




Summer 2021

Improving Patient Outcomes with Post-Op Education for Nurses Caring for Patients Undergoing Total Joint Replacement

Amanda Collier
Jacksonville State University, asalze@stu.jsu.edu

Follow this and additional works at: https://digitalcommons.jsu.edu/etds_nursing

 Part of the [Medical Education Commons](#), [Orthopedics Commons](#), [Perioperative, Operating Room and Surgical Nursing Commons](#), and the [Surgery Commons](#)

Recommended Citation

Collier, Amanda, "Improving Patient Outcomes with Post-Op Education for Nurses Caring for Patients Undergoing Total Joint Replacement" (2021). *Doctor of Nursing Practice Projects*. 46.
https://digitalcommons.jsu.edu/etds_nursing/46

This Final DNP Paper is brought to you for free and open access by the Theses, Dissertations & Graduate Projects at JSU Digital Commons. It has been accepted for inclusion in Doctor of Nursing Practice Projects by an authorized administrator of JSU Digital Commons. For more information, please contact digitalcommons@jsu.edu.



DNP Manuscript Defense Approval

First Name: * Amanda

Last Name: * Collier

Student ID: *

Date: * 06/28/2021

- Choose your DNP program: *
- Adult-Gerontology Acute Care Nurse Practitioner (Doctor of Nursing Practice)
 - Family Nurse Practitioner (Doctor of Nursing Practice)
 - Post-Master's DNP (Doctor of Nursing Practice)

Manuscript Title: * Improving Patient Outcomes

Date of Manuscript Approval: * 06/28/2021

Student Signature	Electronically signed by Amanda Collier on 06/28/2021 11:53:55 PM
Chair, DNP Manuscript Signature	Electronically signed by Serena Gramling on 06/29/2021 9:26:56 AM
DNP Clinical Coordinator Signature	Electronically signed by Lori McGrath on 06/29/2021 9:56:48 AM
DNP Program Coordinator Signature	Electronically signed by Donna Dunn on 06/29/2021 10:38:50 AM
Director of Online & Graduate Nursing Programs Signature	Electronically signed by Kimberly Helms on 06/29/2021 10:38:41 AM
Dean of Graduate Studies Signature	Electronically signed by Channing Ford on 07/26/2021 8:35:09 PM

IMPLEMENTATION OF AN EVIDENCE-BASED PROTOCOL FOR PATIENTS
WITH TOTAL JOINT REPLACEMENT TO REDUCE READMISSIONS FOR
SURGICAL SITE INFECTIONS

A DNP Project Submitted to the
Graduate Faculty
of Jacksonville State University
in Partial Fulfillment of the
Requirements for the Degree of
Doctor of Nursing Practice

By

AMANDA CHEEKS COLLIER

Jacksonville, Alabama

August 6, 2021

copyright 2021
All Rights Reserved

Amanda Cheeks Collier Date August 6, 2021

ABSTRACT

Background: Surgical site infections (SSI) are the third most reported nosocomial infection causing an increased length of stay, increased healthcare cost, and a substantial increase in morbidity. A SSI is an infection developing within 30 days of surgery without using an implant and within one year of surgery utilizing any form of implant. Typically SSI occurs at the time of incision. However, poor postoperative wound care can lead to an SSI.

Purpose: This project aims to educate nursing staff on care of the total joint replacement (TJR) patient to reduce readmission rates for postoperative SSI.

Design Methods: This quality improvement project delivered education to participants during a 30-minute session. Education included the different wound dressings and associated care, SSI risks and prevention, and patient discharge education. A quasi-experimental design was utilized with pre- and post-education testing to evaluate effectiveness.

Conclusion: Comparison of the pre- and post-educational session testing revealed a substantial increase in staff knowledge of TJR patient care and associated wound dressings and care guidelines, as well as a decrease in SSI readmission rates.

Implications for Nursing: Success of the educational sessions led to this education being added to new hire orientation and yearly staff competency education.

Keywords: Surgical site infection, wound care, education, evidence-based practice, NPWT, silver, sterile gauze, TJR

Acknowledgment

To Dr. Serena Gramling, I appreciate all the patience, support, and guidance you showed and provided me during the development and implementation of this project. Without you, I would not have made it to the end. You have been there and listened and encouraged me so that I could complete this project. I am forever grateful to you.

