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Education to Improve Patient Satisfaction and Outcomes in the Neurosurgical Patient:

Tara Orgon Stamper

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Abstract

Objective: Evidence based literature has illustrated that patient education can improve patient outcomes. In this translational study, a perioperative neurosurgery education bundle was implemented in patients undergoing elective cranial surgery to determine whether this patient centered education improved patient satisfaction, patient knowledge and patient outcomes. ***Method:*** This quality improvement study implemented an education bundle for elective cranial surgery patients both at a preoperative clinic visit and prior to discharge. Patients completed the Patient Interview Teaching Guide (PTIG) questionnaire and Client Satisfaction Questionnaire (CSQ-8) at the first postoperative visit. ***Results:*** Correlation statistics were conducted on demographic factors and patient knowledge and satisfaction scores. No sample characteristics significantly correlated with the level of patient satisfaction and knowledge following implementation of a neurosurgery perioperative education bundle. A significant correlation was found between time between surgery and follow up and postoperative complications and 30-day readmissions. A statistically significant effect on postoperative complications and 30-day readmissions could not be attributed to bundle implementation. ***Conclusions:*** Study results show that there is no statistically significant benefit to the implementation of a perioperative neurosurgical education bundle to elective cranial surgery patients. Although statistical significance was lacking, there is still a great need for patients to receive adequate patient education during their perioperative period. Implications for further research include the use of a collaborative approach to further identify mechanisms that would facilitate the delivery of patient health care information as well as recruit a larger study sample.

Keywords: *neurosurgery education, patient satisfaction, patient education, patient outcomes, perioperative education*

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Education to Improve Patient Satisfaction and Outcomes in the Neurosurgical Patient

Chapter I

Education specific to a patient's health care journey engages them to actively participate in their care (Frank-Bader, Beltran & Dojidko, 2011). Patient acuity has increased over the past few years and patients are coping with multi-faceted disease processes that can be difficult and cumbersome to understand. Lack of understanding can lead to frustration and a loss of control. Self-care and the patient's ability to recognize and meet their own needs play an important part in their health care (Ross, Ohlsson, Bloomberg & Gustafsson, 2014). Patient empowerment also leads to improved patient satisfaction and overall patient outcomes. A patient's level of satisfaction with their health care team, care and overall experience is shaped by the amount of personalized education a patient receives (Wagner & Washington, 2016). Timeliness, efficiency, compassion, empathy and expectations also affect a patient's satisfaction (Sutherland & McLaughlan, 2013). Patient education influences patient outcomes (Abrams, Nuzum, Zezza, Ryan, Kisla & Guterman, 2015). Such outcomes as complications, readmissions, pain perception and patient anxiety are impacted by the disease process expectations that patient education provides (Hill and Dunlop, 2015; Bozimowski, 2012; Crabtree, Puri, Bell, Bontumasi, Patterson, Kreisel, Krupnick & Meyers, 2012).

The 21st century health care environment has shifted from health care providers being an authoritative power in a patient's plan of care to a facilitator of information (McBride & Andrews, 2013). In 2001, the Institute of Medicine (IOM) demanded that the patient be the center of their health care (IOM, 2001). A patient's care is geared towards individual patient preferences and morals while helping patients have their own values guide their care (IOM, 2001). The six dimensions of patient centered care are respect for patients' values, preferences

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and expressed needs; coordination and integration of care through collaboration and teamwork; accessibility and free flow of information, communication, and education; physical comfort; sensitivity to non-medical and the spiritual dimension of care and involvement of family and friends (Drenkard, 2013). Individualized information and its effective delivery to the patient lays the foundation for patient centered care (Drenkard, 2013). The Affordable Care Act, in 2010, further brought attention to patient centered care as it transformed health care reimbursements from a unit-based system to one that is value based (Abrams et al., 2015). Health care providers and institutions are no longer paid for how much care they provide but how well they provide it (Abrams et al., 2015). With this new system, it is imperative that hospitals incorporate the patient centered care dimensions and ensure that patients are engaged in their care (Reiter, 2014). Neurosurgeons meet the needs of patients with complex disease processes. To ensure patient empowerment to sustain a neurosurgical health care journey, patient education must encompass a broad range of information.

At this inner-city level, I trauma center, there exists no standardized patient education for patients undergoing an elective cranial procedure. With a maximum bed capacity of 435, the institution offers both general and specialty surgical services including trauma, cardiothoracic, transplant and neurosurgery. As part of their mission, the facility serves critical and acute care neurosurgical patients. In addition to neurotrauma, the institution provides care to surgical patients for various spinal and cranial disorders. To date, there is no standardized protocol for perioperative education given to elective cranial patients. Given that multiple surgeons perform cranial surgeries, it is unclear if essential cranial surgery information is provided to patients. A standardized patient education program for cranio-surgical patients has the capacity to improve outcomes, to include patient satisfaction and a reduction of postoperative complications (Wagner

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& Washington, 2016; Kliot, Zygourakis, Imershein, Lau & Kliot, 2015; Frank-Bader et al., 2011; Ben-Morderchai, Herman, Kerzman & Irony, 2010; Johansson, Salantera & Katjisto, 2007).

Purpose

The purpose of this study was to implement a patient education bundle for elective cranio-surgical patients to improve patient satisfaction, knowledge and outcomes. It aimed to answer the following PICOT question: In the cranial neurosurgery patient (P), how does a cohesive, structured perioperative neurosurgery education bundle (I) compared with the non-structured standard education (C) affect patient satisfaction, knowledge and outcomes (O) over a twelve-week timeframe (T)? Outcomes were defined as postoperative complications and thirty-day readmissions. Postoperative complications are defined as any neurological or infectious complication in a postoperative cranial patient who has had surgery and the complication is a direct consequence of the surgery. A 30-day readmission is defined as any neurological, medical or infectious event that caused a patient recently postoperative from surgery to be readmitted within thirty days of initial discharge.

Specific Aims and Clinical Questions

The purpose of this study was to implement a perioperative neurosurgery education bundle delivered preoperatively and at discharge to increase patient satisfaction, knowledge and improve outcomes. This interventional prospective study addressed the following clinical questions:

Clinical Question 1

What sample characteristics correlate with the level of patient satisfaction and patient knowledge after implementation of a neurosurgery perioperative education bundle?

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Clinical Question 2

What factors (age, gender, ethnicity, comorbidities, past medical and social histories) correlate with 30-day readmissions and postoperative complications?

Clinical Question 3

What is the level of patient satisfaction after implementation of a neurosurgery perioperative education bundle?

Clinical Question 4

What is the level of patient knowledge after implementation of a neurosurgery perioperative education bundle?

Clinical Question 5

What effect does a perioperative neurosurgery patient education bundle have on 30-day readmissions?

Clinical Question 6

What effect does a perioperative neurosurgery patient education bundle have on postoperative complications?

Needs Assessment and Feasibility

Four neurosurgeons conduct cranial procedures at the study institution. The department has no standardized information to provide patients with prior to their surgical experience. Within the neurosurgery clinic, patients can be counseled before surgery by the neurosurgeon, advanced practice provider or nurse clinician. The same is true of the discharge process. There

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exists no standard patient teaching handout or checklist given to cranio-surgical patients before transition to the post-acute care setting. Knowing that patient education has been shown to improve patient satisfaction and patient outcomes, the need for the translational study was identified (Ben-Morderchai et al., 2010; Johansson et al., 2007). In addition to the evidence-based importance of patient education, patient outcomes are also crucial not only to the institution itself but more importantly to the actual patient. Outcomes include medical compliance and pain management both which are important to a patient's overall plan of care. Outcomes such as length of stay and thirty-day readmissions are important to the institution. All listed outcomes impact a hospital's national rating and thus its ability to serve patients with high quality patient care. The current hospital consistently ranks lower on the Healthcare Consumer Assessment of Healthcare Providers Survey (HCAHPS) rating scale than institutions of similar size (Medicare.gov, N.D.). For the HCAHPS questions, "Was your pain controlled?", the study institution reported 68% whereas the Pennsylvania and national average were both reported at 71% (Medicare.gov, N.D.). For the HCAHPS question, "How well did you understand the care you would need after the leaving the hospital?", the study institution reported 51% and the Pennsylvania and national average were both 52% (Medicare.gov, N.D.). Additionally, the national average for unplanned readmissions was 15.3% (Medicare.gov, N.D.). The study institution was not given a percentage for this outcome but the Medicare website states "worse than the national average" (Medicare.gov, N.D.). Other patient satisfaction and knowledge questions contribute to that low ranking (Medicare.gov, N.D.). Based on this objective data, implementing a standardized education bundle will inform patients of the care that they need from the start of their surgical experience to when they leave the hospital. Such education provides patients knowledge that sets expectations of their health care recovery.

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It was important to discuss feasibility prior to initiation of the study. Patient education is a vital aspect of nursing clinical practice and nurses can impact outcomes through education (Sherman, 2016). The study intervention tool is delivered by clinic and bedside nurses during the perioperative period. To facilitate continuation of the bundle once the study concludes, the bundle will be incorporated into the electronic medical record. By incorporating the bundle education into the EMR, it will be readily available for clinical staff to retrieve without difficulty and provide the one on one counseling session. Education is delivered in a private clinic room allowing time for the patient to listen to the information and ask questions. The operational feasibility of the perioperative neurosurgery education bundle and scheduling aspect can be coupled together. These components of feasibility may prove to be the most challenging. Resources necessary to continue the perioperative bundle are money, time and nurse training. Since the clinic and bedside nurses will be delivering the bundle during routine preoperative visits and at patient discharge, there is no additional monetary cost moving forward. The time to counsel the patient adequately during the preoperative visit will require a collaborative approach within the neurosurgery practice itself. Clinic nurse and bedside nurse training on the necessary and appropriate information for perioperative cranial patients is also sustainable. Quarterly training sessions can be conducted ensuring that all nurses are appropriately equipped to deliver the perioperative education bundle. The long-term plan to continue providing patients with the perioperative neurosurgery education bundle after study completion, consists of the bundle being incorporated into the EMR and scheduling additional time in clinic to allow clinical personnel and the patient to have the necessary one on one counseling session.

