Preoperative Education for Patients Undergoing Spine Surgery

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Abstract

Low back pain is a worldwide health problem. Preoperative education is essential to provide patients with information across the continuum of care. Gaps exist among healthcare organizations regarding deficiencies in properly educating patients about their surgical experience. The lack of proper preoperative education can negatively impact reimbursement for healthcare systems, providers, and patient outcomes. In a large metropolitan tertiary care center providing spine surgery, an evidence-based project was implemented. A self-developed pre and post intervention surveys was given assessing patients' knowledge and surgical expectations after surgery. A tri-fold education pamphlet was given to the participants with information that included detailed information regarding expectations before and after surgery. Descriptive statistics were used to describe the sample and outcome variable. An increase in knowledge in expectations after surgery was noted from pre-intervention (mean 1.83, *SD* .408) to post-intervention (mean 1.67, *SD* .816) with a Cohen's D of 0.248 although this was not statistically significant. However, the change in average length of stay (LOS) was significant. The average LOS for the project participants dropped from 4.54 days to 2.833 days which is within the Centers for Medicare and Medicaid Services (CMS) guidelines of 2.92 days for this surgical population. In conclusion, an increased in patients' knowledge regarding expectations following surgery and decreased LOS was seen for the project participants.

Keywords: spine surgery patients, patient expectation assessment, length of stay, patient education, preparation for surgery, clinical assessment tools

Preoperative Education for Patients Undergoing Spine Surgery

Proper patient education is recognized extensively in healthcare as an essential component of improving patient outcomes (Marcus, 2014). A gap exists in organizations surrounding patient education specifically in specialty procedures and surgical procedures. According to Agency for Healthcare Research and Quality, (n.d.), 30% of patients being discharged are less likely to be readmitted or visit the ED when they have a clear understanding of their after-hospital care instructions. A lack of knowledge of proper care can be potentially dangerous and causes extra expenditures for the patient and the healthcare system.

Background and Significance

According to HealthyPeople (2018), low back pain is the second leading cause of absenteeism from work, the third most common cause of surgical intervention and the fifth most common reason for hospitalization. Treatment of low back pain is costly to Americans; it is estimated people spend at least 50 billion dollars each year (HealthyPeople, 2018). Additionally, about 80% of Americans experience low back pain in their lifetime (HealthyPeople, 2018). It is estimated that each year about 15-20% of the population will develop prolonged back pain, 2-8% will have chronic back pain, 3-4% will be temporarily disabled and 1% are permanently disabled due to back pain (HealthyPeople, 2018).

Herniated disks, spinal stenosis, degenerative disk disease, and spinal instability are the leading causes of lumbar spine surgery (Hartley, Neubrander, & Repede, 2012). Treatment options include managing pain, rest, physical therapy and surgical intervention. Patients who elect to have spine surgery many times face minimal preparation time. Current patient education practice has conventionally failed to educate patients on their care before and after surgery.

Patient education is limited due to the decrease in allotted LOS in the hospital (Hartley et al., 2012). Preoperative teaching that is practical increases patient self-care knowledge, reduces pain, decreases anxiety, and adequately prepares the patient for post-operative care in their homes (Hartley et al., 2012).

Factors that contribute to an increase in LOS are essential to identify in the preoperative phase to adequately prepare for those factors to improve postoperative outcomes. Gruskay, Fu, Bohl, Webb, & Grauer, (2015) determined some of the major factors contributing to an increase in LOS were age, American Society of Anesthesiologist (ASA) score, history of heart disease, and discharge to a nursing facility.

Moreover, the Joint Commission (JC) emphasizes the importance of providing patient education. JC's purpose is to improve the health care of the public, to evaluate healthcare organizations and ensure the care provided is of highest quality and value (The Joint Commission, 2018). JC certifies and accredits more than 21,000 health care organizations and programs in the United States (The Joint Commission, 2018). This organization focuses on patient safety and quality of care. Additionally, JC addresses patient's rights and education, prevention of medication errors, management of infection control, verification that hospital personnel such as doctors, nurses, and other hospital staff are competent and qualified. Furthermore, JC ensures emergency preparedness plans are in place, they collect data to measure hospital performance and utilizes the data to make improvements (The Joint Commission, 2018).

Consequently, hospitals must provide the proper training and education based on the patient's needs and abilities. Organizations must assess the patient's learning needs and utilize instruction and education methods customized to the patient's level of understanding. Patient education is essential and directly influences the patient's outcomes and promotes healthy

behaviors (The Joint Commission, 2012). Individualized preoperative patient education is vital to ensure organizations comply with JC guidelines and are meeting patients' needs and expectations while providing excellent patient care.

In a large metropolitan hospital system providing spine surgery, currently, there is no process in place that is dedicated to patient education in this service line. Numerous modalities have been trialed with no definitive or consistent patient education method. General preoperative instruction is given to patients, but no specific procedure/surgical education is provided. Moreover, patients' expectations of the surgical process are deficient. The organization's stakeholders have identified patient education as a major gap with abundant room for improvement. Additionally, the stakeholders of the organization raised concern after evaluating comparison data from other facilities looking at the same population of patients and how some health centers are meeting the reimbursable number of days set by Centers for Medicare and Medicaid Services CMS (CMS, 2017). CMS guides the reimbursement for medical treatments. Facilities who adhere to these guidelines receive maximum compensation. An analysis of the LOS data, explicitly examining DRG 460 non-complicated spine fusion surgeries in comparison to other local hospitals performing the same operations revealed that the facility was not meeting the target for reimbursement set by CMS. Data from fiscal year 2016 showed a total of 432 spine fusions were performed with a mean LOS of 4.54 days compared to CMS reimbursable of 2.92 days.

Many reasons contribute to the issue. The organization determined a tremendous gap surrounding patient education as one of the factors contributing to this downfall. Surgical teams must first assess expectations, then moderate these patient-driven expectations with true trajectory of care potentials. Presently, no pre-surgical expectation assessment for patients is

place to develop an individualized education plan. In addition, when teaching was provided, a lapse in time occurred where patients vaguely recalled the teaching

Problem Statement and PICO

The lack of education impacts patients, providers, and health systems. Educating patients correctly on what to expect preoperatively, post-operatively, inpatient and at discharge is crucial to meeting expectations and setting precedence for patients so that they have a clear understanding of their surgery process. This gap negatively impacts providers and health systems due to a loss in reimbursement by CMS due to an increase in LOS. Numerous factors contribute to the gap. Some of the factors are related to poor understanding of spine surgery outcomes, recovery standards, mobility, pain management, and patient responsibilities regarding the expectation for their care on the continuum focusing on the preoperative phase. This inquiry has led to the clinically relevant PICO question: in adult spine surgery patients (P), how does a surgery expectation assessment plus standardized patient education (I) compare to current practice (C) affect preparation for surgery, perceived surgical experience, and length of stay (O).

Search Sources and Process

A review of the literature was undertaken to address the PICO question. The search strategy was based on the electronic databases: PubMed, Cumulative Index to Nursing and Allied Health Literature (CINAHL), and the Cochrane Library. Descriptors were combined with the Boolean connector AND, OR, and MeSH in English to broaden study results. Keywords searched: *expectation assessment, patient education, surgery, instruments to measure outcomes, surgery expectation assessment, spine surgery, outcome assessment, back surgery, standardized education, standardized patient teaching, readiness for surgery, effect on length of stay,*

preparation for surgery, patient expectation assessment, LOS, ERAS, and clinical assessment tools.

Inclusion criteria included full-text studies published from 2013 to 2018, adult patients, spine surgery, patient expectations, preoperative education, surgery expectation, outcomes, and LOS. Exclusion criteria included studies published before 2013, clinical studies, clinical guidelines, editorials, commentaries, and reviews addressing emergency or urgent spine surgeries.

PubMed was the first database searched (Appendix A) for this literature review. An abundance of studies was obtained and reviewed. A total of 42 studies contained all components of the PICO question for consideration. The initial search of this database utilizing *expectation assessment AND surgery AND patient education* yield seven studies. A refinement in search strategy containing keywords: *surgery expectation assessment AND spine surgery* yielded 32 studies for evaluation.

CINAHL was the second database searched (Appendix B). This database provided a wide range of studies as well. The initial search with this database yield two articles with keywords: *patient expectation assessment AND surgery*. One article with keywords: *expectation assessment AND surgery AND patient reported outcomes*. After refining the search utilizing keywords: *clinical assessment tools AND spine surgery AND patient satisfaction,* 24 studies were retrieved for review.

Lastly, the Cochrane Library database was searched (Appendix C). This database provided the most studies incorporating all three components of the PICO question. The initial search yield 49 studies utilizing keywords: *measurement instruments and surgery expectation assessment and surgery*. Forty studies using keywords: *standardized patient education and spine*

surgery and LOS. 214 studies utilizing keywords: *surgery expectation assessment and surgery and clinical outcomes*. Most of the studies retrieved from this database were of good quality articles and relevant to the PICO question.

A total of 50 studies related to adult spine surgery, preoperative patient expectations and education, patient preparation and LOS were selected for review. A few of the articles were discarded due to not meeting inclusion criteria. A total of ten final studies were selected for this literature review (Appendix D). The studies chosen consisted of five systematic reviews (SR), one meta-analysis (MA), one retrospective case study (RCS), one randomized control trial (RCT), one cross-sectional study, and one integrative review. It is important to note, even though integrative reviews sometimes deliver vague information; this integrative review had a well-developed method and research design. The selected ten studies met inclusion criteria and were individually reviewed and organized in an evidence evaluation table (Appendix D).

Overall, the strength of the ten studies selected for this review was of high quality and relevance. A total of six level I evidence studies consisting of five SR and one MA; one level II evidence RCT study; one level III evidence cross-sectional study; and two level IV evidence studies consisting of one randomized case study and one integrative review. Due to the nature of the study phenomena, no qualitative studies were found. Reliable, tested and valid measurement tools well known in the science of research were utilized in many of the studies to capture patients' expectations and outcomes (Appendix D). Most of the articles reviewed discussed the importance of addressing pre-operative expectation; post-operative expectation; patient-reported outcomes such as patient satisfaction, understanding plan of care, and reduce pain and anxiety; variables affecting LOS and patient education (Appendix E).

Validity and reliability among all the studies were measured through the utilization of evidence-based tools for evaluation of outcomes (Appendix D & E). All the studies implemented interventions, critically appraised current data and provided information regarding the use of valid measurement tools to assess studies. Two articles identified some bias however it was offset by the incorporation of validity scales such as Glombiewski-Gutterman-Koenig (GGK) quality score. Across all studies, careful consideration was taken utilizing descriptive statistics to extract high-quality data. Four of the studies reproduced low-quality data. However, the instruments of measurement and data collection were of valid and reliable value due to the positive results obtained from the intervention and outcome (Appendix D).

