If you choose to stop being in the study, any information collected about you **before** the date you leave the study will be kept in the research records for 36 months from the end of the study but you may request that it not be used.

**What if there is new information learned during the study that may affect my decision to remain in the study?**

If significant new information relating to the study becomes available, which may relate to whether you want to remain in this study, this information will be given to you by the investigator. You may be asked to sign a new Informed Consent Form, if the information is given to you after you have joined the study.

**Are there any benefits for taking part in this research study?**

The possible benefit of your being in this research study is gain knowledge about ways to prevent constipation and complications from constipation in the neurosurgical patient to include length of hospital stay, emergency room visits related to constipation after discharge, and readmission rates related to constipation. There is no guarantee or promise that you will receive any benefit from this study. We hope the information learned from this research study will benefit other people with similar conditions in the future.

**Will I be paid or be given compensation for being in the study?**

Advanced Practice Registered Nurses and Registered Nurses are eligible for 1.0 continuing education hour.

**Will it cost me anything?**

There are no costs to you for being in this research study.

**Will clinically relevant research results be shared with me?**

The study investigator does not plan to share research results with people in the study.

**How will you keep my information private?**

Information we learn about you in this research study will be handled in a confidential manner, within the limits of the law and will be limited to people who have a need to review this information. To minimize risks to confidentiality, the researcher will be the only person with access to the computer which contains data. The computer requires a six-digit log-in password. The names of the participants will not be used. The names of the participants will be exchanged with a randomly selected numbers to ensure no identifiable information is accessible. Results of the study may be used in publications and presentations. If we publish the results of the study in a scientific journal or book, we will not identify you. All confidential data will be kept securely on the secured computer in the home office of the researcher. All data will be kept for 36 months from the end of the study and destroyed after that time by deletion of computer files and the recycle bin will be permanently deleted.

**Whom can I contact if I have questions, concerns, comments, or complaints?**

If you have questions, you are free to ask them now. If you have questions later, you may contact the researcher, Denise Diaz, at 954-265-6711 or dd1266@my.nsu.nova.edu

**Research Participants Rights**
For questions/concerns regarding your research rights, please contact:

Institutional Review Board
Nova Southeastern University
(954) 262-5369 / Toll Free: 1-866-499-0790
IRB@nova.edu

You may also visit the NSU IRB website at www.nova.edu/irb/information-for-research-participants for further information regarding your rights as a research participant.

**All space below was intentionally left blank.**

**Research Consent & Authorization Signature Section**

Voluntary Participation - You are not required to participate in this study. In the event you do participate, you may leave this research study at any time. If you leave this research study before it is completed, there will be no penalty to you, and you will not lose any benefits to which you are entitled.

If you agree to participate in this research study, sign this section. You will be given a signed copy of this form to keep. You do not waive any of your legal rights by signing this form.

**SIGN THIS FORM ONLY IF THE STATEMENTS LISTED BELOW ARE TRUE:**

- You have read the above information.
- Your questions have been answered to your satisfaction about the research.

**Adult Signature Section**

I have voluntarily decided to take part in this research study.

| Printed Name of Participant | Signature of Participant | Date |
|---|---|---|
| Printed Name of Person Obtaining Consent and Authorization | Signature of Person Obtaining Consent & Authorization | Date |

## Appendix B

## Nova Southeastern University IRB Approval Letter

To: Denise Diaz

From: Vanessa A Johnson, Ph.D.,

Center Representative, Institutional Review Board

Date: April 22, 2019

Re: IRB #: 2019-240; Title, "Identifying Attitudes and Knowledge Deficits Regarding Constipation in the Neurosurgical Patient: A Quality Improvement Project"

I have reviewed the above-referenced research protocol at the center level. Based on the information provided, I have determined that this study is exempt from further IRB review under 45 CFR 46.101(b) ( Exempt 2: Interviews, surveys, focus groups, observations of public behavior, and other similar methodologies). You may proceed with your study as described to the IRB. As principal investigator, you must adhere to the following requirements:

1) CONSENT: If recruitment procedures include consent forms, they must be obtained in such a manner that they are clearly understood by the subjects and the process affords subjects the opportunity to ask questions, obtain detailed answers from those directly involved in the research, and have sufficient time to consider their participation after they have been provided this information. The subjects must be given a copy of the signed consent document, and a copy must be placed in a secure file separate from de-identified participant information. Record of informed consent must be retained for a minimum of three years from the conclusion of the study.