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Chapter II

An initial review of the literature provided evidence that patient education improves patient satisfaction (Wagner & Washington, 2016; Kliot, Zygourakis, Imershein, Lau & Kliot, 2015; Frank-Bader, Beltran & Dojidko, 2011; Ben-Morderchai, Herman, Kerzman & Irony, 2010; Johansson, Salantera & Katjisto, 2007). A review of existing literature of the impact of neurosurgery education on patient satisfaction and outcomes was conducted using CINAHL, PubMed, EBSCO and ScienceDirect. Reference lists from other articles were also examined for additional sources. Databases were searched using the keywords neurosurgery education, patient satisfaction, patient education, patient outcomes, perioperative education. Articles published in English from peer-reviewed journals were included. The search was limited to articles published within the last five years initially. When few studies were yielded in the original timeframe, the search was expanded to include those published since 2000. Studies employed different delivery modes of patient education including written, oral and visual. Articles on the importance of verbal communication were also included in the review. Education given to patients at any time during their health care experience were included in the review. The review yielded little evidence using neurosurgical patients as the target population.

Patient Education

Kliot, Zygourakis, Imershein, Lau & Kliot (2015) implemented a neurosurgery patient education bundle to improve patient satisfaction and aimed to have a positive impact on performance scores. The study compared the effect of the neurosurgery patient bundle to standard patient education on patient satisfaction as measured by HCAHPS scores (Kliot et al., 2015). The neurosurgery patient education bundle consisted of a preoperative expectation letter written to inform patients of what to expect before, during and after their procedure and

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hospitalization. A brochure containing pictures of attending physicians, residents and nurse practitioners on the neurosurgical service was also included as part of the bundle. The letter and brochure were distributed to patients in the outpatient setting prior to surgery. The authors received positive feedback regarding the preoperative letter on their patient satisfaction survey because it allowed the medical team to set patient expectations that were mutually agreed upon (Kliot et al., 2015). A positive trend in meeting patient information needs was identified, specifically six months prior to and after implementation of the bundle. Prior to implementation, 74.6% responded that the MD explained information and following, 78.7%. The authors commented that though this finding was not statistically significant ($p = 0.194$) it did show improvement (Kliot et al., 2015). The percentage of patients who commented that they always received information in writing about signs and symptoms of complications to be aware of also improved, 90.9% to 94.4% ($p = 0.103$) following implementation of the study's intervention tool (Kliot et al., 2015).

Education is comprised of various activities that have the potential to change a patient's behavior to improve individual knowledge (Lawal & Lawal, 2016). In a systematic review by Lawal & Lawal (2016), the authors compared studies on individual versus group patient education for diabetes mellitus type 2. Seven studies using diabetic group education as an intervention showed that group education was more effective than one-on-one sessions. Such characteristics as appropriate hemoglobin A1C levels, body mass index and general diabetic knowledge were improved when delivered in a group setting. Personal interactions between group members suffering from the same chronic disease and with the same goals strengthened understanding and contributed to a person's ability to change behavior (Lawal & Lawal, 2016). In contrast, the review also evaluated studies showing equal effectiveness between the two

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modes of education delivery. Similar diabetic outcomes such as hemoglobin A1C and daily glycemic control were unchanged following both individualized and group education (Lawal & Lawal, 2016). Lawal & Lawal (2016) recognized there are difference in learners and that educators must conform appropriately depending on those differences. Ultimately, patients should be given a choice whether to receive diabetic education in group or individual form depending on their preferences and mode of optimal learning (Lawal & Lawal, 2016).

Frank-Bader, Beltran & Dojlidkjo (2011) developed a standardized education teaching process for patients undergoing organ transplant. The standardized education was comprised of survey data from transplant nurses across three different units – intensive care, step-down and medical-surgical nursing unit. All these nurses had the potential to discharge a kidney or liver transplant patient. On the survey, nurses stated no standardized discharge education was in place and teaching delivery varied widely depending on the nurse (Frank-Bader et al., 2011). The transplant standardized teaching process was broken down into three components: 1) assessing patient learning preferences and identifying any barriers to the teaching-learning process 2) strategies to facilitate learning and engagement of patients and families in active care and 3) encouraging a multi-disciplinary approach to teaching within the institution (Frank-Bader et al., 2011). Patients' learning preferences and barriers were assessed on admission by the admitting nurse. This information was placed in the patient's chart for reference throughout hospitalization. Physical and emotional status was also assessed because they can impact a patient's readiness to learn. Previous strategies to enhance in hospital teaching included a folder with information on the patient's transplant, medication grids, wound care and signs and symptoms to be aware of. The authors found that family members often took the folder home leaving the patient without any resource. To avoid additional cost with the production of more

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folders, the teaching material was uploaded to the hospital's intranet for free access at any time (Frank-Bader et al., 2011). Patient pathways were developed and aligned with pre-existing clinical pathways to encourage families as an active part of care. A pharmacist, nutritionist and transplant nurse practitioner met the patient on admission and followed them throughout their hospitalization to provide specific information and answer any questions. The multi-disciplinary team conducted team rounds twice weekly to discuss patients, their progress and discharge needs (Frank-Bader et al., 2011). The new standardized teaching process was introduced at several staff meetings. Review of documentation occurred to ensure proper use. Evaluation of the discharge process occurred six months after implementation. Data was collected quarterly for one year using an author created survey (Frank-Bader et al., 2011). The survey instrument originally involved numerous discharge topics that patients reported as cumbersome to answer. After a review of the literature and piloting drafts of the instrument, the authors focused on transplant discharge medications involving rejection and infection. The final survey consisted of a 5-point Likert scale given to patients on the day of discharge following teaching. Reliability data was not given for the instrument. Comparison of fourth quarter data to first quarter data revealed increases in nurse review of medications (3.9 – 4.8), side effects (3.6 – 4.7) and general satisfaction with the discharge process (3.4 – 5.0) (Frank-Bader et al., 2011).

Adherence to a health care regimen is jeopardized with insufficient patient knowledge (Shaha, Wiithrich, Stauffer, Herczeg, Fattinger, Hirter, Papalini & Herrmann, 2015). A patient and family education program on oral anticoagulation therapy (OAT) was vetted in an original article by Shaha et al. (2015). The authors engaged in a community based participatory research design to develop and implement the education program. The OAT program was designed over three half day workshops attended by community-based nurses, medical and pharmacy

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professionals within the community. During the workshops, current OAT practice, brochures and a review of the literature were reviewed for the most up to date practice information. The new program was put before a panel of experts including nurses (n=10) and a medical professional (n=1) (Shaha et al., 2015). Nine four-hour teaching sessions were conducted to educate the nurses on the new OAT program. Data was collected six months following implementation of the program. Both the nurses delivering the program (n=67) and patients (n=9) took a post implementation survey. Nurses who delivered the program considered the structured information to be useful and able to be tailored to the individual patient's needs however more time was needed to cover topics adequately (Shaha et al., 2015). Of the nine patients completing the survey, five were newly placed on OAT and four had been on long term therapy. Qualitative analysis resulted in six different patient themes: forgetfulness, anxiety, loss of control, family support, lack of education and lack of support from health care professionals (Shaha et al., 2015). Random evaluation of nursing documentation of the teaching program was also conducted. By conducting this study, the authors concluded that it was possible to include input from important people surrounding OAT including patients, families, nurses, pharmacists and physicians. Merging this clinical information with a current review of evidence-based practice resulted in a comprehensive and concise OAT program (Shaha et al., 2015).

Education influences knowledge and the capability of patients to practice self-care behaviors (Mohammadpour, Sharghi, Khosravan, Alami, & Akhond, 2015). The authors conducted a randomized controlled trial investigating the effect a discharge education tool had on patients who recently suffered a myocardial infarction. Sixty-six patients were randomly selected at discharge. The control group received no education and the intervention group received education, counseling and support (Mohammadpour et al., 2015). To include

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appropriate patient information in the teaching, a pretest was conducted by the authors. The resultant education program included information on the cardiovascular system, MI risk factors and management and the importance of medical and dietary regimen compliance (Mohammadpour et al., 2015). The MI Self Care Ability Questionnaire (MISCAQ) was used to assess patient knowledge following the intervention. Test retest reliability of the instrument was 0.798, indicating high reliability (Mohammadpour et al., 2015). The two groups had no significant difference regarding characteristics. Following the intervention, the experimental group had a statistically significant higher score for knowledge, motivation and skills ($p <$ 0.0001) (Mohammadpour et al., 2015). The study results mirrored the concept of Orem's self-care deficit theory and the idea that patients who are appropriately counseled and educated possess a higher level of knowledge, motivation and education regarding their disease process. The authors did state that a limitation of the study included lack of generalizability and participant recruitment and data collection was not blinded (Mohammadpour et al., 2015).

Hospitalized ankylosing spondylitis (AS) patients were given a structured teaching program and assessed for knowledge improvement in a cohort study by J., Suneetha & Skandhan (2016). Following a pilot study showing poor disease knowledge in AS patients, the authors conducted a larger study involving seventy subjects and implemented the education program. The structured teaching program (STP) consisted of lecture with discussion and visual aids including flashcards. A pre and post-assessment study design was utilized to determine any change in patient knowledge. The questionnaire was based on the Arthritis and Rheumatism Council (ARC) brochure assessing four areas of knowledge: general knowledge, immunogenic tests and inheritance, general protection and joint protection. Reliability and validity was tested as high (r = 0.8) (J., Suneetha & Skandhan, 2016). A significant positive difference in

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knowledge scores were seen following the intervention ($p < 0.001$). The authors also stated that nurses delivering the program have a major role in caring for AS patients and facilitating new behaviors (J., Suneetha & Skandhan, 2016).

Strong and Bettin (2014) developed a patient education tool, Journey to Discharge Tool, to clearly communicate the stages that a patient takes from hospital discharge to rehabilitation. The tool was created by the hospital team and then compared with feedback provided by patients and families. The authors liken the concept of the tool to that of a road map. A map eliminates gender and cultural differences as all maps "move [a person] from one place to another [place]" (Strong & Bettin, 2014, p. 53). During the pre-admission phase, health care professionals collect information regarding the patient. On admission, the patient begins their journey. They are introduced to staff, given handbooks and the patients' right and responsibilities. A patient specific notebook is given to the patient and throughout the hospitalization, nurse clinicians put necessary patient specific information in the book and explain it to family. Entering rehabilitation is comparable to being done traveling on the trip. Short and long-term goals are established with the patient (Strong & Bettin, 2014). The authors were able to establish a .5 FTE nursing position to continue post discharge care through a follow up phone call. Specific follow up questions were determined by the study authors, a potential limitation of the study. Three years following implementation of the Journey to Discharge Tool, Press Ganey scores increased from 73rd to the 95th percentile for the study institution (Strong & Bettin, 2014).