Most of the studies reported heterogeneity; this precluded the use of a meta-analytical technique to estimate the strength of associations. The limited initial retrieval of studies searching specifically for adult spine surgery patients prevented the homogeneity of studies, and thus it was necessary to expand the search to other surgeries. Due to the heterogeneity, most of the studies used a quantitative method to assess, quantify and report preoperative expectations and patient-reported outcomes. Diverse use of validated methods of measurement were used across all studies. Most of the interventions assessed were preoperative patient expectations, post-operative expectations and patient-reported outcomes (Appendix E). The most common outcomes reported were correlations between preoperative expectations and postoperative outcomes.

Evidence Synthesis

Louw, Butler, Diener, & Puentedura, (2013) developed a neuroscience educational (NE) booklet that addresses pain, anxiety, stress in musculoskeletal conditions and disability. The development of this brochure along with one-on-one educational sessions for patients before

spine surgery delivered the best outcome. A heterogonous sample of studies reviewed discovered the benefits of utilizing the written material in adjunct with in-person meetings to decrease pain, decreased perceived disability and increased physical activity. The authors stated further studies needed to occur to test for efficacy of the NE booklet.

One year after the introduction of NE booklet as described above, a multicenter randomized controlled trial was conducted. This study focused on the effects of NE in pain. The results obtained from this trial revealed no significant difference between the NE groups to the control group. However, in regards to preparation for the surgical procedure and surgical experience the results were significantly better for the NE group than the control group. Also, 45% of healthcare expenditure was reduced in the NE group than the control group in a one-year follow-up (Louw, Diener, Landers, & Puentedura, 2014). A three-year follow-up in a randomized controlled trial found no significant difference in patient outcomes in regards to pain between the NE group and the control group. However, the implementation of NE at the three-year mark resulted in the favorable views of the patients' surgical experiences and reduced further healthcare needs than the control group. Educating patients regarding surgical expectations to reduce health expenditures produces lasting behavior changes following surgery (Louw, Diener, Landers, Zimney, & Puentedura, 2016).

Enhanced recovery after surgery (ERAS) is an evidence-based model of care, with the goal to prepare patients for surgery, reduce the impact of surgery, and to enhance the recovery process (Wainwright, Immins, & Middleton, 2016). ERAS currently is being used in colorectal operations and hip and knee replacement with excellent outcomes. A critical concept of ERAS is decreasing patient's stress response to surgery; this will, in turn, allow for faster recovery and shorter LOS. Although this model has not been implemented for primary spine surgery; it has the

potential to have a positive impact in the care of spine surgery patients. The demand for major spine surgery is on the rise. ERAS seems promising in addressing the variation in LOS, post-operative pain, and functional recovery. The use of the components of ERAS individually such as patient education, physiotherapy, pain management, and interventions to minimize blood loss are beneficial. The incorporation of ERAS pathway in major spine surgery focusing on adopting the evidence-based practice, improving clinical procedures, enhancing logistics will enable prompt patient recovery, hence reducing hospital cost and LOS (Wainwright et al., 2016).

Preoperative education is essential to improve patient outcomes (The Joint Commission, 2012). The deliverance of education requires a multidisciplinary approach taking into account the patient's educational learning styles, culture, and literacy to be able to assess, communicate and incorporate appropriate methods based on learning needs (Marcus, 2014).

Reiter, (2014) discusses the benefits of patient education for both patients and practitioners. Patient education is essential to ensure sufficient understanding of the expectations before, during and after surgery. Reiter, (2014) reinforces the importance in assessing and individualizing the plan of care for the patient. Not all patients learn the same way; they may have a different perception regarding recovery. For example, one may believe it is better to rest after surgery while another may not think in resting at all. It is essential to develop a plan that addresses individuals learning styles and that the education is reinforced on the continuum (Reiter, 2014).

Preoperative education has been shown to reduce anxiety, pain and improve patient outcomes. A randomized controlled trial with block design was conducted in a medical center in Taiwan. The study explored the impact of using an educational intervention versus a standard patient education on pain and anxiety. The education intervention involved a booklet explaining

the disease process, the operative environment, surgical procedures and post-operative care. Patients received 30 minutes of education by a nurse practitioner or an experienced nurse in the field which incorporated the use of videos and pictures to capture the learning needs of the patients. The control group consisted of standard education information. Patients in the control group received 15 minutes verbal information regarding the steps and cautions before the operation based on a checklist. The study revealed that a preoperative educational intervention was more effective in reducing anxiety and pain (Lee et al., 2017).

Providing correct and adequate information to patients is essential to decrease anxiety and ensure patients are knowledgeable regarding their surgical care. The importance of evaluating individual education needs is vital. The delivery of education is beneficial when the practitioner has a good understanding of patient's knowledge. Wongkietkachorn, Wongkietkachorn, & Rhunsiri, (2017) conducted a multicenter, single-blind, randomized controlled trial to compare a needs-based patient education with traditional patient education in reducing preoperative anxiety. The study resulted in favorable outcomes regarding decreasing anxiety, reduced education time and increased patient satisfaction with the needs-based patient education approach.

Gruskay, Fu, Bohl, Webb, & Grauer, (2015) conducted a multivariate analysis using a retrospective case series at a tertiary care center. The purpose of the study was to analyze the factor affecting LOS in posterior lumbar fusion patients. The results of the study concluded that the older the patient's age and the more pervasive the disease, longer hospital stays occurred. There was no correlation with comorbidities as a predictor of more extended hospital stays. Intraoperative events did not affect LOS, but postoperative events did. Postoperative events included anemia requiring blood transfusions, hardware complications requiring re-operation,

altered mental status, and pneumonia (Gruskay et al., 2015). The results from this study are beneficial for improving patient education and setting expectations in the preoperative phase to improve outcomes.

A systematic review looked at determining the impact of expectations on satisfaction and patient-reported outcomes (PRO) for patients undergoing elective spine surgery. Pre-existing expectations have been acknowledged to influence these events. The databases examined were MEDLINE, EMBASE, CINAHL, and Cochrane Library for studies that explored the relationship between expectations and satisfaction/PROs in spine surgeries. Three domains reviewed: 1. "does the magnitude of preoperative expectations impact patient satisfaction and/or PRO after surgery? 2. Does the underlying spinal pathology influence this relationship? 3. What is the impact of unmet expectations on satisfaction?" (Witiw et al., 2018, p. 19).

The results revealed high preoperative expectations resulted in higher satisfaction and PROs after surgery in lumbar disc herniation but not for lumbar spinal stenosis; patient expectations exceeded actual outcomes, resulting in a discrepancy in expectation-actuality; and the higher the discrepancy, the lower the satisfaction. The findings emphasized the importance of setting realistic expectations before surgery to achieve good outcomes and patient satisfaction (Witiw et al., 2018).

Customized education strategies are essential to meet the individual needs of the patients at every stage in their lives. A randomized study by Rhodes et al., (2015) studied the effects of an interventional preoperative education for scoliosis surgery (PEOSS) on anxiety levels of patients undergoing posterior spinal fusion (PSF). The study also looked at the outcomes of this intervention on LOS, patient/caregiver satisfaction, pain medication usage and caregiver anxiety. The study resulted in increased anxiety throughout the surgical process in adolescents in both the

control group and the interventional group. However, the patient satisfaction was higher in the interventional group. Based on this study results it is appropriate to conclude that educational strategies that are age-appropriate produce better outcomes (Rhodes et al., 2015).

Patients with a history of heart disease had shorter LOS in the study by Gruskay et al., (2015), this is a significant finding as these patients have an extensive preoperative workup and are closely monitored. This extensive preoperative workup along with effective preoperative education may benefit spine surgery patients. Understanding patient's expectations preoperatively and postoperatively are crucial to determining patient's preparedness. An explicit discussion regarding reasonable expectations may change patient's perceptions and expectations and will enable the provider and the patient to have a plan of care that is suitable and understandable. This approach will result in higher patient satisfaction (Soroceanu, Ching, Abdu, & McGuire, 2012). Preoperative expectations and education may have positive results in addressing pain relief, anxiety, and post-operative care thus reducing LOS (Soroceanu et al., 2012).

The evidence retrieved from the studies showed an overall moderate positive correlation between pre-operative expectations and post-operative expectations; although the degree of impact varied from low to moderate in one study and positive results reported in the other studies measuring this relationship (Appendix E). A study looking at education positively influenced patient outcomes when standardized education was delivered. The evidence showed the positive correlation between patient expectations and patient-reported outcomes; this had a direct effect on LOS and patient satisfaction. The utilization of valid and reliable measurement tools measuring interventions and outcomes is essential to guide research and achieve high-quality results and reduce bias. Based on the evidence presented one can conclude understanding patient

expectations across the continuum in surgical care is vital. The positive results utilizing validated measurement tools to guide research, a standardized patient education to understand patient's expectations to reduce LOS, improving patients' understanding of post-operative care and improving patient satisfaction is essential to quality outcomes.

Purpose

The purpose of this project is to improve patients understanding of their surgery, enhance the patient experience, reduce variability in the quality of education provided to patients and reduce cost.

Evidence-Based Practice Model and Conceptual/Theoretical Model

Evidence-based practice is essential to improve the quality of patient care and reduce healthcare costs (Brown, 2014). Many EBP models exist to aid nurses, and healthcare providers incorporate the best evidence into clinical practice. A model that is well known and used in a clinical setting to effectively implement a practice change at the unit or organization level is the Iowa Model of Evidence-Based Practice (Titler et al., 2001). The Iowa Model of Evidence-Based Practice to Promote Quality of Care (Appendix F) guided this project. The Iowa Model serves as a conceptual framework that guides and organizes implementation to ensure changes are appropriate to attain high-quality outcomes for the organization. This framework was used to guide the project by identifying the problem (inadequate preoperative teaching), the stakeholders (patients undergoing spine surgery DRG 460 non-complicated spine surgery, excluding cervical) to address the issue (pre and post questionnaire and provide a tri-fold pamphlet providing preoperative education) and evaluate the process (post questionnaire and LOS) (White & Spruce, 2015).

The expectation-actuality discrepancy (E-AD) conceptual model (Mannion et al., 2009) (Appendix G) describes the interrelated concepts and predicts events and situations by defining relationships among variables. This model explains that as the difference between what a patient expects from surgery and what they experience widens, satisfaction lessens (Witiw et al., 2018). This conceptual model aligns with the project in utilizing descriptive analysis looking at cause and effect. This model is most useful in determining the patient's expectations regarding their spine surgery and determine where the knowledge deficits are.