To Dr. Ryan Cordry, I have enjoyed creating the learning materials needed and educating the staff to care for your patients. I thank you immensely for your leadership and willingness to participate and guidance in this project.

To my best friend, co-worker, classmate, Crystal, I would not have been able to complete this journey without you. You have been there day in and day out when I doubted myself and thought I should give up. You inspired me to continue every day. It has been my honor and privilege to go through this process with you from our BSN to our DNP, and I look forward to seeing all that you accomplish in life. I am so proud of you.

To my husband Craig, where do I begin? From day one, you believed in my strength and dedication to nursing and encouraged me to pursue my dreams even when others did not think it was such a good idea. Thank you for picking up my slack at home, and thank you for understanding when I could not participate in social gatherings to focus on a test or an assignment or this project. Without your love and devotion, I would not have achieved my dreams, and I am eternally grateful. I love you!

Table of Contents

Abstract	iii
Introduction	1
Background	2
Problem Statement	2
Organizational Description of Project Site	3
Review of the Literature	3
Evidence-Based Practice:	15
Theoretical Framework/Evidence-Based Practice Model	15
Goals, Objectives & Expected Outcomes	17
Project Design	18
Project Site and Population	19
Setting Facilitators and Barriers	20
Implementation Plan/Procedures	20
Measurement Instrument(s)	22
Data Collection Procedure	22
Data Analysis	23
Results	
Interpretation/Discussion	
Cost-Benefit Analysis/Budget	23
Timeline	25

Ethical Considerations/Protection of Human subjects.....	26
Conclusion	27
References.....	29
Appendix.....	36
Appendix A: Theoretical Framework DMAIC.....	36
Appendix B: Timeline.....	37
Appendix C: Classical Data Analysis.....	38
Appendix D: Bayesian Data Analysis.....	39
Appendix E: Pre-test Data by Question.....	40
Appendix F: Post-test Data by Question.....	44
Appendix G: Individual Participant Test Score Analysis.....	48
Appendix H: Consent for Participation in Research.....	49
Appendix I: Signature Page of Consent Form.....	51
Appendix J: Pre-Test.....	52
Appendix K: Post-Test.....	55
Appendix L: Educational Material.....	58
Appendix M: Jacksonville State University IRB Approval.....	73
Appendix N: Facility Approval of Project.....	74
List of Tables.....	viii
List of Figures.....	viii

LIST OF TABLES

Table

1: Timeline.....	37
2: Pre-Test Data Analysis by Question.....	40
3: Post-Test Data Analysis by Question.....	44
4: Individual Participant Scores.....	48

LIST OF FIGURES

Figure

1: Theoretical Framework DMAIC.....	36
2: Educational Material.....	58

IMPLEMENTATION OF AN EVIDENCE-BASED PROTOCOL FOR PATIENTS
WITH TOTAL JOINT REPLACEMENT TO REDUCE READMISSIONS FOR
SURGICAL SITE INFECTIONS

Introduction

According to Darouiche (2019), in the United States (U.S.), 27 million surgeries are performed every year. Up to 5% of surgeries resulted in surgical site infections. Surgical site infection (SSI) has become the third most reported nosocomial infection causing an increased length of stay of patients, increased healthcare cost, and a substantial increase in morbidity, causing undue harm to the patient's life (Darouiche, 2019). Advancements in technology, implementation of sterile dressing application post-operatively, and strict sterile dressing change guidelines have significantly reduced SSIs. SSI rates vary based on patient history, procedure, surgical technique, and healthcare provider.

A moderate-sized metropolitan hospital with a total joint replacement (TJR) program is in need of additional education of their nursing staff, including specific wound care guidelines, to decrease postoperative infection rates. This project aims to provide the required education associated with the specific total joint care guidelines to the nursing staff and assess the effectiveness of the educational sessions. Improved education allowed more staffing flexibility and increased knowledge of care requirements for patients undergoing total joint replacement. The additional education ultimately contributed to improved patient outcomes as well as an increase in patient satisfaction.