Ross, Ohlsson, Blomberg & Gustafsson (2014) added the benefit of personalization to standardized education for heart failure (HF) patients in a descriptive design study. A control and intervention group both received HF education delivered by three experienced HF nurses. However, the intervention group was invited to write down questions specific to their own

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physical and psychosocial status prior to the education. In an addition to receiving the guideline driven HF education, the intervention group also had their own questions answered. The Numeric Rating Scale (NRS), Cronbach alpha 0.97, was used to evaluate the education. There was no statistical difference between the two groups. Patients in the intervention group responded that the information they received pertained more specifically to their personal care (Ross et al., 2014).

Review of current patient education studies reveal two consistent themes: 1) group versus individual education and 2) standardized versus unstandardized education (J., Suneetha & Skandhan, 2016; Lawal & Lawal, 2016; Kliot et al., 2015; Mohammadpour et al., 2015; Shaha et al., 2015; Ross et al., 2014; Strong & Bettin, 2014; Frank-Bader et al., 2011). Each study reviewed illustrated the benefit of patient education to empower the patient to become the driving force of their care.

Patient Satisfaction

Both qualitative and quantitative research articles have been used in the literature to investigate the influence patient education has on patient satisfaction. Wagner & Washington (2016) evaluated responses on the Modified Client Satisfaction Tool assessing the effectiveness of a discharge class on postpartum mothers. Traditional teaching methods, delivered by the nurse at the bedside, were rated as more satisfying overall than the discharge class. Individual teaching allows for flexibility and more personalized instruction than to a larger group of patients (Wagner & Washington, 2016). Mothers receiving the traditional discharge method specifically felt greater decision-making capabilities than the intervention group and their questions were answered in an individual way (Wagner & Washington, 2016). Discharge education can also be delivered in a structured manner through written materials. Ben-Morderchai et al. (2010)

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compared standard patient education to a structured model at the time of hospital discharge. The intervention group (n = 47) reported greater satisfaction with the discharge process and nurse-patient communication than the control group (n = 48). In a randomized control trial conducted by Chou & Lin (2011), a pain education program given to Tiawanese cancer patients significantly increased patient satisfaction with both physicians and nurses. The education program consisted of a thirty to forty-minute pain education session using the *Pain Education Booklet* delivered by the study's research assistant. A control group received conventional care with no guidance by the booklet (Chou & Lin, 2011).

A structured preoperative video module was shown to 150 patients undergoing a lung resection in a prospective cohort study conducted by Crabtree, Puri, Bell, Bontumasi, Patterson, Kreisel, Krupnick, & Meyers (2012). A control arm (n = 150) of the trial was prospectively assessed prior to the video's intervention followed by evaluation of the experimental group. The video module consisted of several important aspects of surgery including preoperative testing, admission procedures, details of the surgery itself and expectations from immediately postoperative, at discharge and once at home. Additional information was given on pain management, appropriate postoperative lung exercises, and expectations for respiratory and physical therapy during admission and at home (Crabtree et al., 2012). Results of the study showed an improvement in overall patient satisfaction and preparedness for surgery in those patients who viewed the module. Anxiety about surgery was also decreased in the experimental arm (Crabtree et al., 2012).

When investigating the literature for studies evaluating patient satisfaction, a standardized education model, whether video, written or printed materials, were delivered to patients. Overall, patients considerably reported a higher rate of satisfaction following a

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cohesive and standardized education process (Wagner & Washington, 2016; Crabtree et al., 2012; Chou & Lin, 2011; Ben-Morderchai et al., 2010). In addition to the latter literature review on patient education, this information lends to a greater need to investigate the effect of adequate patient education on overall patient satisfaction.

Patient Outcomes

Several studies investigated the effect of patient education on patient outcomes including hospital length of stay, thirty-day readmissions, compliance and pain management. Johansson et al. (2007) found that implementation of a preoperative "concept care map method" education model decreased hospital length of stay in an intervention group (M = 6.78 days) compared to a control group (M = 8.18 days). In the discharge education study of orthopedic patients by Ben-Morderchai et al. (2010), post hospital parameters including pain control, readmissions, physician visits and functional status were assessed. A statistically significant finding was improved pain management in the intervention group: 48.9% of patients in the intervention group reported pain postoperatively compared to 70.8% in the control group (p = 0.029). The decrease in pain complaints can be attributed to an improved use of analgesic medication due to increased knowledge regarding its benefit (Ben-Morderchai et al., 2010). The mean postoperative functional status, as measured by a standard activity of daily living (ADL) scale, also was higher in the intervention group (25 +/- 25) than the control group (34 +/- 32, p = 0.012).

At Oregon Science and Health University (OSHU), a pharmacist-initiated discharge education program targeted all cause 30-day readmissions and heart failure (HF)-related readmissions (Warden, Freels, Furuno & Mackay, 2014). The pharmacy-managed program included discharge information on heart failure pathophysiology, lifestyle modifications,

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symptomatic management and awareness including monitoring daily weights, medication information on all heart failure related medications and follow up information with contact numbers (Warden et al., 2014). Discharge counseling was initiated on the day of admission and occurred at multiple intervals throughout the admission. The before-and-after quasi-experimental study showed a reduction in both outcomes at statistically significant levels (p = 0.02 and p = 0.11, respectively) (Warden et al., 2014). An additional quasi-experimental research study was conducted at Assiut University in Asyut, Egypt to evaluate the effectiveness of a nursing educational program on reducing or preventing postoperative complications following intracranial surgery (Abd elmowla, Abd El-Lateef & El-khayat, 2015). No significant difference was found between the intervention and control groups at assessment, before discharge or at three months postoperative. Postoperative neurosurgical complications including cerebrospinal fluid leak, postoperative hematoma, seizures and residual neurological problems were significantly lower in the intervention group than the control group at six months postoperatively (Abd elmowla et al., 2015).

Consistent patient education influences patient outcomes as demonstrated by the described literature (Abd elmowla et al., 2015; Warden et al., 2014; Ben-Morderchai et al., 2010). There is no universally accepted, consistent method of patient education known to influence outcomes in the neurosurgical population. This lends further evidence to the necessity of the current translational study.

Conclusion

The studies identified through the literature encompass a wide range of clinical settings and types of educational programs. Each study demonstrates that cohesive education can impact a patient's overall health care plan (J., Suneetha & Skandhan, 2016; Wagner & Washington,

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2016; Abd elmowla et al., 2015; Mohammadpour et al., 2015; Shaha et al., 2015; Chou & Lin, 2011; Ben-Morderchai et al., 2010; Johansson et al., 2007). The discipline of pharmacy additionally shows that cohesive patient education can affect patient outcomes (Warden et al., 2014). Articles reviewed examined interventions that encompassed education aimed at improving knowledge, satisfaction and outcomes. Each intervention was delivered by a health care profession to the patient and family, across clinical settings. Based on the literature, patient education can improve outcomes across patient diagnoses. The development of an education instruction bundle for cranio-surgical patients is supported by this research.

Strengths of Current Evidence

Despite the lack of generalizability of the evaluated literature to the postoperative neurosurgical population, evidence plainly illustrates that education affects outcomes. Evidence exists that patient education impacts satisfaction and postoperative complications (J., Suneetha & Skandhan, 2016; Wagner & Washington, 2016; Abd elmowla et al., 2015; Mohammadpour et al., 2015; Shaha et al., 2015; Chou & Lin, 2011; Ben-Morderchai et al., 2010; Johansson et al., 2007). This strong quality evidence lends to the implementation of a perioperative education bundle to improve neurosurgical patient care.

Limitations of Current Evidence

A fair number of articles pertaining to patient education and the outcomes of satisfaction, post-operative complications and thirty-day readmissions exists in the literature, but a scarce number involve the postoperative neurosurgical patient as its target population. Throughout the literature, there is no one delivery mode of education recommended over another. Methods of education include oral, written or visual materials. Education was also delivered at different time

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points along the health care continuum. Taking these limitations into consideration, the translational project will entail both oral and written materials with implementation before hospitalization and at the time of discharge.

Theoretical Framework

Nursing practice has long been based on scientific practice and conceptual theory to guide care. Incorporating theoretical foundation into advanced nursing practice is a doctorate of nursing practice (DNP) essential as put forth by the American Academy of Colleges of Nursing (AACN) (AACN, 2006). Essential I states, a DNP will utilize scientific theory to "describe the actions and advanced strategies to enhance, alleviate, and ameliorate health and health care delivery phenomena" (AACN, 2006, p.9). Selecting a nursing theory as foundation for the effect a perioperative neurosurgery education bundle will have on patient satisfaction and outcome is key to ensuring the intervention is based upon scientific theory and evidence. Orem's Self Care Deficit Theory (OSCDT) is a widely-used theory that has been shown to improve a patient's self-care ability and has been chosen as the basis for this project (Mohammadpour, Sharghi, Khosravan, Alami & Akhond, 2015).