Methods

An evidence-based project was implemented in an urban tertiary care center specializing in neurologic surgery. Permission was obtained from the organization's Investigation Review Board (IRB) and Arizona State University IRB. English speaking participants over the age of 18 years who were scheduled for elective thoracic and lumbar spine surgery (specifically DRG 460 surgeries) and presented to the preoperative department for preoperative testing were recruited to participate. Participants were provided the purpose of the project verbally and in written format. Consent to participate in the project was implied upon completion of the preintervention survey. The pre-intervention survey consisted of questions to assess the participants learning preference and method of surgery education already received, knowledge about their spine surgery, preparedness, expectations after surgery, current back pain, LOS and at home care (Appendix H). The functional and demographics surveys consisted of questions regarding age, gender, ethnicity, level of education, the use of assistive devices for ambulation, length of time experiencing back pain, anticipated length of stay after surgery (Appendix I). After the pre-intervention surveys were completed, a tri-fold education pamphlet (Appendix J) was given to these participants with information that includes detailed information regarding expectations

before and after surgery. The intervention not only provided education but also outlined and set expectations for participants before, immediately after surgery and help at home.

A post-intervention survey was collected on post-operative day two before the participant was discharged home following their surgery. The post-intervention survey consisted of questions assessing a change in knowledge regarding expectations after surgery, effectiveness of the intervention, management of pain and help at home (Appendix K). The pre-intervention and post-intervention surveys were self-developed questionnaires based on Bandura, (2016) self-efficacy questionnaires and in conjunction with project site mentor. The survey instruments were evaluated by ASU faculty and project site mentor for content validity. The pre and post surveys were assigned a randomized number by the project coordinator to allow for paired analysis and to protect the identity of the participants. No identifiable information was on the surveys. The survey results were kept confidential and stored in REDCap software. Data was entered in SPSS software for data analysis. Due to the small sample size, only descriptive statistics were used. The effect size was calculated using the Cohen's D.

Results

There was a total of 6 participants consisting of 5 females and 1 male. All the participants were Caucasian with ages ranging from 30 to 69 and an average age of 58 years. Most of the participants reported walking to the preoperative center with 1 reporting the use of an assistive device for ambulation. All the participants reported suffering from back pain for an average of 98 days. An average of 3 days was the anticipated LOS reported by the participants (Appendix L). Due to the small sample size (N=6) no statistical analysis was performed (Appendix M). To determine the effect size a Cohen's D was calculated. An increase in knowledge in expectations after surgery was noted from pre-intervention (mean 1.83, SD .408) to

post-intervention (mean 1.67, *SD* .816) with a Cohen's D of 0.248 although this was not statistically significant (Appendix N). However, the difference in the average LOS was significant for this sample. The average LOS for the project facility was 4.54 days, LOS for project participants was 2.833 days meeting CMS guidelines of 2.92 days for this sample.

Discussion

One of the limitations of the project was it only included Caucasian and English-speaking participants. A diverse population perhaps may show a different impact due to differences in expectations from other people from other cultures. A small sample size prohibited from performing statistical analysis. Additionally, slight differences in wording on the pre and post surveys prevented additional analysis of the data. Moreover, the project had one outlier resulting from a participant's prolonged LOS of six days due to complications which impacted the overall LOS for the project participants. A larger sample size may result in a better understanding of the impact of the educational pamphlet and patients' expectations. Implications of the project are a standardized preoperative education for this surgical population may improve patients' knowledge about expectations following surgery which may result in decreasing LOS and decrease in costs.

Conclusion

An increased in patients' knowledge regarding expectations following surgery was seen in the project participants. LOS for project participants fell within the CMS guidelines for patients who underwent non-complicated thoracic or lumbar spine surgery. As the literature review suggested, a standardized patient education to improve patients' understanding and expectations of their surgical care is vital to decrease LOS. The results of the project were presented to the project facility. Furthermore, incorporation of the educational pamphlet as part

of the preoperative process will be adopted at the project facility for all patients undergoing spine surgery. A brief report of the project was submitted to the Journal of Nurse Practitioners for publication consideration.

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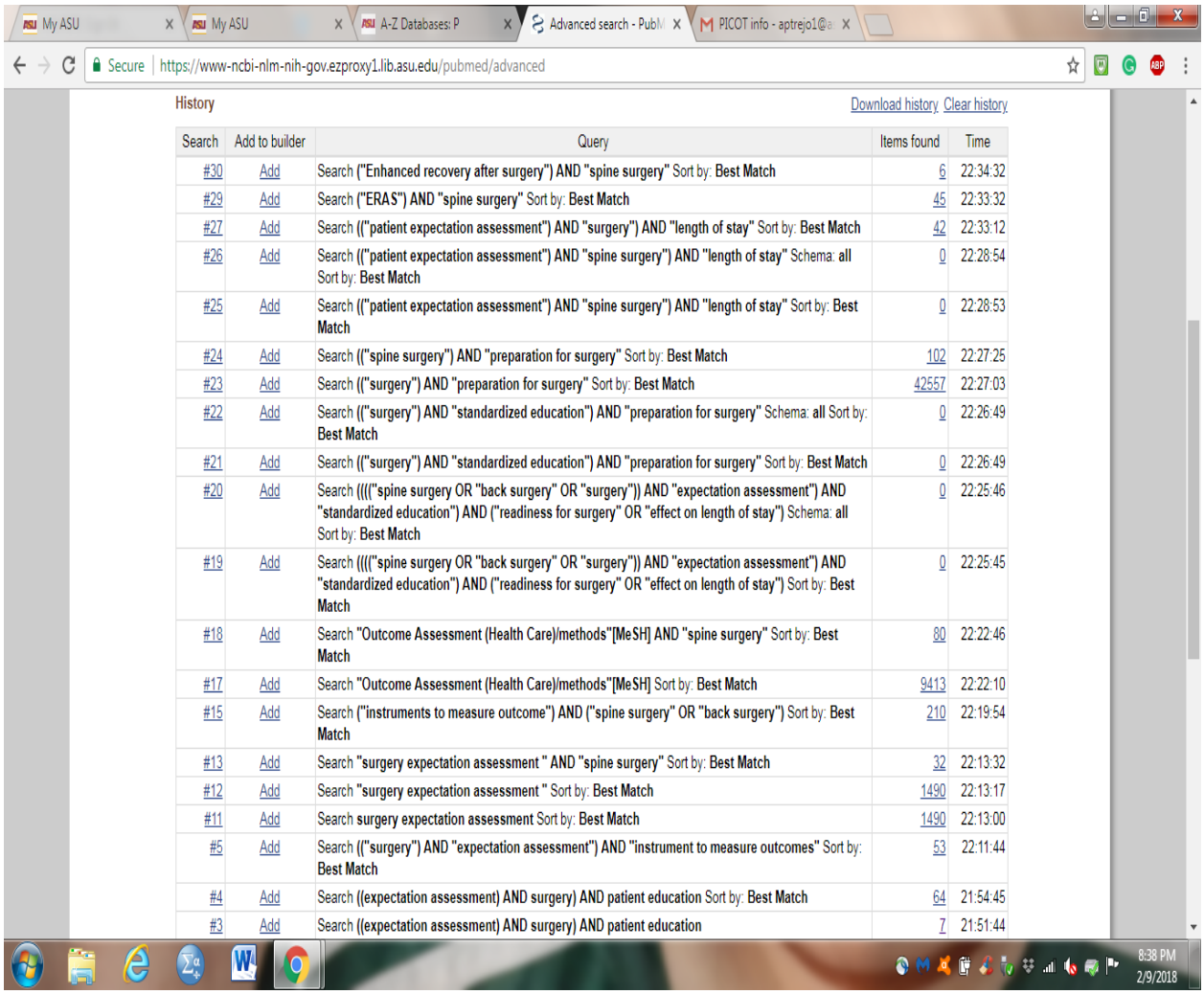
Appendix A