Background

SSIs are defined as infections occurring within 30 days of surgery without the use of implants or within one year of surgery with the use of an implant of any kind (Darouiche, 2019). Initial contamination typically occurs at the time of the surgical procedure. However, poor postoperative wound care can also lead to SSIs. The facility chosen for this project utilizes two different types of advanced wound dressings for patients with total joint replacement: a silver impregnated dressing and a closed incision negative pressure wound therapy dressing. Nursing staff consistently voiced concerns over the differences in dressing requirements, application and care of the dressings, and overall knowledge of care associated with the different dressings. There is also a lack of knowledge of how the dressings contributed to wound healing. The nursing staff at the identified facility needed updated evidence-based guidelines and the associated education to provide quality patient care.

Problem Statement

This DNP project will address the following question: for nurses caring for total joint replacements, does an educational session about the patient care in the immediate postoperative period versus no educational session increase knowledge and understanding of the care of the postoperative total joint replacement patient?

This project aims to determine if using a standardized education session increases nurse's knowledge of the dressings used in particular joint surgeries and a decrease in postoperative (post-op) SSIs readmissions at the project facility. The educational sessions included all aspects of care, including providing a thorough explanation of the types of dressings used on the unit, how they function, and post-op care associated with the

dressings to decrease postoperative infections and pain. The educational sessions also allow more staffing by increasing the number of knowledgeable nurses caring for patients with TJR. The project outcomes were successful, and the project facility adopted this method for the orientation of new employees and is now part of the yearly competency training. An additional benefit is that the project contributed to the requirements for the facility to receive their Total Joint Accreditation with the Joint Commission (JCAHO).

Organizational Description of Project Site

The project site serves an aging patient population with multiple comorbidities. These patients are more susceptible to infections and injury after surgical procedures, especially after orthopedic total joint replacement surgery. The project facility is currently experiencing rapid growth of its orthopedic total joint program and is in the process of gaining Total Joint Accreditation from the Joint Commission. The facility employed numerous nurses unfamiliar with the different dressings used by the orthopedic providers and the postoperative care associated with those dressings. The nursing staff voiced concerns about the lack of education about the products used postoperatively and how to care for this population. In response to this problem, developing an educational program for postoperative patients with TJR was necessary. This process improvement project improved patient care, increased confidence, and decreased stress for participants caring for patients with joint replacement surgery and decreased postoperative SSI for patients with TJR.

Review of the Literature

Surgical site infection (SSI) is an infection that occurs when bacteria enter the body at the time of incision or within 30 days if without the placement of an implant or

within one year if there is an implant (Dahiya et al., 2016). "Bacteria are autonomously replicating unicellular organisms known as prokaryotes because they lack an organized nucleus" (Grossman & Porth, 2014, p.256). The most common pathogen in SSI's is *Staphylococcus aureus* (*S. aureus*), which is responsible for approximately 50% of all SSIs. *S. aureus* is commonly found on the skin and nasal passages. *S. aureus* is found on the body, leading to the most common source of infection being the patient's endogenous skin flora (Anderson et al., 2017).

The American College of Surgeons has established a list of risk factors for developing SSIs (Ban et al., 2016). Risk factors included complete functional dependence, obesity, complicated emergency surgery, prolonged surgical duration, chronic obstructive pulmonary disease, other respiratory conditions, diabetes, smoking, coronary artery disease, peripheral vascular disease or limb ischemia, hypertension, bleeding disorders, renal disease, preoperative sepsis, and being of the female sex (Ban et al., 2016). When a patient develops an infection, the presenting symptom severity varies from each patient based on their independent risk factors and type of bacteria. A patient's symptoms are the expression of the struggle between the invading bacteria and the body's inflammatory and immune response of the patient (Grossman & Porth, 2014). Procedure variables also add risk factors in a patient developing an SSI. Associated risks with SSI replacement surgery include types of antimicrobial prophylaxis preoperatively, surgical scrub duration, preoperative hair removal, skin anti-sepsis protocol, choice of preoperative skin preparation, wound class, and foreign body contamination of the surgical site. Other factors, such as operating room ventilation, sterilization of surgical

instruments, surgical technique, and duration of surgery, also add risk to surgical outcomes (Darouiche, 2019).