2) ADVERSE EVENTS/UNANTICIPATED PROBLEMS: The principal investigator is required to notify the IRB chair and me (954-262-5369 and Vanessa A Johnson, Ph.D., respectively) of any adverse reactions or unanticipated events that may develop as a result of this study. Reactions or events may include, but are not limited to, injury, depression as a result of participation in the study, life-threatening situation, death, or loss of confidentiality/anonymity of subject. Approval may be withdrawn if the problem is serious.
3) AMENDMENTS: Any changes in the study (e.g., procedures, number or types of subjects, consent forms, investigators, etc.) must be approved by the IRB prior to implementation. Please be advised that changes in a study may require further review depending on the nature of the change. Please contact me with any questions regarding amendments or changes to your study.

The NSU IRB is in compliance with the requirements for the protection of human subjects prescribed in Part 46 of Title 45 of the Code of Federal Regulations (45 CFR 46) revised June 18, 1991.

Cc: Marcia Derby-Davis

Vanessa A Johnson, Ph.D.

## Appendix C

## IRB Approval Letter

May 24, 2019

Denise Diaz

IRB Project#: MHS.2019.034

Project Title: Identifying Attitudes and Knowledge Deficits Regarding Constipation in the Neurosurgical Patient: A Quality Improvement Project

Submission Type: Non-Human Subject Research Determination (Reference# 005675)

Dear Investigator:

The Institutional Review Board (IRB) at the implementation hospital has reviewed the proposed activity referenced above and determined that it does not meet the definition of research with human subjects as outlined in 45 CFR 46.102 or 21 CFR 56.102. Therefore, IRB oversight is not necessary. Please note that you are still required to follow all applicable institutional policies and ethical guidelines. Additional details regarding this determination are provided starting on page 2 of this letter. Please review each page carefully.

Sincerely,

Signature applied by Lukasz Fiedorowicz on 05/24/2019 11:28:24 AM EDT

Luke Fiedorowicz, Ph.D.

IRB Director

## Appendix D

## Literature Review Matrix

| Authors/Year | Level of Evidence | Theoretical Framework | Problem/Population and Purpose | Intervention | Comparison (If any) | Outcomes | Use of Evidence |
|---|---|---|---|---|---|---|---|
| Knowles, S., McInnes, E., Elliott, D., Hardy, J., Middleton, S. (2013) | III | None | Constipation in the critical care patient/ 208 patients/To determine if implementing a bowel protocol had decreased incidence of constipation | Educating nurses and providers on bowel protocol implementing bowel protocol on day one of admission | Retrospective analysis of patient's bowel movements without protocol versus with protocol | No significant difference in the incidence of constipation pre and post-implementation of the protocol | Use of different medications |
| Houghton, D., Horgan, L., Boldy, D. (2015) | IV | None | Constipation has led to increased health care costs/ Phase 1 had 103 participants, Phase 2 had 14 participants/ To evaluate the effects of a nurse-led clinic management on idiopathic childhood constipation. | Implementation of a nurse-led constipation management system in children with idiopathic childhood constipation | A two-phase exploratory study that compared treatment without nurse-led management to those with nurse-led management | A decrease in health care costs in the nurse-led management patient population of $940 per patient. | The proposed protocol will be part of an order set that nurses can implement |