Search Strategy 1

PubMed



History

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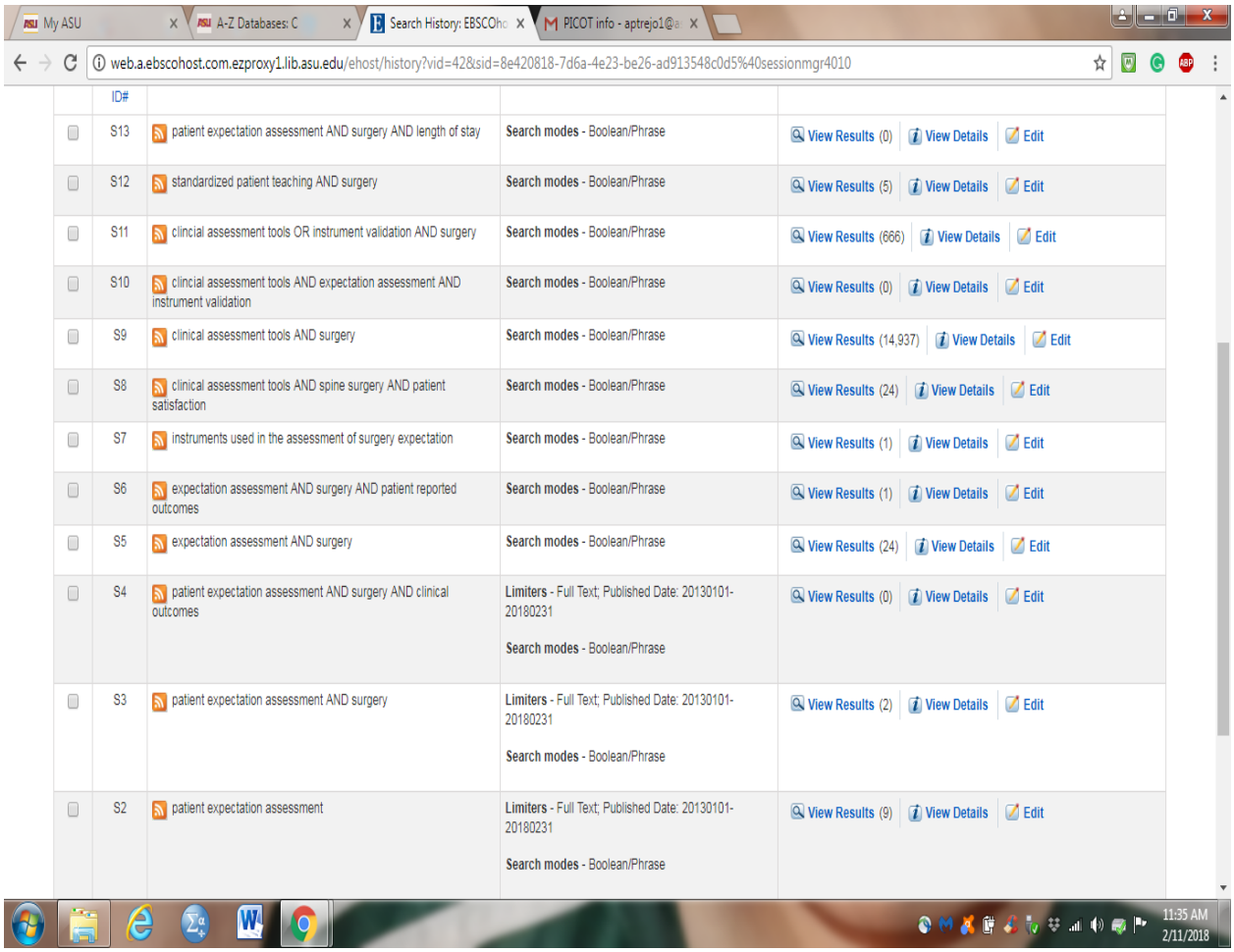
Search	Add to builder	Query	Items found	Time
#30	Add	Search ("Enhanced recovery after surgery") AND "spine surgery" Sort by: Best Match	6	22:34:32
#29	Add	Search ("ERAS") AND "spine surgery" Sort by: Best Match	45	22:33:32
#27	Add	Search (("patient expectation assessment") AND "surgery") AND "length of stay" Sort by: Best Match	42	22:33:12
#26	Add	Search (("patient expectation assessment") AND "spine surgery") AND "length of stay" Schema: all Sort by: Best Match	0	22:28:54
#25	Add	Search (("patient expectation assessment") AND "spine surgery") AND "length of stay" Sort by: Best Match	0	22:28:53
#24	Add	Search (("spine surgery") AND "preparation for surgery" Sort by: Best Match	102	22:27:25
#23	Add	Search (("surgery") AND "preparation for surgery" Sort by: Best Match	42557	22:27:03
#22	Add	Search (("surgery") AND "standardized education") AND "preparation for surgery" Schema: all Sort by: Best Match	0	22:26:49
#21	Add	Search (("surgery") AND "standardized education") AND "preparation for surgery" Sort by: Best Match	0	22:26:49
#20	Add	Search ((((("spine surgery OR "back surgery" OR "surgery")) AND "expectation assessment") AND "standardized education") AND ("readiness for surgery" OR "effect on length of stay") Schema: all Sort by: Best Match	0	22:25:46
#19	Add	Search ((((("spine surgery OR "back surgery" OR "surgery")) AND "expectation assessment") AND "standardized education") AND ("readiness for surgery" OR "effect on length of stay") Sort by: Best Match	0	22:25:45
#18	Add	Search "Outcome Assessment (Health Care)/methods"[MeSH] AND "spine surgery" Sort by: Best Match	80	22:22:46
#17	Add	Search "Outcome Assessment (Health Care)/methods"[MeSH] Sort by: Best Match	9413	22:22:10
#15	Add	Search ("instruments to measure outcome") AND ("spine surgery" OR "back surgery") Sort by: Best Match	210	22:19:54
#13	Add	Search "surgery expectation assessment " AND "spine surgery" Sort by: Best Match	32	22:13:32
#12	Add	Search "surgery expectation assessment " Sort by: Best Match	1490	22:13:17
#11	Add	Search surgery expectation assessment Sort by: Best Match	1490	22:13:00
#5	Add	Search (("surgery") AND "expectation assessment") AND "instrument to measure outcomes" Sort by: Best Match	53	22:11:44
#4	Add	Search ((expectation assessment) AND surgery) AND patient education Sort by: Best Match	64	21:54:45
#3	Add	Search ((expectation assessment) AND surgery) AND patient education	7	21:51:44

Appendix B

Search Strategy 2

CINAHL



ID#			
S13	patient expectation assessment AND surgery AND length of stay	**Search modes** - Boolean/Phrase	View Results (0) | View Details | Edit
S12	standardized patient teaching AND surgery	**Search modes** - Boolean/Phrase	View Results (5) | View Details | Edit
S11	clincial assessment tools OR instrument validation AND surgery	**Search modes** - Boolean/Phrase	View Results (666) | View Details | Edit
S10	clincial assessment tools AND expectation assessment AND instrument validation	**Search modes** - Boolean/Phrase	View Results (0) | View Details | Edit
S9	clinical assessment tools AND surgery	**Search modes** - Boolean/Phrase	View Results (14,937) | View Details | Edit
S8	clinical assessment tools AND spine surgery AND patient satisfaction	**Search modes** - Boolean/Phrase	View Results (24) | View Details | Edit
S7	instruments used in the assessment of surgery expectation	**Search modes** - Boolean/Phrase	View Results (1) | View Details | Edit
S6	expectation assessment AND surgery AND patient reported outcomes	**Search modes** - Boolean/Phrase	View Results (1) | View Details | Edit
S5	expectation assessment AND surgery	**Search modes** - Boolean/Phrase	View Results (24) | View Details | Edit
S4	patient expectation assessment AND surgery AND clinical outcomes	**Limiters** - Full Text; Published Date: 20130101-20180231 **Search modes** - Boolean/Phrase	View Results (0) | View Details | Edit
S3	patient expectation assessment AND surgery	**Limiters** - Full Text; Published Date: 20130101-20180231 **Search modes** - Boolean/Phrase	View Results (2) | View Details | Edit
S2	patient expectation assessment	**Limiters** - Full Text; Published Date: 20130101-20180231 **Search modes** - Boolean/Phrase	View Results (9) | View Details | Edit

Appendix C

Search Strategy 3

The Cochrane Library

Appendix D

Table 1

Evaluation Table

Citation	Conceptual Framework	Design/Method	Sample/Setting	Major Variables & Definitions	Measurement	Analysis	Findings	Decision for Use
Auer et al., (2016) Patients' expectations predict surgery outcome: a meta-analysis Funded by German Research Foundation No conflicts or biases identified Europe	Inferred to be Transactional Model of Stress and Coping	**Design:** MA **Purpose:** To assess the association between patients' pre-surgical expectations and post-surgical QOL	N=21 Data collected from MEDLINE, CENTRAL, and PsychINFO **Inclusion Criteria:** patients undergoing surgical procedure age-ranging from 18-65 years, using a prospective design, expectations measure before sx and QOL after sx. English and German articles **Exclusion criteria:** CSS, case reports, letters, review, and comments were excluded, articles published in other languages other than German and English, articles published before 1980 or after Dec. 2013	**IV1:** Pre-surgical expectation **IV2:** Post-surgical QOL **DV1:** Expectation and overall QOL **DV2:** Expectation and physical QOL **DV3:** Expectation and mental QOL	Data was extracted based on databases described in sample/setting. MOOSE recommendations were followed as a review protocol. Researchers had experience with expectations, psychological factor involving surgeries and MA Extracted data based on study characteristics	All analysis was conducted by using a software called CMA, Pearson's *r* -GSE -IPQ-R -LOT & LOT-R -Positive expectation scale -SEQOL CI-95%	**DV1:** 11 studies, 0.126 (95% CI, 0.079 to 0.172 *P* for heterogeneity=0 .63; random effects model) **DV2:** 12 studies, 0.208 (95% CI, 0.113 to 0.299; *P* heterogeneity <0.001; random-effects model) **DV3:** 12 studies, indicating low to moderate associations between pre-surgery patients' expectations and post-surgery QOL	**Level I** **Strengths:** robust effect size. The study provided with significant effect size of the relationship between patients' expectations and postsurgical QOL Good analytical process to decrease bias **Weaknesses:** the lack of control of the influence of presurgical QOL on the effect sizes. Poor homogeneity of the studies **Conclusion:** Presurgical expectations have a strong association with postsurgical QOL. Focusing on

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								presurgical expectations has the possibility of rendering surgeries more effectively
Citation	**Conceptual Framework**	**Design/Method**	**Sample/Setting**	**Major Variables & Definitions**	**Measurement**	**Analysis**	**Findings**	**Decision for Use**
Ellis et al., (2015) The relationship between preoperative expectations and the short-term postoperative satisfaction and functional outcome in lumbar spine surgery: A systematic review Funded by Division of Orthopaedics, Montreal General Hospital No conflicts or biases identified Canada	Inferred to be Social Cognitive Theory	**Design:**SR **Purpose:** To examine the relationship between the patient's PE and short-term POS and FO in LSS	N= 13 Data collected from: Medline, Embase, and Cochrane 1996- Nov. 15, 2014 **Inclusion criteria:** Case control Cohort, RCT MA study population IV Outcome measured **Exclusion criteria:** non-lumbar spine studies	**IV:** what is the short-term relationship between PE and POS and FO in LSS **DV:** Positive expectations significantly correlated with short-term POS and FO	Searched conducted utilizing the database mentioned under sample/setting. Predefined search algorithm that identified the influence of PE on postoperative satisfaction and FO Two independent reviewers and a third independent mediator Methodological assessment Dichotomous, multiple choice, open ended questions PE assessment tool Functional assessment such as VAS, ODI, SF-36	Methodological quality assessment tool ODI and SF-36 CI-95%	**DV:** this review demonstrated a positive correlation between PE and postoperative satisfaction and FO in LSS.	**Level I** **Strengths:** good quality an article review. Measurement tools along with tables with assessment questions and tools were helpful. Good discussion offering suggestions for better research process to obtain better and specific data **Weaknesses:** lack of homogeneity The use of many measurement tools to study the phenomenon created difficulty in making generalizations. Studies varied in regards to demographics, surgical indication, type of surgery and follow up time