According to Skube et al. (2017), manifestations of postoperative infection include fever, pain, tenderness, redness, delayed wound healing, warmth at the site of infection, and swelling. Other infections can be specific to wound and infection type. An SSI can be classified into three categories, superficial, deep, and organ. A superficial SSI involves only the skin and subcutaneous tissue. The symptoms of a superficial SSI include purulent drainage from the incisional site and general symptoms. A deep SSI involves the muscle and or fascia. A deep incisional SSI also may have purulence and cause the wound to reopen on its own; the surgeon may have to open the incision as well drain the infection. The deep incisional SSI also demonstrates the general infection symptoms. An organ SSI involves muscle, fascia, and an organ system. An internal organ or space SSI presents with the general symptoms as well as purulence. The drainage may be noticed from an implanted drain within the surgical area. An abscess may also form deep within the body. An abscess is an enclosed area of pus and disintegrating tissue surrounded by inflammation (Skube et al., 2017).

Although an SSI is a complication of surgery on its own, it can lead to additional debilitating conditions and outcomes. For example, an SSI that migrates into the bone of a distal appendage can result in the loss of the affected appendage. Another example of an SSI in surgery would be when a cholecystectomy leads to an intraabdominal abscess that invades the colon. This process could cause colon death and require resection with the possible placement of a colostomy or ileostomy. Furthermore, an SSI can lead to multi-organ system failure with mechanical ventilation, which increases the patient's risk

of mortality. Approximately 31% of healthcare-acquired infections are related to surgical procedures (Hutzler & Williams, 2017). SSIs continue to be a substantial cause of morbidity and have a directly associated mortality rate of 3% (Centers for Disease Control [CDC], 2021). Postoperative patients are also at risk of severe complications related to infection of the surgical incision and other body systems such as respiratory illnesses, postoperative site bleeding, blood clots in the legs, pulmonary emboli, and falls (Lasater & Mchugh, 2016). After surgery, the patients will, in the days and weeks to follow, require mobility assistance, physical rehabilitation, wound management, and ongoing education about postoperative self-care (Lasater & Mchugh, 2016).

To combat SSI rates, many forms of quality improvement processes have been developed and implemented. There have been improvement processes developed for the preoperative, perioperative, and postoperative phases. These quality improvements have a proven record of SSI reduction. Wound care plans begin in the perioperative phase and carry over to the postoperative phase. The selection of the type of dressings used to protect the new surgical site is vast. However, this project focuses on using silver-impregnated dressings, negative pressure wound therapy, and standard occlusive sterile gauze dressings.

Ionized silver has known antimicrobial properties and has been used in burn wound care for over two hundred years (Barillo & Marx, 2014). Silver has antimicrobial properties and reduces the bioburden and associated endotoxins in wounds. Silver directly sequesters associated endotoxins to promote re-epithelialization and improve healing (Abboud et al., 2014). "While it is generally recognized that ionic silver is responsible for the antimicrobial activity of silver due to the dissociation of ions from the

oxidized metal surface, the actual mechanism by which ionic silver kills bacterial cells has not been established" (Marx & Barillo, 2014 p. S10). Four theories are explaining how silver's antimicrobial mechanism functions. They include inhibition of life-sustaining enzymes by chemical interactions with silver ions, killing bacteria by interacting and rupturing the cell membrane or cell wall, the interactions between ionic silver and the DNA of the bacterial cell, and the silver-free radicals destroying the bacterial cell (Marx & Barillo, 2014). Silver dressings can be left in place for up to seven days before changing, and depending on the type of dressing, the silver cloth dressing may be rinsed and reused (Marx & Barillo, 2014).

Negative pressure wound therapy (NPWT) is used on both open and closed incisions. While the most common use of NPWT is for non-healing, open, and infected wounds, these dressings also prove valuable in the clean closed surgical incision. Prophylactic NPWT (pNPWT) on closed incisions in the field of orthopedic surgery has demonstrated positive postoperative benefits (Wang et al., 2019). There are four primary mechanisms and multiple secondary mechanisms of wound healing with NPWT. NPWT's primary mechanisms of action include microdeformation, macro-deformation, alteration of the wound environment, and fluid removal. Secondary action mechanisms include neurogenesis, angiogenesis, modulation of inflammation, and bioburden alterations (Panayi, 2017). NPWT reduces fluid pooling in the incision site and reduces the subsequent skin maceration and the associated infections.