| Authors/Year | Level of Evidence | Theoretical Framework | Problem/Population and Purpose | Intervention | Comparison (If any) | Outcomes | Use of Evidence |
|---|---|---|---|---|---|---|---|
| Ross-Adjie, G., Monterosso, L., & Bulsara, M. (2015) | II | None | Constipation in post major joint arthroplasty/ 331 patients: 160 patients intervention group, 171 patients in control group/To evaluate the effectiveness of a bowel protocol on this patient population | The implementation of the Murdoch Bowel Protocol© in the intervention group | Compare patients who received routine hospital bowel regimen to those who received the Murdoch Bowel Protocol© | Intervention group took six less days than control group to return to normal bowel function | The Murdoch Bowel Protocol© may be relevant in the neurosurgical patient population |
| Guardiola, B., Llompart-Pou, J., Ibanex, J., Raurich, J. (2016) | III | None | Constipation in critically ill patients/ 588 patients total: 63 in control phase, 64 in the treatment phase, and 70 in the prophylaxis phase/Evaluate and compare the different bowel protocols in the prophylaxis and treatment regimens | Prophylactic treatment versus treatment starting on day four | Comparisons made between observational, prophylaxis, and treatment group | The patients who were in the prophylaxis group had a bowel movement sooner than the other groups and had a decrease length of stay in ICU and in overall hospital admission | This protocol may be valuable for use in proposed project |

| Authors/Year | Level of Evidence | Theoretical Framework | Problem/Population and Purpose | Intervention | Comparison (If any) | Outcomes | Use of Evidence |
|---|---|---|---|---|---|---|---|
| Rhodes, L.N., Loman, D.G., Bultas, M.W. (2016) | III | None | Constipation in children post scoliosis repair. 36 participants. The purpose was to compare a bowel protocol using PEG versus MO in post-operative patients. | The participants were given the standard of care treatment of twice daily docusate with either PEG or MO to determine which medication prevented constipation | PEG versus MO administration | No statistical difference in number of bowel movements between the two groups. There was evidence of increased medication refusal with PEG | May need to assess for increased refusal of medication when implementation begins. |
| Fushimi, N., Yamada, M., Hachiya, H., Shibuya, T., Ohashi, N., Mori, A. (2017) | II | None | Constipation in the elderly patients recovering from critical illness. 25 participants. The purpose was to ascertain if increased fiber and electrolytes in tube feeding would prevent constipation. | The intervention group was given tube feeding with higher fiber and electrolyte content and the control group was given standard tube feeds. | Comparison between two different tube feedings | The intervention group had a decrease in stool hardening related to the control group. | There is evidence that non-pharmaceutical treatment may be beneficial |

| Authors/Year | Level of Evidence | Theoretical Framework | Problem/Population and Purpose | Intervention | Comparison (If any) | Outcomes | Use of Evidence |
|---|---|---|---|---|---|---|---|
| Oczkowski, S., Duan, E., Groen, A., Warren, D., & Cook, D. (2017) | I | Analytic framework based upon narrative reviews and authors consensus | Constipation causing adverse patient outcomes in critically ill patients/four trials including 534 patients were analyzed/To determine the impact of bowel protocols in critically ill patients | Interventions in the four randomized controlled trials included the use of lactulose administration | Compared four different trials from 2001-2015 | Nonsignificant reduction in constipation with use of bowel protocol and no decrease in feeding intolerance | The evidence suggests using different medications other than lactulose in the bowel protocol |
| Trads, M., Deutch, S.R., Pendersen, P.U. (2017) | III | Motivation Theory, Theory of Development | Constipation in the post-operative patient/186 patients/ The purpose was to test the efficacy of a nursing intervention based on active patient involvement | The nursing-led interventions included increased fiber and fluid intake. The control group received standard care. | Intervention group had diets with increased fiber and fluid intake compared to control group | The constipation rates for the patients in the intervention group were significantly lower ($p$ = 0.042) | The use of non-pharmaceutical interventions may be used as an adjunct therapy in the proposed protocol |
| Smith, A., Stimson, C., & Stevens, P. (2018) | III | None | Extended length of stay in trauma patients secondary to constipation/ 282 patients total: 166 in the standard hospital protocol group, 116 in the high-intensity protocol group/evaluate difference of LOS | Group 1 had the standard hospital protocol versus group 2 having high-intensity protocol. | Comparison of group 1 and group 2 outcomes | There was no significant difference in length of hospital stay between the two groups. Significant difference in the number BMs | This may be a valuable tool to relieve constipation in the neurosurgical patient |