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								Conclusions: The review positively correlated with short-term postoperative satisfaction, and FO.
Citation	**Conceptual Framework**	**Design/Method**	**Sample/Setting**	**Major Variables & Definitions**	**Measurement**	**Analysis**	**Findings**	**Decision for Use**
Gruskay et al., (2015) Factors affecting length of stay after elective posterior lumbar spine surgery: a multivariate analysis No funding was received for this study Potential bias on skewed cases towards one-level procedures USA	Inferred to be Social Cognitive Theory	**Design:** RCS **Purpose:** understanding the variables affecting LOS after open elective PLF	N=103 Location: Tertiary care center Between Jan. 2010 and June 2012 **Inclusion criteria:** -Preoperative factors: patient demographics including, gender, age, BMI, smoker, non-smoker, ETOH, opiate or illicit drug use, marital status, and employment status -Previous surgeries -Levels instrumented -ASA score -Major comorbidities -Intraoperative factors -Postoperative factors **Exclusion criteria:** patients treated with anterior/posterior approach Patients treated with minimally invasive	**IV1:** patient demographics **IV2**: previous sx **IV3**: levels instrumented **IV4:** ASA score **IV5:** intraoperative factors **IV6:** postoperative factors **DV1:** no single comorbidity was predictive of longer LOS **DV2:** older age and widespread systemic disease had longer LOS **DV3:** Intraoperative events did not affect LOS **DV4:** Heart disease had short LOS due to more extensive preoperative	Multivariate stepwise regression CI: 95%	Bivariate independent samples *t* tests were performed for all variable comparing the normal stay cohort with the extended stay cohort. Multivariate linear stepwise regression was performed with LOS. A series of iterative analyses were performed, excluding predictors by declining p value until only variable, with p<.2 remained as the final model covariates. Final regression was performed with these variable, with p<.05 indicating statistical significance	**DV1:** of this cohort 79% had LOS of 4 days or less. No specific co-morbidity was found to be associated with LOS in this multivariate analysis **DV2:** age p=.038, and ASA sore p=.001 **DV3:** no intraoperative factors were found to be associated with a longer LOS **DV4:** p=.005, significantly associated with a decrease in LOS **DV5:** average LOS 5.1±2.3 vs. 2.9±0.9 days for patients	**Level IV** **Strengths:** this study had a good study design. It thoroughly described the phenomenon studied and illustrated the findings utilizing confidence interval to measure effect. **Weaknesses:** Study was retrospective. Conducted in one facility. Some data was skewed towards one-level procedures. To minimize the potential for bias a regression analysis was performed. **Conclusion:** Understanding the factors that impact

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			techniques More than three levels of instrumentation Trauma cases	workup **DV5:** postoperative complications had a longer LOS		Pearson bivariate cross-correlation analysis was performed with all IV. Two-sided p values <.05 were considered statistically significant SPSS software was used for all statistical analysis	with no complications (p<.001)	LOS is crucial to help surgeons in treatment choice, preoperative counseling. This study identified age, ASA scores, history of heart disease, and discharge to subacute/nursing facility are associated with increased LOS. Perhaps a more extensive workup and close medical management is warranted for all patients to decrease LOS as discovered in this study of patients with heart disease having shorter LOS
Citation	**Conceptual Framework**	**Design/Method**	**Sample/Setting**	**Major Variables & Definitions**	**Measurement**	**Analysis**	**Findings**	**Decision for Use**
Lee et al., (2017) Effects of educational intervention on state anxiety and pain in people undergoing spinal surgery: a randomized controlled trial Funded by the Department of Rehabilitation Sciences, Hong Kong Polytechnic University	Inferred to be Transactional Model of Stress and Coping	**Design:** RCT with block design **Purpose:** To investigate the effects of education on anxiety and pain for patients undergoing spinal surgery	N=86 n=43 (IG) n=43 (CG) Location: Medical Center in central Taiwan-Chung Shan Medical University Hospital April to Dec. 2012 **Inclusion criteria:** age >20 years Voluntary participation Able to understand Taiwanese Mandarin	**IV:** booklet rich in information 30 minutes of education by NP or nurse along with videos and pictures **IV2:** Standard preoperative teaching consisting of 15 minutes of teaching **DV1:** no significant	STAI VAS Patient monitors for physical indicators CI:95%	Sample size was calculated using G*Power 3.1.5: large effect size (Cohen's *d*=.8) on a two-sided independent *t* test with an α error of .05 and an allocation ratio of 1 for the two groups. ANCOVA SPSS for all analyses	**DV1:** age p=.57, gender(male) p=.82, type of surgery p=.96, smoking p=.73, education level p=.55, marital status p=.90, drinking p=.90, employed p=.60, diagnosis p=1.00, LOS p=.06 **DV2:** anxiety	**Level II** **Strengths:** Well-constructed study. Provided with important facts regarding importance of preoperative education and outcomes. Good data analysis tools **Weaknesses:** All participants were

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			Chinese or Taiwanese No hearing or vision impairments **Exclusion criteria:** Other languages Hearing or vision impairment Patients' less than 20 years old	difference in demographic or clinical characteristics **DV2:** Anxiety and pain were significantly lower in the IG than CG			and pain were significantly lower in the IG than the CG 30 minutes before sx (t=3.45 and 2.30; p=.001 and .024, respectively) The day after surgery: (t=2.68 and 4.81; p=.009 and <.001, respectively)	recruited from the same hospital. This prevents for generalization due to similar demographic information **Conclusion:** Preoperative education is effective in informing patients undergoing spinal surgery which can lead to reduction in pain and anxiety postoperatively
No bias identified Taiwan								
Citation	**Conceptual Framework**	**Design/Method**	**Sample/Setting**	**Major Variables & Definitions**	**Measurement**	**Analysis**	**Findings**	**Decision for Use**
Mancuso et al., (2013) Development and testing of an expectations survey for patients undergoing lumbar spine surgery. No funding received for this study No bias was identified	Inferred to be Health Belief Model	**Design:** CSS **Purpose:** To develop and test a patient-derived expectations survey	N=118 (Phase I) N=56 (Phase II, III) **Inclusion criteria:** patients with diverse lumbar spine diagnoses **Exclusion criteria:** other diagnoses	**IV1:** Phase I- interviews with patients with open-ended questions about expectations and assembly of draft survey **IV2:** Phase II- Administered the survey twice to assess test-retest reliability **IV3:** Phase III- selection of final item based on concordance of responses and clinical relevance, and development of	Surveys developed in III phases.	Phase I: 118 preoperative patients with diverse lumbar spine diagnoses, 583 expectations were gathered, 31 categories were selected for draft survey Phase II: 56 patients completed the survey twice, 4 days apart Phase III: 21 final items including symptoms relief, return to basic mobility, resuming	**DV1:** The mean scores for both administration in Phase II were 66 and 65 points, the Cronbach alpha coefficients for both administration were 0.90 and 0.92, and the intraclass correlation coefficient between scores was 0.86 **DV2:** The scores revealed	**Level III** **Strengths:** This article provided good information regarding patient expectations and used a reliable scale to measure patient's perspectives **Weaknesses:** the authors did not include the questions offered to them, a table outlining the process would have been helpful to capture similarities across the different

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USA				scoring rubric **DV1:**21 items were retained for final survey addressing symptom relief, return to basic mobility, resumption of activities, and improvement in psychosocial well-being **DV2:** A rubric score calculated based on the number of expectations and amount of improvement expected ranging from 0-100 points, the higher the score the higher the expectations		activities, improvement of psychosocial well being	the higher the scores the higher the expectations	phases **Conclusion:** Good information measuring the physical and psychosocial expectations. The incorporation of measurement score is important to capture the and record patient expectations.
Citation	**Conceptual Framework**	**Design/Method**	**Sample/Setting**	**Major Variables & Definitions**	**Measurement**	**Analysis**	**Findings**	**Decision for Use**
Nepomuceno et al., (2016) Instruments used in the assessment of expectation toward a spine surgery: an integrative review No funding was received for this	Inferred to be Health Belief Model	**Design:** IR **Purpose:** To identify and describe instruments used to assess patients' expectations toward spine surgery	N=25 Databases searched PubMed, CINAHL, LILACS, and PsycINFO published between 1998 and 2015 **Inclusion criteria:** primary studies -published in full evaluating adult and/or elderly patients'	**IV1:** formulation of guiding question **IV2:** literature search for proposed theme **IV3:** categorization of studies **IV4:** evaluation of studies **IV5:** discussion and interpretation	Formulation of steps to guide the review and data extraction	LSSES, internal consistency Cronbach's alpha=0.92, after surgery correlation coefficient of 86% (Cohen's kappa=0.86) ES, good internal consistency (Cronbach's alpha=0.93),	**DV1:** LSSES and ES are the current and only measurement instruments **DV2:** the use of VAS to measure how much the patients hope to improve after spine surgery	**Level IV** **Strengths:** good review processes and method. The findings were categorized and based on measurement tools and instruments to assess patient expectations.

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study No bias identified Brazil		expectations towards spine sx treatment, because of degenerative disease, using tools, published in any language, regardless of date of publication, and with a quantitative approach **Exclusion criteria:** secondary studies and clinical guidelines Case studies Pilot study in preclinical stage Methodological studies Urgent/emergency ss Studies evaluation expectation of quality of healthcare services or from healthcare professionals	of results **IV6:** synthesis **DV1:** instruments already submitted to psychometric validation **DV2:** modified clinical scores to assess patients' expectations **DV3**: scales created by authors themselves without an adequate description of the development methodology or any evident of validation		agreement coefficient of 90% (Cohen's kappa=0.90) NASS-Cronbach's alpha =0.88, test-retest reliability Cohen's kappa =0.95 MODEMS-Cronbach's alpha=0.71, test-retest reliability Cohen's kappa=0.91 SEIQL-DW/VAS-reliability test-retest Cohen's kappa =0.76	**DV3:** the incorporation of NASS, MODEMS, SEIQL-DW/ VAS, evaluation of other constructs such as health related QOL, anxiety, depression, patient satisfaction with surgical outcome are crucial	Excellent review process and useful information to use for future research **Weaknesses:** no actual study to test the instruments was performed. **Conclusion:** the review of measurement instruments was excellent to guide future research in regards to patient expectations
Citation	**Conceptual Framework**	**Design/Method**	**Sample/Setting**	**Major Variables & Definitions**	**Measurement**	**Analysis**	**Findings**	**Decision for Use**
Schouten et al., (2016) Expectations of recovery and	Inferred to be Social Cognitive Theory	**Design:** SR **Purpose:** The purpose of the	N=38 N=4 (expert opinion cases)	IV1: TJBF managed nonsurgically IV2: TJBF	Case Questionnaire	GRADE Percentages for expert opinion analysis	**DV1: -**TJBF nonsurgically: GRADE quality: low	**Level I** **Strengths:** the review was well