Microdeformation is the microscopic mechanical changes (shear and hydrostatic forces to the extracellular fluid, gravity through the extracellular matrix, compression, and tension) that occur when suction is applied to the wound resulting in an undulated

wound surface. Localized hypoxia increases the vascularity and perfusion of tissues, enhances the healing process, and stimulates vessel sprouting towards the incision (Panayi, 2017). Macro-deformation is the induced wound shrinkage due to pore collapse when suction is applied. Because fluid accumulation in the wound compresses local tissues and reduces tissue healing, removing the fluid restores circulation and perfusion, causing the wound to heal. Once the fluid is removed, the warm enclosed environment restores osmotic and oncotic gradient pressure to the wound surface. The four primary mechanisms of NPWT affect various wound healing processes, including neurogenesis, hemostasis, angiogenesis, modulation of inflammation, cellular proliferation, differentiation, migration, granulation formation, and alterations in bioburden (Panayi, 2017).

A sterile technique or aseptic technique (depending on the type of wound) should be used when performing dressing changes. Standard sterile dressings or inactive dressings provide a barrier between the wound and the external environment while protecting from secondary infection. Sterile dressing requires daily or more frequent changes to keep the wound clean and protected. Inactive and standard dressings are highly absorbent and usually made of cotton, synthetic fibers, or multiple layers. These dressings keep the wound in a warm moist environment. Open wounds have a moist environment that promotes cell growth, angiogenesis, and fibrinolysis (Kujath & Michelsen, 2008).

Accurate wound and health assessments are critical components in wound management. To develop an appropriate treatment course, one must have a complete past medical history, family history, physical assessment, bloodwork, including cultures

and imaging. An environmental, socio-economic, and current living situation should also be included in assessing the patient. Chronic medical conditions such as diabetes, peripheral vascular disease, certain medications such as chronic steroid use, poor nutritional status, illicit drugs use, alcohol consumption, and smoking can significantly impair wound healing. Chronic medical conditions play a role in wound healing. "Poor patient self-efficacy, the knowledge required for postoperative wound monitoring and communication may lead to negative clinical outcomes" (Bishop et al., 2018, p.17). For example, a patient with diabetes could have delayed wound healing from possible nerve damage, poor blood circulation, or a compromised immune system (Advanced Tissue, 2015). With delayed wound healing, there is an increased risk of infection.

When assessing a wound of any type, the clinician determines the physical and anatomical location, size, depth of tissue destruction, tissue color, surrounding tissue temperature, and any drainage color, consistency, foul odor, and the amount that may be present (Barkley & Myers, 2015). After surgery, the postoperative wound is closed with suture, staples, or adhesive strips, or liquid, provided the surgery is not for an infection that the clinician determines needs to remain open. Wound closure methods are removed at variable times according to how the incision is healing and independent evaluation of the patient and their medical history. Typically sutures and staples are removed within five to 14 days. Adhesive closures resolve on their own in response to bathing, usually 10 to 14 days.

Preoperative lab work and diagnostic testing are essential for postoperative wound management. Important parameters to evaluate include protein levels, complete blood count, erythrocyte sedimentation rate, liver function tests, glucose and iron levels, total

lymphocyte count, blood urea nitrogen and creatinine levels, lipoprotein levels, vitamin and mineral levels, and urinalysis. Wound healing can be affected with just one deterrent (Hess, 2015). A patient's vital signs are often the first indicator of post-surgical infection. The patient may present with fever, tachycardia, and hypotension. Bloodwork can reveal leukocytosis, anemia, abnormal clotting times, hyperglycemia, hypoalbuminemia (Barkley & Myers, 2015). Inflammatory markers such as sedimentation rate, procalcitonin, and lactic acid can be elevated. A wound culture can also be obtained by wound swab, tissue culture, or biopsy.

SSI reduction efforts should be a priority to ensure good patient outcomes following any surgical procedure. SSI complications include increased patient and hospital costs, loss of income, additional pain, suffering, and increased risk of death. The best treatment for a SSI is prevention with an individual patient-centered focus of care. "Preventive strategies to reduce the rate of SSIs after spine surgery have become critically important due to the deleterious impacts of this complication on patients and health care systems. These strategies can be separated into three main categories: preoperative optimization of patient-related risk factors, intraoperative, and postoperative measures to prevent SSIs" (Atesok et al., 2019, p. 184).