Self-Care Deficit Theory

The main theme of OSCDT is that patients want to care for themselves (Petiprin, 2016). The theory is comprised of three interrelated concepts that can be applied to all aspects of nursing practice: 1) universal self-care requisites 2) developmental self-care requisites and 3) health deviation requisites. Health deviation requisites arise when a patient's condition demands new needs, producing a "self-care deficit". An individual's ability to provide self-care is dependent on their knowledge, motivation and skills (Mohammadpour et al., 2015). It is in this

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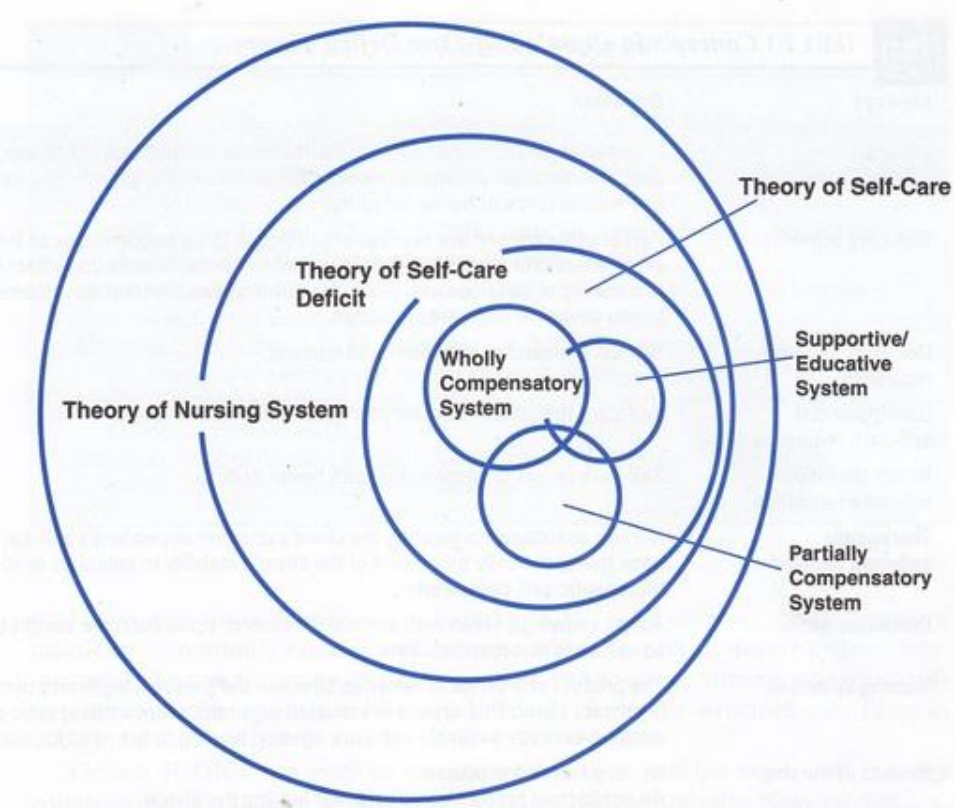
instance where nursing assists the patient with care, education and support (Petiprin, 2016). In the post-operative neurosurgical patient, the patient's health status is different from their baseline in terms of overall functionality, symptoms and quality of life. This temporary condition produces new self-care needs that patients are forced to expand upon.

Figure 1. Self-care deficit nursing theory.



The self-care deficit theory has been applied to various clinical conditions including myocardial infarction, peritoneal dialysis, hypertension and insomnia (Kurtz & Schmidt, 2016; Mohammadpour et al., 2015; Drevenhorn, Bengston, Nyberg & Kjellgren, 2014; O'Shaughnessy, 2014). Mohammadpour et al. (2015) conducted a randomized clinical trial assessing the effect of an educational intervention developed on OSCDT on the self-care ability of patients suffering a myocardial infarction. Sixty-six patients were randomly assigned to an

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intervention group and control group. The supportive educational intervention given to the experimental group resulted in higher levels of self-care knowledge, motivation and skills compared to the control group (Mohammadpour et al., 2015). In a pre- post-test study, Swedish nurses were exposed to an intervention consisting of patient-centered education regarding hypertension. The hypertensive patients who were counseled with patient-centered education achieved higher scores on the Exercise of Self-Care Agency (ESCA) instrument. The ESCA is an instrument used to measure a patient's perception of their ability to provide self-care (Drevenhorn et al., 2014).

In the translational study, the patient needing to undergo a cranial procedure has now acquired a new "self-care deficit" by Orem's theoretical concept of health deviation requisites. The perioperative neurosurgery education bundle will provide patients with cohesive information to close this deficit. Information is not only provided to the patient, but the bundle also permits patients to ask questions and clarify any details they may be unsure about. Information regarding their specific disease process, cranial procedure and expectations after surgery will alert the patient to any deviation from what is to be expected. If the patient recognizes a change, then they will seek care earlier and potentially decrease post-operative complications such as a surgical site infection. Such empowerment in a patient's self-care could lead to improved outcomes and thus impact overall patient knowledge and satisfaction.

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Chapter III

This translational study aimed to determine whether implementation of a perioperative neurosurgery education bundle improved patient knowledge, patient satisfaction and patient outcomes. The quantitative correlational study design investigated correlation and causation between patient sample characteristics, patient knowledge, patient satisfaction, 30-day readmissions and postoperative complications. .

Study Description

The implementation project took place during a twelve-week time-period within the neurosurgery department at Allegheny General Hospital, a part of Allegheny Health Network. The neurosurgery department is comprised of twelve neurosurgeons with varied surgical specialties; four of the surgeons focus on cranial disorders and perform the most cranial procedures. These four surgeons within the neurosurgery department operate on average 25 cranial cases per month. Preoperative implementation occurred during the patient's preoperative visit in the outpatient clinic. Discharge implementation occurred at the time of discharge from the neurosurgical unit. During the patient's first postoperative visit, the patient completed the post-test assessment.

Subjects and Recruitment

Approval of the study was obtained from the Allegheny Health Network and Georgia College and State University Institutional Review Boards to comply with applicable laws and regulations associated with research. Participants were recruited using a purposive sampling strategy. Purposive sampling is an effective method when the target population carries distinct characteristics (Terry, 2015). In the study's population, this distinct characteristic is the "elective

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cranial neurosurgical patient". Inclusion criteria included 1) patients > 18 years of age and 2) undergoing a cranial surgery. Participants were proficient in English and able to fill out the surveys appropriately. Exclusion criteria included 1) < 18 years of age and 2) not proficient in English. Potential study participants were identified by the neurosurgeons during clinical visits and then recruited in person by the primary investigator. Informed consent was obtained by the PI.

To achieve a power of .80 and an alpha of .05, a sample size of 51 was needed (Soper, 2017). A total of forty-one clinics were screened for potential participants. Each clinic had an average number of 28 neurosurgical patients. A total of eight participants were recruited for the study thus not meeting the requirements for statistical power.

Participant data was collected at one point during the study – the postoperative visit. Study surveys were administered to participants via a manila envelope given to the participant at the time of their visit registration. The envelope contained the Preoperative Teaching Interview Guide (PTIG) survey for patient knowledge and the Client Satisfaction Questionnaire (CSQ-8) survey for patient satisfaction. Also included in the envelope was a thank you note from the PI and a $5 gift card to a local grocery store. Participants were asked to complete the surveys in the privacy of the clinic room, place them in the envelope and return them to the registration desk. Outcome data was retrieved from the Allegheny Health Network Department of Infection Control and Department of Quality and Safety for 2017 quarter data for 30-day readmissions and postoperative complications. Thirty- day readmissions were placed into three categories: 1) infection, 2) neurological and 3) medical. Postoperative complications were defined as a readmission related to the surgical procedure or a neurological consequence. Readmissions containing a medical diagnosis were not included in postoperative complications.

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Intervention Tool

The PI developed the perioperative neurosurgery education bundle based on current clinical practice and review of the literature. Information contained within the perioperative education bundle, both written and verbal instruction, was obtained from PI clinical expertise and neuroscience publications (Greenberg, 2016; Hickey, 2013). The written portion of the bundle was comprised of two parts: preoperative information and discharge information.

The preoperative written information was further broken down into two sections: 1) general information regarding brain surgery including hospital expectations and 2) disease specific information. The general information handout had information about why the patient was recommended surgery and items necessary to remember in preparation for surgery. The handout further detailed precise events that the patient would experience on the day of surgery, beginning with checking in at the Ambulatory Care Center and summarizing potential discharge locations including home, inpatient rehabilitation or a skilled facility. Instructions for family members and regarding recovery room procedures were given. The general information sheet ended with the patient waking up in the recovery room (Appendix A). Which diseases to incorporate into the disease specific handouts were determined based on clinic data obtained from the department of neurosurgery. In the facility, the most common disease processes that underwent an elective cranial procedure were brain tumors and unruptured aneurysms. The disease specific handouts were focused on these two diagnoses (Appendices B, C). The brain tumor handout listed signs and symptoms associated with brain tumors. The most common tumor types were described in a graph on the handout. The bundle also verbally walked the patient through the surgical experience, beginning with placement of the patient on the operating room table. The description of the patient's hospitalization further detailed staying in the

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intensive care unit, getting transferred to a regular nursing floor and potential discharge timing and disposition.

The written portion of the preoperative education bundle was coupled with verbal instruction delivered by the PI. In a private clinic room to protect patient confidentiality, the PI went through the written materials face to face with the patient, verbally reiterating the information provided. The PI encouraged questions from the patient and/or family members. These answers were based on clinical expertise and experience. The verbal instruction consisted of an approximate ten-minute session. The preoperative education bundle was delivered by the principal investigator once the patient was identified and consented to participate in the study. A "Perioperative Education Bundle Checklist" was developed by the PI to ensure that all important factors were included in the verbal portion of the bundle (Appendix D). The date and start/end time of preoperative bundle administration were recorded for each study participant on a bundle checklist.

The discharge portion of the bundle also incorporated both written and verbal instruction (Appendix E). This information was delivered to the patient at hospital discharge. Information on the written handout was gathered from neurosurgical publications as well as accepted general practice within the neurosurgery department. The discharge bundle contained specific information on safety precautions, activity restrictions, wound care and showering. The more common postoperative neurosurgical medications patients were prescribed were listed individually, providing an area for the discharge nurse to write in the patient's specific dose. These medications included dexamethasone, levetiracetam and a narcotic for pain. The medications were identified and explained by the bedside nurse discharging the patient. Patient specific doses, next medication time and potential side effects were explained to the patient. The

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last section of the written discharge bundle was for follow up information. The neurosurgeon's phone number, nurse's station phone number and other pertinent physician information were listed in this section. Additional tests needed after discharge were listed as well as a date/time for a postoperative appointment(s). The PI recruited and educated bedside neuroscience nurses working on both the acute and intensive care units to do so.

Measurement Tools

Three surveys were used to assess independent and dependent variables. The demographic questionnaire was developed by the PI and included questions on gender, ethnicity, age, prior neurosurgical history, pain history and co-morbidities (Appendix F).