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functional outcomes following thoracolumbar trauma: an evidence-based medicine process to determine what surgeons should be telling their patients Funding by Medtronic No identifiable bias USA	study was to define the expected functional outcomes following common thoracolumbar injuries	Databases searched: MEDLINE and EMBASE from 1980-Oct. 2010 **Inclusion criteria:** thoracolumbar sx Neurological intact Functional outcomes **Exclusion criteria:** lack of functional outcome measures Failure to separate results for patients with/without neurological injury Inability to distinguish data for thoracolumbar or low lumbar injuries	treated with posterior instrument stabilization IV3: Thoracolumbar junction flexion-distraction injury treated with posterior instrumented stabilization IV4: Low lumbar burst fracture managed nonsurgically IV5: 5 question questionnaires about expected outcome and questionnaire to surgeons regarding information given to patients **DV1:** pain free **DV2**: regaining pre-injury ROM **DV3:** return to activities and work **DV4:** consistent accurate information, realistic expectations	Final follow up 38% were pain-free, predicted from survey responders 61% -TJBF posterior instrumentation , GRADE: low, 45% pain free at follow up, predicted by survey 62% -Thoracolumbar junction flexion-distraction injury treated with posterior instrumentation GRADE: very low pain free 48%, surveys predicted 56% -Low lumbar burst fracture-nonsurgically, GRADE: very low, pain free 26%, survey predicted 59% **DV2: -**TJBF non-surgically no studies assessed ROM recovery across all cases, experts survey response was 68% at the 1-year mark -TJBF posterior instrumentation	constructed. Good data extraction pertaining to the desired information Specific case scenarios evolved with the specificity representing an effort to reduce variability and enhance generalization **Weaknesses:** expert opinions were used exclusively for many of the study domains. The follow up interval exceeded the 12-month time point may have introduced bias. The outcome predictors are limited to quality and quantity of the research available **Conclusion:** overall good review with good data analysis in regards to functional outcomes

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: survey response 57% -Thoracolumbar junction flexion-distraction injury treated with posterior instrumentation: survey predicted 44% -Low lumbar burst fracture-nonsurgically: survey predicted 65% **DV3:** TJBF non-surgically: 71% returned to work, survey predicted 46% TJBF posterior instrumentation: 32% return to work, survey predicted 35% -Thoracolumbar junction flexion-distraction injury treated with posterior instrumentation: 29-32% returned to work, survey predicted 29-48% -Low lumbar burst fracture-nonsurgically: 60-90%

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							returned to work, survey predicted 97% **DV4:** difficult to measure due to paucity in data	
Citation	**Conceptual Framework**	**Design/Method**	**Sample/Setting**	**Major Variables & Definitions**	**Measurement**	**Analysis**	**Findings**	**Decision for Use**
Waljee et al., (2014) Patient expectations and patient-reported outcomes in surgery: A systematic review Funded by the National Institute of Arthritis and Musculoskeletal and Skin disease and National Institute on Aging and a Midcareer Investigator Award in Patient-Oriented Research No bias identified	The Expectancy-Discrepancy Model The Assimilation Model The Assimilation-Contrast Model	**Design:** SR **Purpose:** Is to systematically review the available literature describing the relationship between patient expectations and PROs	N=60 Database searched: Ovid Medline literature published before Nov. 1, 2012 **Inclusion criteria:** primary data consisting of adult patients -patient expectations regarding sx procedure were measured pre and post operatively -PROs measure pre and post op -relationship between patient expectations and PROs specifically examined **Exclusion criteria:** not published in English -studies not including primary data -editorials, commentaries, and review papers	**IV1:** fulfillment of expectations **IV2:** Positive expectations related to improved post op PROS **IV3:** Positive expectations related to worse post op PROs **IV4:** No correlation between expectations and post op PROs **DV1:** Patient expectations **DV2:** Patient expectations and PROs	Literature review based on inclusion and exclusion criteria for data extraction	Descriptive statistics	**DV1:** 17% used previously validated surveys, 25% used qualitative methods, 45% used ad hoc surveys, an 13% used modified outcome surveys **DV2:** 40% found the fulfillment of expectations correlated with improved PROs, 20% of patient expectations were not correlated with PROs postoperatively	**Level I** **Strengths:** studies reviewed revealed positive expectations were associated with improved PROs Expectancy-discrepancy theory was discussed in an effort to understand the mechanism by which patient expectations could influence postoperative experiences Overall good information retrieved from this review **Weaknesses:** Heterogeneity existed in methods used to assess and report PE and postoperative PROS

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								Many of the studies were observational **Conclusion:** good information regarding their findings and next steps. Future studies should be geared toward examining patient expectations and the relationship between patient perception and postoperative recovery
USA								
Citation	**Conceptual Framework**	**Design/Method**	**Sample/Setting**	**Major Variables & Definitions**	**Measurement**	**Analysis**	**Findings**	**Decision for Use**
Witiw et al., (2018) Exploring the expectation-actuality discrepancy: a systematic review of the impact of preoperative expectations on satisfaction and patient reported outcomes in spinal surgery Funded by the Canadian Institutes of Health Research	Expectation-Actuality Discrepancy	**Design:** SR Prospective observational cohorts **Purpose:** to examine the impact of expectations on satisfaction and PRO for patients undergoing elective SS	N=19 Databases searched: MEDLINE, EMBASE, CINAHL, and Cochrane Library from inception to July 2015 **Inclusion criteria:** adults over 18 -degenerative spinal pathology -deformity -chronic back pain -preop assessment of patient satisfaction -post op assessment of patient satisfaction -post op assessment of PROs -PCT -RCT -RCS	**IV1:** Is there an association between a patients' PE and their post op satisfaction/PROs? **IV2:** Does the underlying spinal pathology influence the relationship between expectations and satisfaction/PROs? **IV3:** Does the difference between expected outcome and actual outcome influence satisfaction?	Literature review based on inclusion and exclusion criteria for data extraction 2 reviewers	Numeric rating scales VAS Dichotomous scales Likert scales	**DV1:** positive association between expectations and satisfaction **DV2:** studies found that the closer patients' expectations were to their actual outcomes the higher the satisfaction **DV3:** the lower the E-AD the higher the satisfaction	**Level I** **Strengths:** good information with good literature review that provided with a variety of assessment tools to measure PE and patient expectations **Weaknesses:** as with other systematic reviews in this topic the heterogeneity precluded the use of meta-analytical methods **Conclusion:** Relevant information to use

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			Exclusion criteria: -pediatric patients -trauma, infection, tumor -spinal cord stimulator -percutaneous injections -non-operative management -Retrospective assessment of expectations -less than 3 months follow up -studies with less than 10 patients	**DV1:** high PE appear to be associated with higher satisfaction and PROs after surgery for focal lumbar disc herniation, but not for LSS **DV2:** PE frequently exceed actual outcome creating an E-AD **DV3:** high-quality studies suggest a larger E-AD portends lower satisfaction				with key assessment tools to measure outcomes
No bias identified USA								
Citation	**Conceptual Framework**	**Design/Method**	**Sample/Setting**	**Major Variables & Definitions**	**Measurement**	**Analysis**	**Findings**	**Decision for Use**
Zywiel et al., (2013) Measuring expectations in orthopaedic surgery: a systematic review Funded by Smith & Nephew, Inc., Biomet	Inferred to be Social Cognitive Theory	**Design:** SR **Purpose:** to define and understand patients' expectations in orthopaedic sx	N=66 Databases searched: OVID Medline and EMBASE **Inclusion criteria:** -underwent othopaedic sx for musculoskeletal conditions -assessment of their expectations at any point during the study -limited studies that assesses patient expectations -full text articles -English	**IV1:** what validated instruments for the assessment of patient expectations of orthopaedic sx have been used in published studies to date? **IV2:** How were these expectation measures develop and validate? **IV3:** What unvalidated instruments on	Literature review based on inclusion and exclusion criteria for data extraction	Qualitative review	**DV1:** the validated tools used patient interviews or open-ended self-response questions as a definitive assessment tools, data was categorized and grouped for analysis **DV2:** one unvalidated tool lacked the adequate	**Level I** **Strengths:** good information regarding the abundance of measurement tools to assess patient expectations Observation was made on the essence of reducing variability to extract useful data to best measure phenomena **Weaknesses:** may

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No bias identified Canada	**Exclusion criteria:** review articles -published abstracts -no full text in English -Short surveys, notes, letters, editorials -non-applicable content	the assessment of patient expectations have been used in published studies to date? **DV1:** 7 validated instruments were identified **DV2:** details of reliability and validity testing were available for all but one of the instruments. **DV3:** 40 unvalidated expectation tools were identified. 13 were based on existing clinical outcome tools and the others were study-specific, custom-developed tools		description of the development methodology or evidence of any testing or validation **DV3:** the use of high-quality, standardized instruments for the measurement of patient expectations is crucial	have failed to identify other instruments used for other types of surgical procedures possibly relevant in spine surgery population **Conclusion:** Good guidance to follow when developing measurement tools and instruments to obtain quality data.

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Appendix E

Table 2

Synthesis Table

Author	**Auer et al.**	**Ellis et al.**	**Gruskay et al.**	**Lee et al.**	**Mancuso et al.**	**Nepomuceno et al.**	**Schouten et al.**	**Waljee et al.**	**Witiw et al.**	**Zywiel et al.**
Year	**2016**	**2015**	**2015**	**2017**	**2013**	**2016**	**2016**	**2014**	**2018**	**2013**
Study Design										
Systematic Review		X					X	X	X	X
Meta-Analysis	X									
Retrospective Case Studies			X							
Randomized Control Trial				X						
Cross-sectional studies					X					
Integrative Review						X				
Sample										
N	21	13	103	86	118 (phase I) 56 (phase II)	25	38 4 (expert opinion cases)	60	19	66
Surgery Type										
Spine		X	X	X	X	X	X		X	
Orthopedic										X
Surgical procedure	X							X		