The World Health Organization's (WHO) third and final stage is the postoperative stage which includes postoperative measures to reduce SSIs. At this stage, recommendations include removing wound drains when clinically indicated, no use of an advanced dressing over the use of a standard dressing on wounds closed by primary intention, and no prolonged prophylactic antibiotic usage after procedure completion (Allegranzi et al., 2016). In 2014, the Center for Disease Control (CDC) introduced the

Core Elements of Hospital Antibiotic Stewardship Programs (Core Elements) to promote antibiotic stewardship in facilities. The antibiotic therapy with consideration given to physician preference, patient allergies, and the specific surgical procedure performed, should be used judiciously and appropriately. Patients also have a significant role in the postoperative stage. Therefore, postoperative wound care guidelines set forth by their provider must be adhered to consistently. Dressing selection depends on the patient, the procedure, and provider preference. There are numerous types of dressings to consider when developing the postoperative wound care plan. Dressings utilized in total joint replacement surgery at the project facility range from sterile gauze to advanced nanoparticle antimicrobial-containing material to vacuum therapy. "Evidence underpinning dressing choice is often regarded as poor with few randomized clinical trials supporting treatment decisions. Therefore, care is based largely on expert opinion and subject to local variability with diverse product formularies" (Vowden & Vowden, 2017, p. 489). Therefore, the provider must consider the effects of the dressing as compared to the wound and wound bed.

Patients may experience increased pain and suffering if an SSI develops. HAI is costly to the health system, the individual patient, and society because as HAI requires additional treatments in a hospital or at home and possible absence from work (Feney et al., 2020). The average cost of an SSI is an increase of \$7,531 compared to \$3,844 for non-SSI patients (Feney et al., 2020). Costs related to SSIs include lab work, medications, diagnostic testing, additional surgical and therapeutic procedures, and prolonged or additional hospitalizations. Losses associated with HCAs include lost wages for patients and caregivers, loss of taxes for the state, and decreased productivity

for employers (Feney et al., 2020). Hospitals and providers can also see a reduction in payment from insurance carriers for preventable infections. The increased cost of healthcare results in the individual payer cost of private health insurance increasing. Hospitals are not reimbursed for healthcare-associated SSIs by most insurance carriers. Therefore, the highest cost for the facilities is the lost bed-days. This loss entails using a bed for a patient that the facility is not being compensated for and the cost of staff and supplies (Abu-Sheasha et al., 2018).

The postoperative patient's nursing care requires knowledge of the surgical process and the risks and possible complications associated with surgery. Nurses need continuing education to maintain and further develop their independent practice knowledge. When addressing nursing education, some potential barriers, such as personalities and attitudes, can affect the acceptance of new knowledge. Providing nurses with instruction specific to the patient population they care for increases nursing morale, patient safety, patient compliance and reduces SSIs and readmission rates.

Implementing an evidence-based practice plan with surgical precautions for preoperative, intra-operative, and postoperative periods decreases SSI risk and other postoperative complications. If the patient is prepared physically and mentally before surgery and educated about the steps required to ensure proper healing, the results are typically improved compliance and proper healing. The patient should return to the highest level of performance sooner, thereby decreasing expenses to the patient, provider, and associated facility.

During a patient's hospital stay post total joint replacement surgery, nurses are the predominant caregivers. If they do not have the proper knowledge, patient care can

suffer. Inadequate nursing care can lead to injuries, medication errors, ineffective pain control, decreased patient satisfaction, decreased patient compliance, decreased Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) scores, reduced reimbursement for the facility, and decreased morale among nursing staff (Simpson, Lyndon, Ruhl, 2016). Educating nursing staff on the patients with TJR postoperative care involves evaluating their existing knowledge, educating how patients are cared for, and evaluating what they have learned. Nursing involves critical thinking and protecting the patient from potential harm. Nurses who participate in continuing education focused on their specialty benefit the patient, nurse, and facility.

Healthcare is an evolving industry where new evidence-based practice (EBP) data are used daily. Nurses must be open to change and continuing their education. When developing an education plan, educators must account for various personal traits and personalities. It is essential that staff feel a sense of control over their duties to accept new knowledge and be consistent in the implementation. We also must account for the different learning styles of the ones being educated. There are four main barriers to nurse learning, time constraints, workplace culture, access to new and evidenced-based literature, and the application of new knowledge (Chatterley, 2017). It is essential to encourage, motivate, and promote continual learning to stay abreast of the evolution of healthcare and adequately care for patients. "Incorporating sequential, individualized learning into traditional C.E. platforms is an impactful method of addressing persisting knowledge gaps toward improved healthcare delivery and patient health" (Robinson, 2019, p. 5).