The *Preoperative Teaching Interview Guide* (PTIG) (Bernier, Sanares, Owen & Newhouse, 2003) was used to assess patient knowledge following implementation of the neurosurgical perioperative education bundle. The survey was available on the public domain. It carries an internal consistency averaging Cronbach's alpha = .83 (Forshaw, Carey, Hall, Boyes, & Sanson-Fisher, 2016). The PTIG is an abbreviated version of a previous survey whose items were concluded with recommendation from a panel of experts (Forshaw et al, 2016). The PTIG contains five distinct subscales: 1) situational/procedural information related to the procedure itself 2) sensation/discomfort information related to sensations and pain the patient may feel before, during and after the procedure 3) patient role information related to the expected behavior of patients as participants in their health care goals 4) skills training related to postoperative care such as wound care and dressing changes and 5) psychosocial support defined as "the interaction between patients and providers which is aimed at helping patients deal with anxiety, concerns and fears" about their upcoming surgery and care (Bernier et al, 2003). Individual subscales of the PTIG carry an internal consistency from 0.54 to 0.72. Each subscale

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of the PTIG collectively evaluate the neurosurgery perioperative education bundle and its impact on the study outcomes.

The *Client Satisfaction Questionnaire-8* (CSQ-8) (Larsen, Attkisson, Hargreaves & Nguyen, 1979) was used to assess patient satisfaction following implementation of the neurosurgical perioperative education bundle. The CSQ-8 is a scored client satisfaction questionnaire. The questionnaire is scored from four to one with four being the best possible score for a question and one being the worst. The highest collective score is 32 and the lowest, 8. Permission was received from the survey authors as well as a money paid to use the survey. The survey costs $0.55 for the first 250 uses. One hundred questionnaires were bought for $55. The survey carries an internal consistency ranging Cronbach's alpha 0.83-0.93. Content validity was provided by expert review and factor loadings (Larsen et al., 1979).

The focus of the study was on implementing a standardized, cohesive perioperative neurosurgical education bundle to elective cranial patients. The intervention tool consisted of preoperative information and key topics pertinent to discharge and post-acute care. Utilizing two surveys previously tested for reliability, the intervention tool was assessed for either a positive or negative impact on patient knowledge, patient satisfaction and patient outcomes.

Chapter IV

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The results of the quality improvement project evaluating the impact of a neurosurgery perioperative education bundle on patient outcomes and patient satisfaction are discussed in this chapter. Demographic variables as well as surgeon, preoperative bundle time implementation, time to treatment, diagnosis and time from discharge to follow up are correlated to patient satisfaction and knowledge. Each clinical question is supported by data and discussed.

IBM SPSS Statistics for Windows, Version 24 was used for data analysis. Prior to analysis, data cleaning was conducted including checking for missing or erroneous variables and outliers. Of the demographic questionnaires, there were three items missing but not more than one for any given participant. Missing data were replaced by mean replacement.

Sample Description

A total of 41 clinics were screened for potential study participants. The number of neurosurgical patients per clinic ranged from 14 – 32. A total of nine participants were initially enrolled in the study but one did not have surgery; therefore, eight participants (N=8) completed the study. The mean age of the sample was 57.3 years (SD=11.1) with a range of 33 to 69 years. The majority of participants were female (62.5%) and Caucasian (100%). The mean height was 5'7" (67 inches) (SD=2.6) and average weight was 174.5 pounds (SD=38.6). Only 25% of the study population smoked cigarettes. Half of the study participants suffered from chronic pain. One participant (12.5%) had previous brain surgery. The majority of participants (75%) lived in a house with family and none lived in an assisted living facility or other facility type. Participants reported a wide range of co-morbidities including hypercholesterolemia (25%), cancer (25%), hypertension (12.5%) and other (12.5%) such as thyroid disease. Two (25%) of the study participants did not answer this question. None of the study participants reported a bleeding problem. Five (62.5%) of the study participants reported care from Surgeon A. The

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most common diagnoses for elective cranial surgery was an unruptured cerebral aneurysm (37.5%) and glioma (37.5%).

On average, 13.8 minutes (SD=5.2) were spent implementing the preoperative education bundle after the patient was enrolled with a range of six to twenty-two minutes. Average time from bundle implementation to date of surgery was 13.9 days, with a range from two to twenty-five days. The average time from surgery to follow up when post bundle surveys were completed was 19.2 days (SD=5.7) and the range was 14 to 31 days.

Clinical Questions

Clinical question 1

What sample characteristics correlate with the level of patient satisfaction and patient knowledge after implementation of a neurosurgery perioperative education bundle?

A Pearson's coefficient was analyzed for scale variables and the Chi Square test of Independence for nominal and categorical variables (See Table 2 and 3). No significant relationships were found between patient satisfaction and gender X^2 (4, N=8) = 3.73, p = .443, ageX^2 (28, N=8) = 32.00, p = .275, height X^2 (20, N=8) = 22.00, p = .341, weight X^2 (28, N=8) = 32.00, p = .275, smoke X^2 (4, N=8) = 4.00, p = .406, chronic pain X^2 (4, N=8) = 4.00, p = .406, previous brain surgery X^2 (4, N=8) = 8.00, p = .092, living arrangement X^2 (4, N=8) = 8.00, p = .092, medical problems X^2 (6, N=8) = 8.25, p = .220, and surgeon X^2 (8, N=8) = 16.00, p = .042 or between patient knowledge and the same characteristics (gender X^2 (6, N=8) = 8.00, p = .238, age X^2 (42, N=8) = 48.00, p = .243, height X^2 (30, N=8) = 32.00, p = .368, weight X^2 (42, N=8) = 48.00, p = .243, smoke X^2 (6, N=8) = 8.00, p = .238, chronic pain X^2 (6, N=8) = 6.00, p = .423, previous brain surgery X^2 (6, N=8) = 8.00, p = .238, living arrangement X^2 (6, N=8) = 8.00, p =

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.238, medical problems X^2 (15, N=8) = 18.00, p = .263. A significant positive correlation was found between surgeon and patient satisfaction X^2 (8, N=8) = 16.00, p = .042. This indicates a higher level of patient satisfaction dependent on the physician performing the cranial surgery. Analysis was not performed on those sample characteristics where the variable was a constant (ethnicity, bleeding problems). There was a significant positive correlation between the amount of time spent implementing the preoperative education bundle and the level of patient knowledge, *r = .843**, p < .01*. Patients with more time spent by the PI implementing the preoperative education bundle had significantly higher knowledge of their disease process and surgical experience.

Clinical question 2

What demographic factors correlate with the occurrence of a 30-day readmission and postoperative complications?

Out of the study population, one surgical site infection occurred. There was no significant correlation between the occurrence of infection and sample characteristics except one. There was a significant correlation between the occurrence of surgical site infection and time between day of surgery and follow up, *r = -.840**, p < .01*. Those patients with less time between the day of surgery and the first postoperative visit were less likely to have a surgical site infection. Out of the study population, two readmissions occurred within 30 days of discharge. One readmission was classified as infection and the other, medical. There was a significant correlation between 30-day readmission and the preoperative bundle implementation time, *r = .752*, p < 0.05*. Patients who spent more time during the preoperative counseling session had a significantly less chance of a 30-day readmission. There was a significant correlation between 30-day readmission and a history of chronic pain, *r = .480*, p < 0.05*. Those patients who

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reported chronic pain had an increased risk of readmission those than patients who did not have a history of chronic pain. There was also a significant correlation between 30-day readmission and patient knowledge, $r = .719^*$, $p < 0.05$. Those patients who reported a higher level of patient knowledge regarding their disease process and surgical expectations were less likely to be readmitted within 30 days. Complete reporting of this analysis is included in Table 4 and 5.

Clinical question 3

What is the level of patient satisfaction after implementation of a neurosurgery perioperative education bundle? The observed range of patient satisfaction was 26.00 – 32.00 indicating a high level of patient satisfaction (Table 6). All eight questions on the survey were given at least a 3.00/4.00. The mean score for the study population was 29.75 (SD 2.19), also indicating a high level of patient satisfaction. All study participants would return to the program if additional help were needed.

Clinical question 4

What is the level of patient knowledge after implementation of a neurosurgery perioperative education bundle? Descriptive statistics including response frequencies and mean scores were utilized to analysis data from the Perioperative Teaching Interview Guide (PTIG). The observed range of PTIG scores was 77.00 – 88.00, indicating patients had a high level of knowledge regarding their care (Table 7). Half of the participants did not recall being taught deep breathing exercises. Twenty-five percent of patients were not told they would feel cold and hear noises entering the operating room. At least one patient was not sure whether they were told how long they would be in recovery, information needed at discharge or the hospital process from admission to discharge.

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The mean PTIG score was 83.5 (SD 3.67), 14.5 points from the highest possible score. This indicates an above average knowledge base regarding their disease process and surgical experience. The mean overall satisfaction with the patient's surgical experience was 9.85 (SD .35). Given that the highest possible score for overall satisfaction is a ten, the mean overall score indicates a general high level of satisfaction for the participants' surgical experience. The mean overall satisfaction with preoperative teaching given for your surgical experience was 9.42 (SD .50). The highest possible score awarded for overall satisfaction with preoperative teaching was also a ten. The mean overall satisfaction score for preoperative teaching indicates patients were highly satisfied with the education they received prior to their surgical procedure and at discharge.

Clinical question 5

What effect does a perioperative neurosurgery patient education bundle have on 30-day readmissions? Data was obtained from Allegheny General Hospital's Department of Quality and Safety depicting the number of 30-day readmissions for the first and fourth quarters of 2017. The first quarter data was collected prior to study implementation. Fourth quarter data was collected following study completion. Readmissions defined as infection were infection related to a neurosurgical procedure. Neurological readmissions included diagnoses such as stroke, headache, seizure, hydrocephalus, cerebrospinal fluid leak, acute hematoma, altered mental status, encephalopathy and weakness. Medical readmissions included diagnoses such as respiratory failure, pneumonia, congestive heart failure, urinary tract infection, blood clot (pulmonary or extremity) and pain. Table 10 displays frequencies for 30-day readmissions in cranial patients. A one sample t-test was done to compare the means of readmission data for quarter one and quarter four, 2017. Fourth quarter 30-day readmissions were significantly lower

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(M = 2.33, SE = .33) than first quarter 30-day readmissions, t (2) = -11.99, p < .007. This analysis shows less 30-day readmissions occurred in the fourth quarter, 2017 than the first quarter. Because of the translational study's small sample size, this can not be attributed to implementation of the education bundle.