| Authors/Year | Level of Evidence | Theoretical Framework | Problem/Population and Purpose | Intervention | Comparison (If any) | Outcomes | Use of Evidence |
|---|---|---|---|---|---|---|---|
| Todd, C. Woodward, S. (2018) | VI | None | Substandard bowel care in patients with spinal cord injury. 11 participants. The purpose was to explore the experience and perceptions of nurses providing bowel care to patients after spinal cord injury | Semi-structured interviews with nurses caring for patients after spinal cord injury | None | Nurses described bowel care as unpleasant but accepted its physiologic need and importance. Study suggested that there is a lack of training in bowel care after spinal cord injury | In depth education sessions will remove stigma associated with bowel care |

## Appendix E

## Demographic Survey

The following survey is designed to ask you to provide demographic information. Please circle the answer that pertains to you. If you do not feel comfortable answering any questions, please leave them blank and go on to the next question.

1. What is your gender?
    - Female
    - Male
2. What is your age?
    - <20 years
    - 20-29 years
    - 30-39 years
    - 40-49 years
    - 50-59 years
    - 60-69 years
    - >70 years
3. What is your highest level of education?
    - MD/DO
    - APRN
    - RN-Diploma
    - RN-BSN+
    - RN-MSN
    - Other

    If you chose “other”, please specify _____

4. How long have you worked under your current licensure (MD, APRN, RN, etc.…)?

    _____years OR _____months OR _____ weeks

5. What is your employment type?
    - Full-time
    - Part-time
    - Per-diem
6. How long have you been working with neurosurgical patients in this institution?

    _____years OR _____months OR _____ weeks

## Appendix F

## Survey Tool

Knowledge and Attitudes Towards Constipation

Section 1

Each question in this section is to test your knowledge of bowel management practices in the neurosurgical patient.

Please tick the appropriate box to indicate TRUE, FALSE, or UNSURE.

1. The following medications may cause constipation
   i) Morphine……. True □ False □ Unsure □
   ii) Insulin…….. True □ False □ Unsure □
   iii) Ibuprofen……. True □ False □ Unsure □
   iv) Iron Supplements…… True □ False □ Unsure □
   v) Antiemetics……. True □ False □ Unsure □
   vi) Antidepressants…… True □ False □ Unsure □
   vii) Chemotherapy…….. True □ False □ Unsure □
   viii) Calcium Channel Blockers……... True □ False □ Unsure □
   ix) Anticonvulsants…….True □ False □ Unsure □
   x) Antihypertensives…….. True □ False □ Unsure □
2. The following medications may cause diarrhea
   i) Morphine……. True □ False □ Unsure □
   ii) Insulin…….. True □ False □ Unsure □
   iii) Ibuprofen……. True □ False □ Unsure □
   iv) Iron Supplements…… True □ False □ Unsure □
   v) Quinidine …… True □ False □ Unsure □
   vi) Antibiotics …….. True □ False □ Unsure □
   vii) Magnesium……... True □ False □ Unsure □
   viii) Metoclopramide……... True □ False □ Unsure □
   ix) Anticonvulsants …….. True □ False □ Unsure □
   x) Antihypertensives…… True □ False □ Unsure □
3. Daily fluid intake can impact a patient's bowel function
   True □ False □ Unsure □
4. Osmotic laxative medications work by drawing water into the intestine to soften the stool
   True □ False □ Unsure □
5. Patients with decreased mobility are less likely to be constipated
   True □ False □ Unsure □
6. Opiates cause an increase in the propulsive contraction of the gut
   True □ False □ Unsure □