Educators must account for different learning styles, personalities, and motivations to learn various personal traits and personalities when developing an education plan. Some nurses may be uncomfortable or unaccepting of change, which creates a barrier to learning, and patient care can suffer. It is essential to encourage, motivate, and promote an environment of continual education to stay abreast of the evolution of healthcare and provide safe care to patients.

There are four main barriers to nurse learning, time constraints, workplace culture, access to new and evidenced-based literature, and the application of new knowledge (Chatterley, 2017). It is essential to motivate and promote ongoing learning to avoid those barriers and improve processes. According to Ajzen (1991), the Theory of Planned Behavior (TPB) states that intention is the determining factor of different behaviors. According to TPB, three factors can predict intention. These factors include individual behavior, social norm, and perceived behavior control (Gagnon, 2015). It is essential that staff feel a sense of control over their duties to accept new knowledge and be consistent in the implementation process. To improve nursing education, one must evaluate current educational trends and make adjustments to meet the audience's needs. The educational creator must also consider the provider's specific patient care protocols, such as the physician-specific wound care and dressing, ambulation requirements, and modes of pain control (Chatterley, 2017).

Evidence-Based Practice

Evidence-based is defined by the National Council of State Boards of Nursing (NCSBN, 2021) as the integration of the best research with clinical expertise and patient values. Improving the care of the total joint replacement patient requires nurses to have ongoing nursing education on evidence-based practices (EBP) regarding patient care with TJR. The educational content was researched and developed based on documented EBP scholarly articles and studies, and specific surgeon-requested care measures. Education was delivered in evidence-based teaching practice (EBTP) methods using a nurse lead learning session. The nurse-led learning session participants included registered nurses, licensed practical nurses, and certified nursing assistants.

This quality improvement project increased the individual participant's knowledge of EBP care of the total joint replacement patient leading to improved patient care. to transform how clinical effectiveness evidence is generated and utilized to improve healthcare, the Institute of Medicine's (IOM) Roundtable on Evidenced-Based Medicine was developed. "With the IOM's 2020 goal that 90 percent of clinical decisions be evidence-based, there is a concomitant need to build faculty capacity to use EBTP and prepare graduates at all degree levels to use EBP effectively in clinical practice" (Kalb et al., 2015, p. 218). It was essential to prepare participants on the primary function, mechanism of action, and care guidelines on the different variations of dressings utilized in the postoperative period for the patients with TJR.

Theoretical Framework/Evidence-Based Practice Model

Define, measure, analyze, improve, and control (DMAIC, see Figure 1) is a quality data-driven improvement process that is part of the Six Sigma initiative. Six

Sigma has its roots in the manufacturing industry and was introduced in the business world in 1986 by Motorola, focusing on defects and ways to reduce defects (Comfere et al., 2020). Six Sigma (Sigma) gets its name from the benchmark that defects should only occur at the sixth standard deviation (Comfere et al., 2020). Six-sigma level is considered more conceptual or aspirational for some areas of healthcare, in other areas, it can and has been achieved (Comfere et al., 2020).

The DMAIC framework of Six Sigma consists of five stages. The first stage is to define the problem. It is providing an adequate definition of the gap in practice that requires assistance. The second phase is to measure the problem. This phase quantified the gap in practice and revealed the problem's current state by providing the statistical data needed to aid in current and future project reliability evaluation. The third phase is to analyze the problem. The measurement data is analyzed to determine what is driving the gap in practice. The primary focus of this phase was the quantitative data evaluation, but there was a qualitative component also. The goal of this phase is to identify and target the gap in practice for improvement. The fourth phase is the improvement phase. Based on the findings from all prior phases, an improvement process is developed and trialed (Go Lean Six Sigma, 2021).

Once the improvement process has been deemed successful, the project moves into the fifth and final phase, the control phase. The project team works with the project facility and transfers ownership from the researcher to the facility or control group. Successful projects often experience setbacks, while maintain associated gains as processes and as tools are transitioned to operational ownership (Comfere et al., 2020). This final phase consists of continued evaluation and following the newly implemented

action plan to ensure continued success. DMAIC was used to evaluate the current problem with the participants' lack of knowledge and confidence in the medical and surgical unit caring for orthopedic patients during the immediate postoperative period.