Clinical question 6

What effect does a perioperative neurosurgery patient education bundle have on postoperative complications? Postoperative complication data, including surgical site infections, were obtained from the Allegheny General Hospital's Department of Quality and Safety and the Department of Infection Control, depicting the number of postoperative complications for the first and fourth quarters of 2017. There were twelve postoperative complications for quarter one and five for quarter four, 2017. A one sample t-test was conducted to determine any significant difference between the two quarters. Fourth quarter postoperative complications were lower (M = 1.67, SE = .33) than first quarter postoperative complications, t (2) = - 9.01, p < .012. Similar to 30-day readmissions, a statistically significant lower number of postoperative complications in the fourth quarter of 2017 cannot be attributed to implementation of the education bundle because of the study's small sample size.

In this chapter, study data was reported, and clinical questions answered. There was no significant correlation between sample characteristics and patient knowledge or patient satisfaction scores. Chronic pain was found to be a risk factor for 30-day readmission though previous brain surgery was not. The amount of time spent implementing the bundle positively correlated with patient knowledge scores. Both similarities and contrasts were found between the study results and literature indicating further investigation into the impact education has on the study variables is warranted.

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Chapter V

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This descriptive translational study was performed to explore what impact a perioperative neurosurgical education bundle had on patient knowledge, patient satisfaction and patient outcomes in the elective cranial patient. Cranial patients undergoing elective craniotomy for diagnoses unruptured aneurysm and brain tumor participated in the study. The findings and conclusions regarding the correlation between sample characteristics, cumulative survey scores and outcomes pre and post implementation are discussed in this chapter. Also, strengths, limitations and implications for future practice and research are presented.

Clinical Question 1: Correlation between Sample Characteristics, Patient Knowledge and Patient Satisfaction

Multiple population characteristics were gathered using the patient demographic questionnaire. However, due to the limited number of study participants (n = 8) there was little trait variation to the group despite their similar need for surgery. As illustrated in Table 2, there was no statistically significant correlation between population traits and patient knowledge and satisfaction. In the review of the literature, multiple studies also did not demonstrate any demographic correlations with patient satisfaction or knowledge (Drevenhorn et al., 2014; Ross et al., 2014; Frank-Bader et al., 2011; Ben-Morderchai et al., 2010). The study by J., Suneetha & Skandhan (2016) did show a significant correlation between knowledge and age. A larger sample size for the current translational study may capture such a significance. Additional demographic characteristics included by J., Suneetha & Skandhan (2016) that also revealed statistical significance included participant level of education, exercise and their occupation. Education and occupation are both factors that have the potential to influence knowledge (J., Suneetha & Skandhan, 2016). These characteristics were not included in the present study but should be considered in future research. A higher level of patient satisfaction was seen

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depending on a which surgeon performed the procedure $X^2(8, N=8) = 16.00$, $p = .042$. Surgeon preference was not a dependent variable identified in the literature. Given this finding, further investigation into what actual information the surgeon and other health care personnel are or are not presenting to patients is necessary. Additionally, understanding what aspect of their surgeon's care they were dissatisfied with would be of benefit.

Additional characteristics gathered by the PI included time related data: bundle implementation time length, timeframe between bundle and operative date and timeframe between discharge and follow up. There were not any studies identified in the literature that investigated the time it took to deliver the education or if the time between implementing the education and follow up were correlated. Ben-Morderchai et al. (2010) conducted a phone call six weeks after discharge regarding the process but time was not included in data analysis as a variable. Strong & Bettin, (2014) also conducted a follow up phone call 48-72 hours following hospital discharge to evaluate patient knowledge but time was not considered as a confounding factor. In the current translational study, the amount of time spent implementing the preoperative bundle and level of patient knowledge were positively correlated, $r = .752^*$, $p < 0.05$. There was a varying amount of time spent with the patient preoperatively based on numerous factors (busy clinic, patient's having other appointments). Given the positive impact time spent giving the education has on knowledge, further indications for research would be to ascertain the most appropriate time frame for the preoperative bundle. Determining the most effective amount of time would be efficient for both the clinic staff and patient.

Clinical Question 2: Correlation between Sample Characteristics and 30-day Readmissions and Postoperative Complications

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There was no significant correlation between patient demographics and 30-day readmissions. This was in contrast to the literature that found men, specifically African American men, were at a higher risk for readmission than their Caucasian counterparts (Moghavem, Morrison, Ratliff, Hernandez-Boussard, 2015; Morris, Rohrbach, Sundaram, Sonnad, Sarani, Pascual, Reilly, Schwab & Sims, 2014). All of the study participants were Caucasian and did not include any other races though both males and females participated in the study. It is likely that the small sample size prohibited including additional races other than Caucasian. Literature also identified accompanying co-morbidities including hypertension, bleeding disorder and diabetes as a risk factor for readmission following a cranial surgical procedure (Rambachan, Smith, Saha, Eskandari, Bendok & Kim, 2014). The study analysis did not identify any such correlation between the latter and 30-day readmission however it did identify chronic pain as a risk factor for 30-day readmission. Those patients suffering chronic pain were more likely to be readmitted within 30 days of discharge ($r = .480^*$, $p < 0.05$).

There was a significant correlation between 30-day readmissions and the amount of time spent during the counseling session of the preoperative bundle, $r = .719^*$, $p < 0.05$. The longer time spent with the patient, the less likely a 30-day readmission was to occur in the study population. No literature was retrieved that utilized education time as a dependent variable with 30-day readmissions. Given the small sample size, the likelihood of actual significance is questionable however this objective data identified education time as a factor that must be considered in future research.

There was a significant correlation between surgical site infections and the time between the date of surgery and the first postoperative follow up appointment, ($r = -.840^*$, $p < .01$). These results indicate that patients who were seen sooner for their postoperative visit were less

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likely to develop an infection. As previously mentioned, time as a dependent variable was not identified during the review of literature. An earlier follow-up appointment likely recognizes signs and symptoms of infection, so treatment can begin immediately, preventing a fulminant infection, need for surgical debridement or a readmission. Previous brain surgery was not identified in this study as a risk factor for infection. This finding is consistent with Kourbeti, Vakis, Ziakas, Karabetsos, Potolidis, Christou & Samonis (2015) who systematically recorded 334 cranial procedures and found that a previous surgery was not a predictor of postoperative infection.

Clinical Question 3: Patient Satisfaction after Bundle Implementation

In this study, more than half of CSQ-8 scores were in > 50th percentile following bundle implementation. Baseline data was unavailable for comparison. Despite the small sample size and lack of statistical significance, this finding is consistent with previously identified literature that patient education can impact satisfaction scores (J., Suneetha & Skandhan, 2016; Wagner & Washington, 2016; Abd elmowla et al., 2015; Mohammadpour et al., 2015; Shaha et al., 2015; Chou & Lin, 2011; Ben-Morderchai et al., 2010; Johansson et al., 2007).

Clinical Question 4: Patient Knowledge after Bundle Implementation

In this study, patients reported a high knowledge base after bundle implementation. Baseline data was unavailable for comparison. The highest possible PTIG score was 88.00. Given that the observed range for the study was 77.00-88.00, this indicates high patient knowledge following the bundle. Specific PTIG topics where patients were unsure of their knowledge included information regarding anesthesia, pain expectations, sequence of hospital events and preparation for discharge. The preoperative education counseling session reviewed

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the sequence of hospital events and necessary steps to take for discharge. The lack of knowledge on these topics indicates that patients undergoing an elective cranio-surgical procedure had trouble remembering newly learned information. Further research is needed to identify strategies for patients to be able to maximize their learning of essential health care information (Kandula, Malli, Zei, Larsen & Baker, 2011).

Clinical question 5: Perioperative Education Bundle and 30-day Readmissions

In the translational study, there were less 30-day readmissions in the fourth quarter, 2017 than the first. The small study sample (n=8) illustrates this finding cannot be attributed to the study intervention tool. Findings in the literature support a decrease in readmissions after patient education (Warden et al., 2014).

Clinical question 6: Perioperative Education Bundle and Postoperative Complications

The incidence of postoperative complications was less in the fourth quarter, 2017 than the first. Despite this significant difference, the decrease cannot be attributed to the study intervention due to the limited sample size. In a study by Abd elmowla et al. (2015), neurosurgical complications such as surgical site infection, postoperative hematoma and cerebrospinal fluid leak were decreased at six months following implementation of a nursing education program on postoperative complications. In the current translational study, the types of postoperative complications varied. The first quarter revealed an equal number of infectious and neurological complications while the fourth quarter had more neurological complications. This is in tandem with the literature.

The translational study's clinical questions were appropriately answered with data yielded from statistical analysis. Each question yielded a finding that warrants further

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investigation into the important benefits standardized education brings not only to the patient but overall care as well.

Study Strengths

Strengths of the study include identifying the need for an improved mechanism of cranio-surgical education delivery and developing an intervention that met that need. The institution's busy neurosurgery clinic employs four different surgeons who perform elective cranial surgery. Each clinic had different personnel developing perioperative information, resulting in a lack of important facts that patients need to know regarding their health care. Information for the intervention tool was gathered not only from experienced surgeons but also from neurosurgical publications outlining quality clinical practice. Supported by evidence-based literature, the intervention tool provides patients with the knowledge to positively engage in their care. The intervention tool, coupled with verbal counseling, informed patients of appropriate care preoperatively, in the hospital and at hospital discharge. Understanding the need for standardized discharge information for craniotomy patients, the neurosurgery department adopted the discharge portion of the perioperative education bundle as standard of care at the initiation of the study. Once vetted by the physicians, the discharge bundle was then presented to the department's quality committee for approval. Once approved by both groups, the discharge bundle was printed in mass and distributed to appropriate units. As many as forty critical and acute care bedside nurses attended one of three mandatory educational huddles explaining the purpose of the discharge bundle, who receives the bundle and where it can be accessed on the unit. During the study, the discharge bundle remained in paper form. When the study ended, the PI contacted EMR technicians to begin incorporating the standardized discharge bundle into the

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system. Having a permanent place in the EMR ensures not only standardization of discharge information provided but the discharge bundle's sustainability as well.