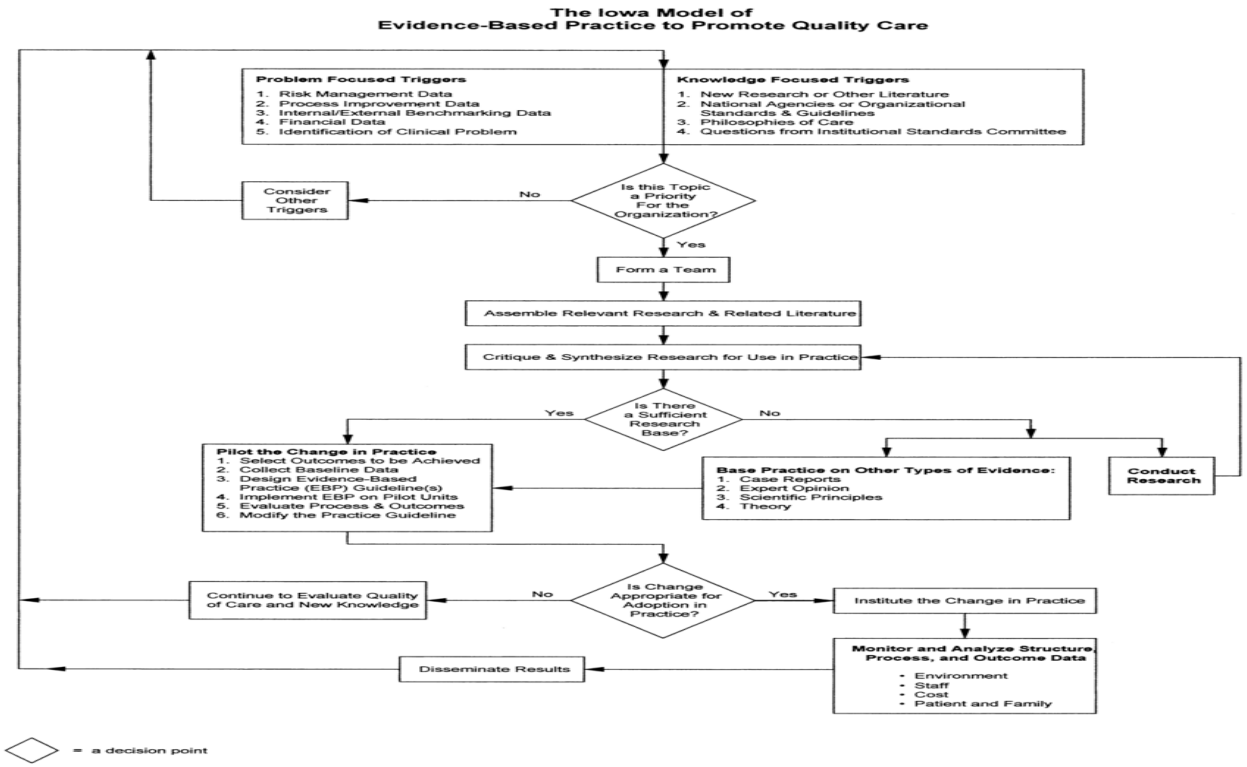
↑-low effect; ↑↑-moderate effect; ↑↑↑-high effect; +-positive effect

Author	**Auer et al.**	**Ellis et al.**	**Gruskay et al.**	**Lee et al.**	**Mancuso et al.**	**Nepomuceno et al.**	**Schouten et al.**	**Waljee et al.**	**Witiw et al.**	**Zywiel et al.**
Year	**2016**	**2015**	**2015**	**2017**	**2013**	**2016**	**2016**	**2014**	**2018**	**2013**
Independent Variables										
Pre-surgical expectation	X	X		X	X	X		X	X	X
Post-surgical expectation	X	X					X			
Variables affecting length of stay			X							
Preoperative education				X						
Patient reported outcomes	X	X					X	X	X	
Outcomes										
Expectation	↑-↑↑	↑↑↑			↑↑	↑↑↑	↑↑	↑↑	↑↑	↑↑
Experience	↑-↑↑	↑↑↑		↑↑↑	↑↑	↑↑	↑↑	↑↑	↑↑	
LOS			↑↑↑							
Preoperative teaching				↑↑↑						
Satisfaction	+	+		+			+	+	+	

↑-low effect; ↑↑-moderate effect; ↑↑↑-high effect; +-positive effect

Appendix F

The Iowa Model of Evidence-Based Practice to Promote Quality Care

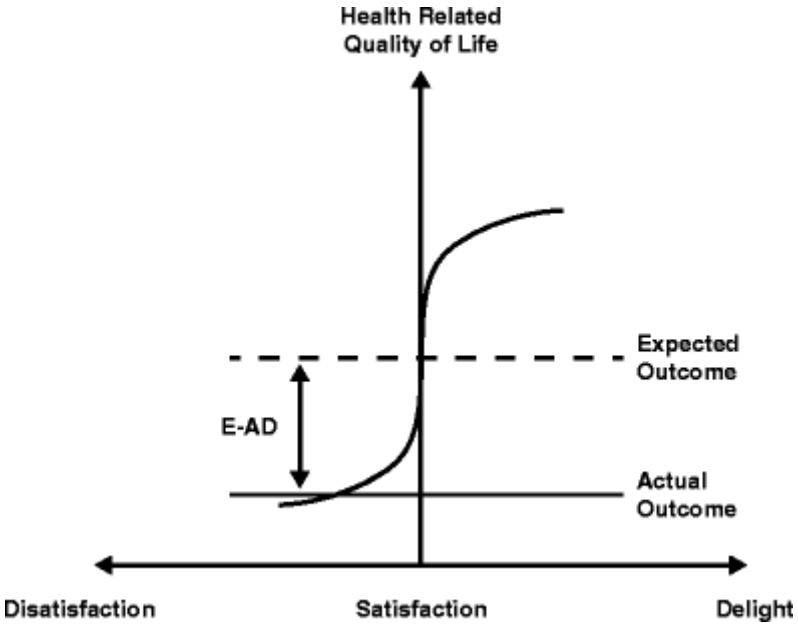


Reference

Titler, M.G., Klieber, C., Rakel, B., Budreau, G., Everett, L.Q., Steelman, V., Buckwalter, K.C., Tripp-Reimer, T., & Goode C. (2001). The Iowa model of evidence-based practice to promote quality care. *Critical Care Nursing Clinics of North America. 13*(4), 497-509.

Appendix G

Expectation-Actuality Discrepancy Conceptual Model



Reference

Mannion AF, Junge A, Elfering A, Dvorak J, Porchet F, Grob D. (2009). Great expectations: really the novel predictor of outcome after spinal surgery? *Spine 34*: 1590–1599

Appendix H

Pre-Intervention Survey

You are invited to participate in an evidence-based project about education of spine surgery. The purpose of the project is to improve patient knowledge/preparation for their spine surgery. This survey should take about 10-20 minutes to complete. Participation is voluntary, and responses will be kept confidential.
You have the option to not respond to any questions that you choose. Participation or nonparticipation will not impact your relationship with St. Joseph's Hospital and Medical Center and Barrow Neurological Institute. Submission of the survey will be interpreted as your informed consent to participate and that you affirm that you are at least 18 years of age. If you have any questions about the project, please contact Janet Trejo, via email at aptrejo1@asu.edu or cell number 602-919-8699. If you have any questions regarding your rights as a research subject, contact the SJHMC Institutional Review Board (IRB) at 602-406-8051.

Pre Educational Intervention Survey

Instructions (Please *circle* all that apply)

1. How were you given information about your spine surgery?

    1. In person and/or by telephone
    2. Written information
    3. Medical Memory or CD or Video
    4. Interactive website (EMMI)
    5. Other_____ ***(write-in)***

2. What is the best way for you to remember new information?

    1. Instruction in person
    2. Written information
    3. On-line instruction or Video

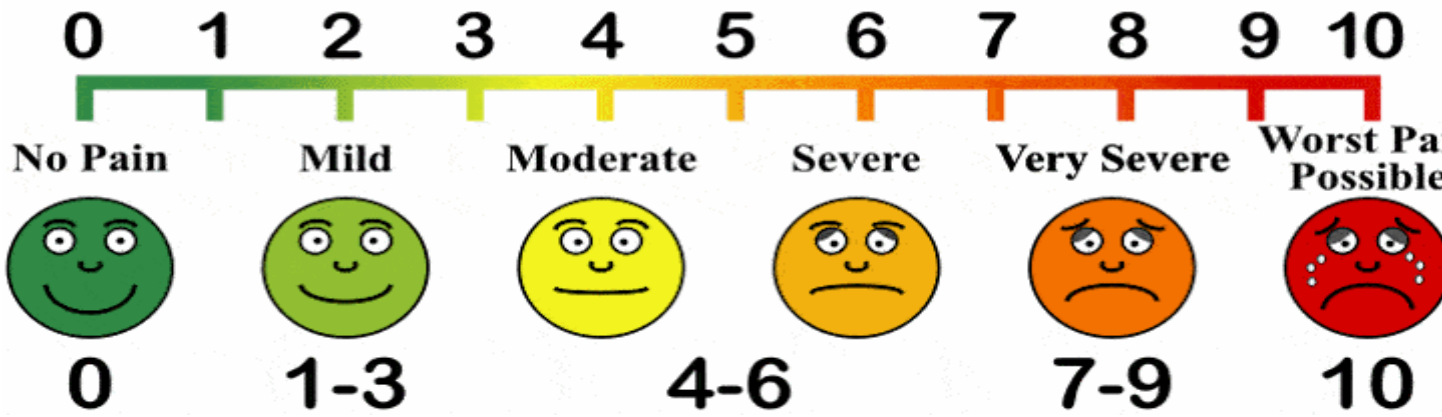
4. Attending a class
5. Other, please explain _____ ***(write-in)***

3. How knowledgeable do you feel about what to expect **after** your surgery?
    1. Very knowledgeable
    2. Somewhat knowledgeable
    3. Not very knowledgeable
    4. Not very knowledgeable at all

4. How knowledgeable are you about the surgery process and recovery of your spine surgery?
    1. Very knowledgeable
    2. Somewhat knowledgeable
    3. Not very knowledgeable
    4. Not very knowledgeable at all

5. Do you feel ready and prepared for your spine surgery?
    1. Very ready
    2. Somewhat ready
    3. Not very ready
    4. Not ready at all

6. Rate your current back pain ***(please circle a number)***



7. How confident are you that you will be able to walk from the hospital stretcher to your inpatient bed after surgery?
    1. Very confident
    2. Somewhat confident
    3. Not very confident
    4. Not very confident at all
8. How many days do you expect to stay in the hospital after your surgery?
    1. 2 days
    2. 3 days
    3. 4 days
    4. 5 days

9. How confident are you that you will be discharged to your home rather than a rehabilitation facility after surgery?
    1. Very confident
    2. Somewhat confident
    3. Not very confident
    4. Not very confident at all

10. How confident are you that you will have someone to help you at home after discharge?
    1. Very confident
    2. Somewhat confident
    3. Not very confident
    4. Not very confident at all

Please add comments and suggestions:

Appendix I

Functional and Demographics Survey

You are invited to participate in an evidence-based project about education of spine surgery. The purpose of the project is to improve patient knowledge/preparation for their spine surgery. This survey should take about 10-20 minutes to complete. Participation is voluntary, and responses will be kept confidential.
You have the option to not respond to any questions that you choose. Participation or nonparticipation will not impact your relationship with St. Joseph's Hospital and Medical Center and Barrow Neurological Institute. Submission of the survey will be interpreted as your informed consent to participate and that you affirm that you are at least 18 years of age. If you have any questions about the project, please contact Janet Trejo, via email at aptrejo1@asu.edu or cell number 602-919-8699. If you have any questions regarding your rights as a research subject, contact the SJHMC Institutional Review Board (IRB) at 602-406-8051.