7. A patient may still be constipated even with a bowel movement every day
   True □ False □ Unsure □
8. Stimulant laxative medications work by stimulating the flow of water to the intestine
   True □ False □ Unsure □
9. Difficulty passing stool (straining) may be a sign of constipation
   True □ False □ Unsure □
10. A diagnosis of impaction should be confirmed with radiological investigations such as X-ray
    True □ False □ Unsure □
11. Patients with delayed bowel movements are more likely to have longer length of stay in the hospital
    True □ False □ Unsure □

The following questions have multi-choice answer options. Please tick one box only indicating the most appropriate answer.

12. Physical assessment of a patients' bowel function includes which of the following?
    a) Observation of the abdomen for distention and palpation for tenderness….□
    b) Measuring the head of bed elevation…….□
    c) Auscultation for the presence of bowel sounds……..□
    d) All of the above…….□
    e) a and c only……....□

**Section 2**

Each question in this section refers to PERFORMING AN ASSESSMENT OF BOWEL FUNCTION FOR THE NEUROSURGICAL PATIENT FOR THE DURATION OF THEIR ADMISSION.

1) Thinking about the last ten neurosurgical patients that you have cared for, how many of them did you perform an assessment of bowel function at least once every shift for the duration of their admission? ___/10

For each of the following questions please circle the number that best matches your point of view.

2) I feel under social pressure, from my professional colleagues, to perform an assessment of bowel function on a neurosurgical patient at least once in a 12- hour shift for the duration of their admission
   Strongly agree 1 2 3 4 5 6 7 Strongly disagree
3) I have complete control over performing an asse4ssment of bowel function on a neurosurgical patient at least once in a 12-hour shift for the duration of their admission.
   Strongly agree 1 2 3 4 5 6 7 Strongly disagree
4) I intend to perform an assessment of bowel function on a neurosurgical patient at least once in a 12-hour shift for the duration of their admission.
   Strongly agree 1 2 3 4 5 6 7 Strongly disagree

5) In my opinion, performing an assessment of bowel function on a neurosurgical patient at least once in a 12-hour shift for the duration of their admission is:

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Good practice | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Bad practice |
| Helpful | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Unhelpful |
| Necessary | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Unnecessary |
| Satisfying | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Not satisfying |
| Very easy | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Very difficult |

6) I will perform an assessment of bowel function on a neurosurgical patient at least once in a 12-hour shift for the duration of their admission

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Strongly agree | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Strongly disagree |

7) There are factors outside of my control that would prevent me from performing an assessment of bowel function on an intensive care patient at least once in a 12-hour shift for the duration of their admission.

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Strongly agree | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Strongly disagree |

8) People who are important to me professionally, think that I should perform an assessment of bowel function on a neurosurgical patient at least once in a 12-hour shift for the duration of their admission.

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Strongly agree | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Strongly disagree |

9) I plan to perform an assessment of bowel function on a neurosurgical patient at least once in a 12-hour shift for the duration of their admission.

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Strongly agree | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Strongly disagree |

10) I am confident knowing when a neurosurgical patient requires an assessment of bowel function.

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Strongly agree | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Strongly disagree |

11) My professional colleagues, whose opinions I respect, think that I should perform an assessment of bowel function on a neurosurgical patient at least once in a 12-hour shift for the duration of their admission

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Strongly agree | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Strongly disagree |

12) Thinking about the last ten neurosurgical patients that you have cared for, how many of them did you perform a per rectum examination? ___/10

For each of the following questions please circle the number that best matches your point of view.

13) I feel under social pressure, from my professional colleagues, to perform PR exam on a neurosurgical patient

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Strongly agree | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Strongly disagree |

14) I have complete control over performing a PR examination function on a neurosurgical patient.

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Strongly agree | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Strongly disagree |

15) I intend to perform PR examination on a neurosurgical patient.