Study Limitations

Limitations also existed within the study. To ensure that clinic personnel have appropriate time to counsel elective preoperative cranio-surgical patients, a time slot should be allotted on the scheduled. The busy neurosurgery clinic moves patients in and out quickly and is a distraction to a private teaching session. Patient characteristics not anticipated when developing the methodology for the study included patients undergoing a second cranial procedure and patients undergoing a cranial procedure where the neurosurgeon was not the primary surgeon on the case. Both situations have the potential to alter the study participant's knowledge of cranial surgery and influence their patient knowledge scores. The lack of participant recruitment was also a limitation in this translational study. For a patient to be consented and enrolled in the study, the PI needed to be on site and accessible to the clinic. If an appropriate study patient was identified but the PI was not on site, the patient could not be enrolled. Including telephone consent and explanation of the study could have eliminated this limitation.

Implications for Practice

After completing this translational study, it is evident that patient education is important to improve overall patient care. Education not only needs to be all encompassing, but that same information needs to be consistently delivered to each cranio-surgical patient undergoing surgery. The discharge portion of the education bundle has already been adopted as standard of care and transitioned into the EMR. This allows for easy accessibility for bedside nurses to

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obtain key information for patients and review it with the patient and family. Additional implications for practice include incorporating the preoperative bundle into the EMR. Further practice change could also consist of including non-elective cranio-surgical patients and delivering the preoperative bundle to patients beginning their health care journey in the hospital and not the outpatient clinic. The addition of a nurse navigator to guide cranio-surgical patients throughout their health care journey would also enhance compliance and improve satisfaction (Deen, Terna, Kim, Leahy & Fedder, 2016). Nurse navigators have been used in many different specialties, such as stroke and oncology, to offer support, answer questions and identify changes in a patient's care (Deen et al., 2016; Cantril & Haylock, 2013). The underlying theory of nurse navigation is that of Orem's Self Care; the same theory applied to this translational study.

Implications for Research

The need for a larger sample size was evident throughout the translational study. A larger sample size would help determine if the current intervention tool and education within it has a positive impact on patient knowledge, satisfaction and outcomes. If a larger sample size is not feasible at the current institution, then multiple network sites should be included in the study. A pre and post-test study of a larger sample size should also be included to ascertain if the study's independent variables can be positively affected. Different education delivery modalities should be considered to test in future research including video and computer applications. Study participants also did not recall information present in the preoperative counseling session. Investigation into patient retention of preoperative discussions and factors affecting it is also important when discussing standardized patient education.

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Conclusion

Patient education and effective communication comprise the basis for patient centered care (Drenkard, 2013). This connection has led institutions to develop initiatives and pathways to consistently meet patients' needs and maintain satisfaction. One way to meet those needs is through education. Properly educating patients of their health care course and setting realistic expectations has been shown to improve patient outcome and satisfaction (Wagner & Washington, 2016; Kliot et al., 2015; Reiter, 2014; McBride & Andrews, 2013; Frank-Bader et al., 2011; Ben-Morderchai et al., 2010; Johansson et al., 2007). As demonstrated by supporting literary evidence, education needs to be cohesive and reiterated to patients. A multi-modality education tool will ensure that patients have ample opportunity to not only ask questions but also learn in different styles. Providing perioperative education to cranial neurosurgical patients in both the pre-operative setting and at hospital discharge to improve patient satisfaction is a hypothesis that needs to be evaluated. This can be accomplished through an interventional study. The translational and clinical study illustrated meets this need. The perioperative neurosurgery education bundle has the inherent possibility to improve knowledge, positively influence satisfaction and overall quality outcomes, all catalysts to enhance patient care.

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Table 1

Sample Characteristics

Characteristic	n	%
Gender		
Male	3	37.5
Female	5	62.5
Ethnicity		
Caucasian	8	100
Latino	0	0
Asian	0	0
European	0	0
Prefer not to answer	0	0
Smoke		
Yes	2	25
No	6	75
Chronic Pain		
Yes	4	50
No	4	50

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Characteristic	n	%
Prior Brain Surgery		
Yes	1	11.1
No	7	77.8
Bleeding Problem		
Yes	0	0
No	8	100
Living Arrangements		
House with family	6	75
House by myself	2	25
Assisted living	0	0
Facility	0	0
Other Medical Problems		
Diabetes	0	0
High Blood Pressure	1	12.5
High Cholesterol	2	25
COPD	0	0
CHF	0	0

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Characteristic	n	%
Cancer	2	25
Asthma	0	0
Heart Disease	0	0
Other	1	12.5
Surgeon		
A	5	62.5
B	1	12.5
C	0	0
D	2	25
Diagnosis		
Aneurysm	3	37.5
Glioma	3	37.5
Meningioma	1	12.5
Metastasis	1	12.5

Characteristic	*M(SD)*	Range
Age (years)	57.3(11.1)	33 – 69
Height (inches)	67.1(2.6)	63 – 71

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Characteristic	*M(SD)*	Range
Weight (pounds)	174.5(38.6)	130 – 250
Preoperative bundle education time (minutes)	13.8(5.2)	6 – 22
Time from bundle implementation to date of surgery (days)	13.9(6.7)	2 – 25
Time from date of surgery to follow up (days)	19.2(5.7)	14 – 31

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Table 2

Results of Chi Square Test and Sample Characteristics for Level of Patient Satisfaction and Level of Patient Knowledge (N=8)

Variable	Chi Square	DF*	*p*
Gender			
Satisfaction	3.73	4	.443
Knowledge	8.00	6	.238
Age			
Satisfaction	32.00	28	.275
Knowledge	48.00	42	.243
Height			
Satisfaction	22.00	20	.341
Knowledge	32.00	30	.368
Weight			
Satisfaction	32.00	28	.275
Knowledge	48.00	42	.243
Smoke			
Satisfaction	4.00	4	.406

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Variable	Chi Square	DF*	*p*
Knowledge	8.00	6	.238
Chronic Pain			
Satisfaction	4.00	4	.406
Knowledge	6.00	6	.423
Previous Brain Surgery			
Satisfaction	8.00	4	.092
Knowledge	8.00	6	.238
Living Arrangement			
Satisfaction	8.00	4	.092
Knowledge	8.00	6	.238
Medical Problems			
Satisfaction	8.25	6	.220
Knowledge	18.00	15	.263
Surgeon			
Satisfaction	16.00	8	.042
Knowledge	13.20	12	.355

**DF = degrees of freedom*

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Table 3

Correlation Analysis between Sample Characteristics and Level of Patient Satisfaction and Level of Patient Knowledge (N=8)

Variable	ED to OR	OR to FU	Bundle Time	PTIG total	CSQ total
1. ED* to OR*					
Pearson's	1	.166	-.017	-.164	.658
Sig (2-tailed)		.694	.968	.697	.076
2. OR to FU*					
Pearson's	.166	1	-.007	.084	-.306
Sig (2-tailed)	.694		.986	.844	.461
3. Bundle Time					
Pearson's	-.017	-.007	1	.843**	-.144
Sig (2-tailed)	.968	.986		.009	.734
4. PTIG total					
Pearson's	-.164	.084	.843**	1	-.171
Sig (2-tailed)	.697	.844	.009		.686
5. CSQ total					
Pearson's	.658	-.306	-.144	-.171	1
Sig (2-tailed)	.076	.461	.734	.686	

**ED = education, *OR = surgery, *FU = follow up*

***Correlation is significant at the .01 level (2-tailed)*

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Table 4

Results of Chi Square Test and Sample Characteristics for 30-day readmissions and postoperative complications following bundle implementation (N=8)

Variable	Chi Square	DF*	*p*
Gender			
Site Infection	.686	1	.408
30-day Readmission	.036	1	.850
Age			
Site Infection	8.00	7	.333
30-day Readmission	8.00	7	.333
Height			
Site Infection	8.00	5	.156
30-day Readmission	5.87	5	.319
Weight			
Site Infection	8.00	7	.333
30-day Readmission	8.00	7	.333
Smoke			
Site Infection	.381	1	.537
30-day Readmission	.178	1	.673

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Variable	Chi Square	DF*	*p*
Chronic Pain			
Site Infection	1.14	1	.285
30-day Readmission	.480	1	.028**
Previous Brain Surgery			
Site Infection	.163	1	.686
30-day Readmission	.686	1	.408
Living Arrangement			
Site Infection	.381	1	.537
30-day Readmission	1.60	1	.206
Medical Problems			
30-day Readmission	3.75	1	.290
Surgeon			
Site Infection	3.43	2	.180
Readmission	.747	2	.688

**DF = degrees of freedom*

***Correlation is significant at the .05 level (2-tailed)*

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Table 5

Correlation Analysis between Sample Characteristics and occurrence of 30-day Readmission and Postoperative Complication (Surgical Site Infection) (N=8)

Variable	1	2	3	4	5	6	7
1. ED* to OR*							
Pearson's	1	.166	-.017	-.164	.658	.173	-.056
Sig (2-tailed)		.694	.968	.697	.076	.683	.894
2. OR to FU*							
Pearson's	.166	1	-.007	.084	-.306	-.840**	-.501
Sig (2-tailed)	.694		.986	.844	.461	.009	.206
3. Bundle Time							
Pearson's	-.017	-.007	1	.843**	-.144	.135	.752*
Sig (2-tailed)	.968	.986		.009	.734	.750	.031
4. PTIG total							
Pearson's	-.164	.084	.843**	1	-.171	-.163	.719*
Sig (2-tailed)	.697	.844	.009		.686	.700	.044
5. CSQ total							
Pearson's	.658	-.306	-.144	-.171	1	.508	.032
Sig (2-tailed)	.076	.461	.734	.686		.199	.941

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Variable	1	2	3	4	5	6	7
6. Site Infection							
Pearson's	.173	-.840**	.135	-.163	.508	1	.488
Sig (2-tailed)	.683	.009	.750	.700	.199		.220
7. 30-day Readmission							
Pearson's	-.056	-.501	.752*	.719*	.032	.488	1
Sig (2-tailed)	.894	.206	.031	.044	.941	.220	

**ED = education, *OR = surgery, *FU = follow up*

***Correlation is significant at the .01 level (2-tailed)*

**Correlation is significant at the .05 level (2-tailed)*

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Table 6

Observed versus Possible Range for Cumulative PTIG and CSQ-8 Participant Scores

Instrument	Observed	Possible
PTIG	77.00 – 88.00	26.00 – 88.00
CSQ-8	26.00 – 32.00	8.00 – 32.00

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Table 7

Frequencies for 30-day Readmissions Cranial Patients

	Q1(%)	Q4(%)
Infection	6	2
Neurological	6	3
Medical	7	3

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Appendix A

Allegheny Health Network

Patient education

Brain Surgery

About brain surgery -

Your doctor has recommended that you undergo brain surgery to relieve symptoms you may be having, protect you from bleeding in the brain, help circulate your brain fluid better or find out what type of tissue a tumor may be.