Spine Surgery Preop Educational Intervention Participant Demographics

Please answer the following questions to the best of your abilities
Fill in the blank or circle the best answer

1. How old are you? _____***(years)***
2. What is your gender? **Male** **Female**
3. What is your ethnic group?
    1. Caucasian

2. Hispanic
3. African American
4. Asian
5. Native American
6. Other _____ ***(write-in)***

4. What is your highest level of education?
    1. No school
    2. Some high school
    3. High school graduate
    4. Some college
    5. College graduate
    6. Graduate degree
5. Did you walk from the parking garage to the preoperative center today?

    Yes No
6. How long have you had back pain? _____ ***(months)***
7. Do you use any assistive devices for walking? **Yes No**
8. How many days do you expect to spend in the hospital? _____

Appendix J

Intervention

Getting ready for my spine surgery

- **Bowel care:**
  - Starts before surgery
  - Goal: a soft bowel movement every day
  - Reason: Prevent problems from constipation (increased pain, nausea)
- **Getting up and around:**
  - Bring your brace if one was ordered for you
  - Review the back of this pamphlet for pictures on how to get out of bed safely
- **Leaving the Hospital:**
  - Expect to leave 1-2 days after surgery*
  - Have a family member or friend available to help you

*may be same day for smaller operations

Getting better after surgery

⇒ Walking after surgery
- After surgery: you will walk from the stretcher to your bed and then longer distances every day
- Log roll to sit at the edge of the bed*
- **DO NOT bend, lift or twist**

⇒ Pain medication will be changed from intravenous to pills

⇒ Starting to eat solid food again

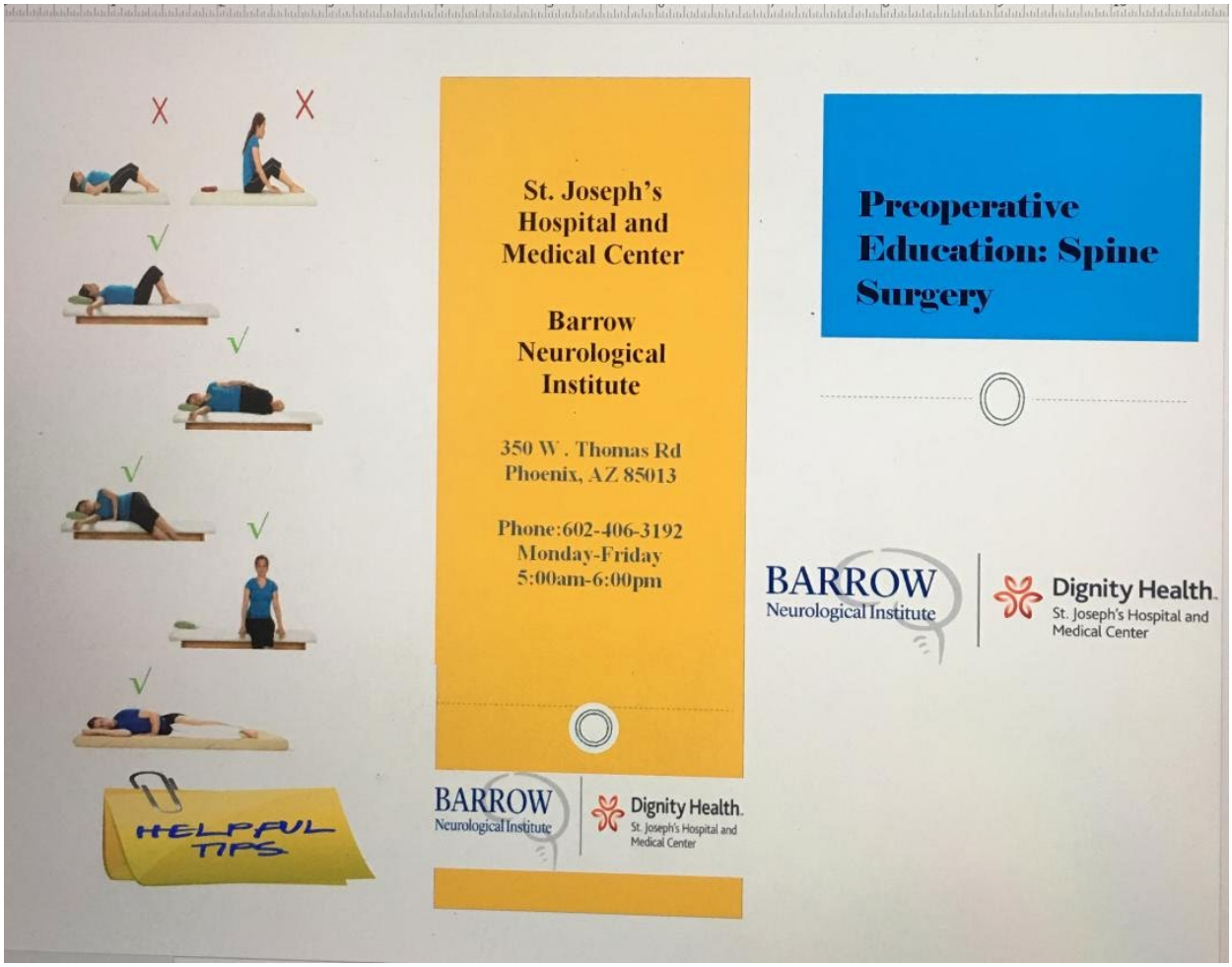
⇒ Urinary catheter is removed

⇒ Surgical drains are removed when ordered

*see back of pamphlet

Getting ready to leave

- You have had x-rays if ordered
- You are walking with supervision several times a day
- You use your brace when walking if ordered
- You are eating a regular food
- You are passing gas
- Your pain is controlled by pills
- You understand your activity restrictions and are able to put on your brace
- You understand your instructions and have made follow up appointments


HELPFUL TIPS
St. Joseph's Hospital and Medical Center
Barrow Neurological Institute
350 W . Thomas Rd
Phoenix, AZ 85013
Phone:602-406-3192
Monday-Friday
5:00am-6:00pm
BARROW
Neurological Institute
Dignity Health.
St. Joseph's Hospital and Medical Center
Preoperative Education: Spine Surgery
BARROW
Neurological Institute
Dignity Health.
St. Joseph's Hospital and Medical Center

Appendix K

Post-Intervention Survey

You are invited to participate in an evidence-based project about education of spine surgery. The purpose of the project is to improve patient knowledge/preparation for their spine surgery. This survey should take about 10-20 minutes to complete. Participation is voluntary, and responses will be kept confidential.
You have the option to not respond to any questions that you choose. Participation or nonparticipation will not impact your relationship with St. Joseph's Hospital and Medical Center and Barrow Neurological Institute. Submission of the survey will be interpreted as your informed consent to participate and that you affirm that you are at least 18 years of age. If you have any questions about the project, please contact Janet Trejo, via email at aptrejo1@asu.edu or cell number 602-919-8699. If you have any questions regarding your rights as a research subject, contact the SJHMC Institutional Review Board (IRB) at 602-406-8051.

Post Educational Intervention Survey

1. How knowledgeable do you feel about the expectations after your surgery?
    1. Very knowledgeable
    2. Somewhat knowledgeable
    3. Not very knowledgeable
    4. Not very knowledgeable at all
2. Did the educational pamphlet improve your understanding of your spine surgery?
    1. Highly improved
    2. Moderately improved
    3. Somewhat improved

4. Not at all improved

3. How educated did you feel after the educational pamphlet about the surgical expectations after your surgery?
    1. Very knowledgeable
    2. Somewhat knowledgeable
    3. Not very knowledgeable
    4. Not very knowledgeable at all
4. Did the educational pamphlet improve your knowledge regarding your post-operative or hospital care?
    1. Highly improved
    2. Moderately improved
    3. Somewhat improved
    4. Not all improved
5. Did you find the educational pamphlet easy to understand?
    1. Very easy
    2. Moderately easy
    3. Somewhat easy
    4. Not at all easy
6. Did you find the educational pamphlet effective and relevant to your spine surgery experience?
    1. Very effective
    2. Moderately effective
    3. Somewhat effective
    4. Not at all effective

7. How confident are you that you will have someone to help you at home after discharge?
    5. Very confident
    6. Somewhat confident
    7. Not very confident
    8. Not very confident at all
8. How confident are you that you will be able to manage your post-operative pain at home?
    1. Very confident
    2. Somewhat confident
    3. Not very confident
    4. Not very confident at all

Please add comments and suggestions:

Appendix L

Table 3

Functional and Demographics Statistics

Survey questions	Mean	*SD*	*n*
Age	58.17	14.607	6
Gender	1.83	.408	6
Ethnic group	1.00	.000	6
Other ethnic group	.00	.000	6
Highest level of education	4.33	1.033	6
Walked from the parking garage to the preoperative center	.33	.516	6
Length of time with back pain	98.67	93.264	6
Use of assistive devices for walking	.33	.516	6
Days expected to stay in the hospital	3.0	1.673	6

Note *SD*=Standard deviation; *n*=number of participants

Appendix M

Table 4

Pre and Post Intervention Statistics

Pre-intervention			Post-intervention		
Survey question	Mean *(SD)*	*n*	Survey Question	Mean *(SD)*	*n*
Pre intervention (knowledge about what to expect **after** surgery)	1.83*(.408)*	6	Post intervention (knowledge about expectations **after** surgery)	1.67 *(.816)*	6
How knowledgeable are you about the surgery process and recovery	1.83 *(.408)*	6	Education pamphlet improve your understanding	1.83 *(.408)*	6
Do you feel ready and prepared	1.17 *(.408)*	6	How educated did you feel after the educational pamphlet	1.67 *(.516)*	6
Able to walk from stretcher to inpatient bed	2.00 *(1.095)*	6	Educational pamphlet improve your knowledge about post operative care	2.00 *(.632)*	6
Days expected to stay in the hospital	2.00 *(.894)*	6	Did you find the educational pamphlet easy to understand	1.67 *(.816)*	6
Discharged home rather than a rehabilitation facility	1.17 *(.408)*	6	Did you find the educational pamphlet effective and	1.67 *(.816)*	6

			relevant		
Pre-intervention (help at home after discharge)	1.00 *(.000)*	6	Post intervention (help at home after discharge)	1.00 *(.000)*	6

Appendix N

Table 5

Pre and Post Intervention Effect Size

Pre-intervention			Post-intervention			
Survey question	Mean *(SD)*	*n*	Survey question	Mean *(SD)*	*n*	Cohen's D
Pre intervention (knowledge about what to expect **after** surgery)	1.83 *(.408)*	6	Post intervention (knowledge about expectations **after** surgery)	1.67 *(.816)*	6	0.248
Pre-intervention (help at home after discharge)	1.00 *(.000)*	6	Post intervention (help at home after discharge)	1.00 *(.000)*	6	0

Note: *SD*=standard deviation; *n*=number of participants