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Strongly agree | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Strongly disagree |

16) In my opinion, performing a PR examination on a neurosurgical patient is:

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Good practice | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Bad practice |
| Helpful | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Unhelpful |
| Necessary | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Unnecessary |
| Satisfying | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Not satisfying |
| Very easy | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Very difficult |

17) I will perform a PR examination on a neurosurgical patient.

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Strongly agree | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Strongly disagree |

## Section 3

This section is about ROLES AND RESPONSIBILITIES in relation to bowel management practices in the neurosurgical ICU and medical floor.

For each of the following questions please **tick one box only**.

1) In your view, how often should neurosurgical patients have their bowel function assessed?
   □ once, on admission □ on admission, and at least every 12 hours
   □ on day three of admission □ other (please specify) _____

2) In your unit, who normally performs a bowel function assessment on the neurosurgical patient?
   □ the bedside nurse □ the charge nurse □ the resident □ the nurse educator
   □ the consultant □ the primary care provider □ other (please specify)_____

3) In your view, who has primary responsibility for performing a bowel function assessment on the neurosurgical patient?
   □ the bedside nurse □ the charge nurse □ the resident □ the nurse educator
   □ the consultant □ the primary care provider □ other (please specify)_____

4) In your unit, who is normally responsible for performing a per rectum (PR) examination of the patient?
   □ the bedside nurse □ the charge nurse □ the resident □ the nurse educator
   □ the consultant □ the primary care provider □ other (please specify)_____

5) In your unit, the decision to perform a per rectum (PR) examination of the patient is made by:
   □ the bedside nurse □ the charge nurse □ the resident □ the nurse educator

□ the consultant □ the primary care provider □ other (please specify)_____

6) In your view, who should decide to perform a PR exam on the neurosurgical patient?
□ the bedside nurse □ the charge nurse □ the resident □ the nurse educator
□ the consultant □ the primary care provider □ other (please specify)_____

7) In your view, who should decide the appropriate bowel regimen to be initiated for the neurosurgical patient?
□ the bedside nurse □ the charge nurse □ the resident □ the nurse educator
□ the consultant □ the primary care provider □ other (please specify)_____

8) In your unit, who is responsible for prescribing the bowel regimen for the neurosurgical patient?
□ the bedside nurse □ the charge nurse □ the resident □ the nurse educator
□ the consultant □ the primary care provider □ other (please specify)_____

Survey adapted from the *Knowledge and Theory of Planned Behaviour (TPB) Survey* created by Knowles, McInnes, Elliott, Hardy, and Middleton (2013)

## Appendix G

## Authors Authorization to Use Knowledge & TPB tool

Dear Denise,

Apologies for the delayed response.
Please accept this response as permission to use The Knowledge & TPB survey in your project. I request that you acknowledge you have based your survey on my work and to cite our publication in any of your work/publications.

Please don't hesitate to contact me if you think I can be of any further assistance.

Wishing you the best of luck with your project.

Kind regards,

**Serena Knowles** | PhD
Project Manager, Critical Care Division

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**Appendix H**

**Provider/Nurse Recruitment Flyer**

# Enhancing knowledge and attitudes towards constipation in the neurosurgical patient

May 20th, 21st, 22nd, 27th, 28th, 29th

At 7:30-8:30 am and 7:30-8:30 pm

1.0 CEU hour provided

Taught by Denise Diaz, APRN with Neurosurgery

# Appendix I

## Project Timeline

| Weeks | Procedure |
|---|---|
| **1-4** | • Knowledge and attitudes pre-test survey for physicians, APRNs, and nurses<br>• Retrospective chart review of neurosurgical patients<br>• Educate physicians, APRNs, and RNs about constipation in the neurosurgical patient<br>• Conduct a post-test survey after the education session |
| **4-12** | • Prospective chart review of neurosurgical patients |
| **12-14** | • Measure outcomes |
| **14-16** | • Disseminate findings to stakeholders |