In preparation for surgery, there are several things you will need to remember:

- Make sure you are clear about what medications to take on the day of surgery.
- Be sure to discuss with your family who will be at home to help you once you are discharged.
- Depending on your surgery, there is a possibility that you may need to go to a rehab facility. If you have insurance, call your insurance company and find out what type of benefits you may have.

On the day of surgery -

On the day of surgery, you will arrive at the Ambulatory Care Center (ACC) at your designated time. Once checked in, a nurse will bring you back to your holding area. You will change into your hospital gown and have a compression hose as well as an IV placed. An IV, intravenous needles, will be used to deliver medications throughout surgery when you are under anesthesia.

Your nurse will take your vital signs and ask about any medications you may have taken on the morning of surgery. You should not have taken any blood thinners such as coumadin, Eliquis, Effient or lovenox for at least a week unless specified by your neurosurgeon. These medications can make you bleed more.

In addition to seeing your neurosurgeon before surgery, you will also meet the anesthesiologist that will be monitoring your breathing and heart function while you are asleep for surgery.

Your family can wait in the 3rd floor waiting room while you are in surgery. Your family will receive updates about your progress in surgery from nurses and your surgeon. Once the difficult part of the surgery is complete, the surgeon will come and tell your family.

Once you wake up in the recovery room, typically you will be taken to the intensive care unit where the doctors and nurses can watch you closely.

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Appendix B

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Patient education

Brain Tumors

Your physician has diagnosed you with a brain tumor. No one knows exactly why some brain tumors happen. They can spread to the brain from other parts of the body or just grow from the brain itself. Brain tumors come in all shapes and sizes. Sometimes, brain tumors do not have to be removed. Your physician can just take pictures every so often to monitor its growth. But if your tumor starts to grow or if you're having symptoms, then your surgeon may recommend that the tumor come out.

Symptoms that you can have from a brain tumor include problems thinking, with speech, reading, writing or weakness on one side of the body or the other. People can also suffer seizures from brain tumors. If you have a history of cancer, there is a possibility that that cancer has spread to your brain. Other times, the tumor has grown from the brain cells themselves. These can be considered very slow growing or fast growing. Fast-growing tumors need other types of treatment, including radiation and chemotherapy after surgery. Most slow-growing tumors can be contained with just surgery. You will know for sure what type of tumor you have when the tissue your physician takes out during the surgery is analyzed by a pathologist, a doctor specializing in looking at cells, about 3-5 days after surgery.

At the beginning of surgery, you will be placed in the Mayfield crown. This helps you be still during surgery. The skin incision your surgeon makes is always bigger than the skull incision. The piece of skull that is temporarily taken out so your surgeon can get to your tumor is put in antibiotic water to keep it clean. Your surgeon then carefully moves aside brain tissue and blood vessels to get to your tumor. Once as much of the tumor is out as possible, your surgeon will replace the skull with titanium mesh or clasps that keep the skull in place. Just like any other bone, the skull will take about three months to fuse with the rest. Once your skin incision is closed, with either suture, staples or glue, you will be moved to the recovery room where the anesthesiologist will remove your breathing tube and the nurses will wait for you to wake up. There is always the chance that your surgeon or a medical doctor specifically trained in critical care will want you to keep the breathing tube in overnight. Don't be alarmed about this – it's for your safety and protection only. The breathing tube will come out as soon as all the doctors involved in your care think it's medically safe.

Typically, after a brain surgery, you will spend a night or two in the intensive care unit so the doctors and nurses can watch you very closely. A medical doctor and your neurosurgery team will both decide when they think it is safe for you to either go to a regular nursing floor or home directly from the intensive care unit. Whichever unit you are discharged from, the nurses there will give you detailed information on what to do when you leave the hospital.

Different Types of Brain Tumors	
Glioma	Grows from the brain. A grade one glioma is a slow growing tumor and grade four glioma is a very fast growing tumor.
Meningioma	Grows from the protective covering of the brain
Metastasis	Grows from another part of our bod y and travels to the brain
Acoustic Neuroma	Grows from the space between the cerebrum and pons of your brain
Pituitary Adenoma	Grows from the pituitary gland

If you have any questions about your surgery or brain tumor, ask your neurosurgeon or someone on your health care team.

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Appendix C

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Patient education

Cerebral Aneurysm

A health care provider has diagnosed you with an unruptured cerebral aneurysm. Aneurysms form from the blood vessels in your brain. It is an outpouching of your blood vessels because the vessel is weak. It can be weak for many different reasons, including genetics, smoking, diabetes or high blood pressure. Aneurysms come in different shapes and sizes.

An aneurysm can be “clipped” when the connection between the aneurysm and blood vessel is narrow enough for the clip to cover. Clipping an aneurysm needs to be done through a craniotomy. A craniotomy can go through any part of the brain, depending on where the aneurysm is most easily reached, including the eye lid.

At the beginning of surgery, you will be placed in the Mayfield crown. This helps you be still during surgery. The skin incision your surgeon makes is always bigger than the skull incision. The piece of skull that is temporarily taken out so your surgeon can get to your aneurysm is put in antibiotic water to keep it clean. Your surgeon then carefully moves aside other blood vessels and nerves to reach your aneurysm. Once the surgeon has placed the clip on your aneurysm, they will test to make sure your blood vessel is circulating blood the correct way. This is done with a Doppler so the surgeon can hear your blood flow. The surgeon will then ensure there is no bleeding around your aneurysm and get ready to replace your skull. Titanium mesh or clasps will keep the skull in place. Just like any other bone, the skull will take about three months to fuse with the rest.

Depending on how your surgeon approached the aneurysm, you may have a lumbar drain placed during surgery. This drain takes away extra cerebrospinal fluid so your surgical incision can heal. It will stay in for 3-5 days after surgery and then be taken out.

Once your skin incision is closed with either sutures, staples or glue, you will be moved to the recovery room where the anesthesiologist will remove your breathing tube and the nurses will wait for you to wake up. There is always the chance that your surgeon or a medical doctor specifically trained in critical care will want you to keep the breathing tube in overnight. Don’t be alarmed about this – it’s for your safety and protection only. The breathing tube will come out as soon as all the doctors involved in your care think it’s medically safe.

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Appendix D

Neurosurgery Perioperative Education Bundle Checklist **Study #_____**

Date/Initials Bundle Administration: _____

Start time: _____ End time:_____

Preoperative Bundle:

◊ Details of planned procedure

◊ Expectations of day of admission

◊ Expectations when waking up from surgery

◊ Expectations of what to expect during hospitalization

◊ Preparation for hospital discharge

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Appendix E

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Patient education

What you need to know when you leave the hospital

It is time for you to leave the hospital and go to your home or a facility for further therapy and care. There are several items that you need to remember when you leave the hospital, and your nursing staff will go over them with you.

Safety: One of the most important things to do when you leave the hospital is keep yourself safe. Make sure you have enough help at home and can easily call people for help if you need it. If you're having problems with talking, then make sure you have someone with you at all times or a LifeAlert bracelet.

Activity: Do not lift anything greater than **10 pounds** for the first two weeks following surgery. **This is like a gallon of milk or two-liter bottle of soda.** You can walk, with the help of a person, walker or cane if you need it. Walking is good for you. Watch where you walk – loose gravel and stone and slippery surfaces can cause you to fall. Please do not use any treadmills, bicycles or weight machines until seen by your neurosurgeon in follow up.

If you are going to a rehabilitation facility, then you can do as much activity as your therapists recommend. They will help you relearn how to walk, dress yourself, feed yourself and get around safely.

Wound Care: It is very important to keep your surgical incision clean. It is closed with either staples, sutures or dissolvable sutures. Make sure that you or a family member look at the incision every day. You want to watch for any redness, swelling or drainage. If any of those occur, you need to call your surgeon right away.

Medications:
After surgery, there are a couple of medicines that you will be discharged on that may be new to you.

Antiepileptic Drug (AED) _____ **Dose** _____
This drug will help prevent seizures. Do not stop taking this medication unless your surgeon tells you to.

Dexamethasone _____
This drug helps brain swelling that may occur after surgery. It is very important you take the medicine as prescribed by your doctor. Sometimes, steroids can increase your blood sugar, make you irritable and cause difficulty sleeping. Make sure you take a ***medication for stomach protection such as omeprazole, famotidine*** with the steroid.

Pain medication_____ **Dose** _____
Take your pain medication as prescribed. Do not take pain medications together unless instructed by your surgeon. If you are not allergic, you can take acetaminophen instead of the pain medication. Do not take any nonsteroidal inflammatory medications, blood thinners or aspirin right after surgery unless your surgeon states it is ok.

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Stool Softener
Constipation is a very bad and big side effect when using pain medication after surgery. A prescription for something to keep your bowels moving will be given to you, or you can buy medication over the counter that you may have used in the past. You may also need a laxative such as bisacodyl in addition to a stool softener.

Follow-Up Information
You will need to see a few different providers after your surgery. When you are discharged, please have a family member or you call to make a follow up appointment.

Neurosurgeon_____
Phone number: 412-359-6200
Do you need any type of tests before the appointment?

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Appendix F

Patient Demographic Questionnaire

1. What is your gender?
2. What is your age?
3. What is your ethnicity?
4. What is your current height and weight?
5. Do you live in a house with family or in a facility where nurse and aids help you?
6. What type of medical problems do you have such as diabetes, heart or lung disease?
7. Have you ever been told you have a bleeding problem? If so, what kind?
8. Do you smoke? If so, how much?
9. Do you suffer from chronic pain?
10. Have you ever had a brain surgery before?

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