Goals, Objectives, and Expected Outcomes

The participants reported a need for more information and direction to care for TJC patients adequately. An educational session was implemented to improve the existing participant knowledge of EBP and the specific physician care guidelines on the total joint replacement patient's care with improved patient care. Improvements in patient care translated to better HCAPS results and improved morale within the participants. This specific unit required participants to care for the total joint replacement patients at a high level of accuracy and care. Before the educational session, staffing was limited to a few of the participants. This decreased staffing led to higher nurse-to-patient ratios and increased risk for medication and patient care errors. The educational session covered the types of procedures performed at the facility, specific wound care requirements, and the types of dressings used, and general and specific nursing care based on the physician and surgery type. The increased participant knowledge translated into improved accurate and consistent patient discharge education, and reduced potential readmissions for SSI, injuries, respiratory illness, and other post-op-related complications. This primary quality improvement project goal was to increase the participants' knowledge of caring for a patient with a total joint replacement. Written testing comparisons demonstrated the increased understanding before and after attending the session. A secondary goal was to create and initiate a new yearly competency for the facilities use in the continued

education of the participants. This competency was also an essential step in achieving total joint replacement accreditation.

Project Design

This project utilized a quasi-experimental control group design involving a pre- and post-test evaluation method (see Appendices J & K). Quasi-experimental projects (QEP) generate causal evidence when randomized control trials (RCT) cannot while generating the evidence faster and at a lower cost (Bärnighausen, 2017).

This project was designed to improve the immediate postoperative care of the patient with TJR and reduce the potential for readmission for SSI by increasing participant knowledge and providing EBP information on the different dressings utilized. The participants were invited to participate in an educational session that included all aspects of the direct, immediate postoperative care of the patients with TJR. The educational session allowed time for questions and any additional thoughts from participants. Each voluntary participant completed a consent to participate in research (see Appendix H) before any contribution to the project. Before attending the session, each participant was given a pre-test for knowledge level evaluation. Immediately following the session, participants were administered a post-test. Scores of pre-test compared with scores from the post-test determined the knowledge level of the participants and the effectiveness of the educational session. Due to the project's overall success in this facility, the administration has made this educational session part of the annual competency training and orientation process for new employees on this orthopedic unit.

Project Site and Population

This project took place at a local for-profit moderate-sized metropolitan hospital. The project facility is part of a more extensive system consisting of multiple hospitals in the area and off-campus corporate headquarters. The community and patient population are primarily Black American and White American older adults. The patients typically have multiple comorbidities, including diabetes, hypertension, and end-stage renal disease. While these conditions can be risks for any patient having TJR surgery, these patients have an increased risk for injury, SSIs, and respiratory illnesses.

This quality improvement project was limited to the facility's nursing staff. Participants were between the ages of 25 and 65 with various backgrounds, both personal and professional. The participants' educational background included nursing certificates, associate's degrees, and bachelor's degrees. Occasionally, the teaching style was altered based on the participants' attitudes and personality traits to ensure the proper delivery of educational content. All participants on the unit voluntarily agreed to participate in this improvement process. The project was implemented on the orthopedic surgical unit in a centralized sizeable private conference room. As with any nursing department, staffing ratios are an ongoing topic. The project facility typically allows four to six patients to one nurse. A nurse-led teaching session included a handout and a PowerPoint presentation. Evaluation of the participant knowledge on care requirements for the patients with TJR was completed utilizing a pre-test and post-test following an educational session. All participants had an opportunity to discuss any concerns after the presentation. The participants' successful completion of the education increased participant performance. It provided additional staff to care for patients with TJRs adequately, decreased patient-to-

nurse ratio, and improved patient satisfaction, resulting in the potential to reduce SSIs, including postoperative respiratory illness and unnecessary readmissions.

Setting Facilitators and Barriers

The project facility was a medical learning facility, and the staff had access to a complete medical library when needed or desired. The project was implemented under the Orthopedic Medical Director, Joint Coordinator, nurse manager, the nursing staff of the corresponding unit, nursing education, and the nursing administration. This author was the primary facilitator and project leader who assumed responsibility for developing and disseminating educational materials and educational sessions for participants. Assistance from team members from the facility was provided as needed to ensure the project's progression and success. This assistance was necessary to improve nursing education and patient care.

The project was not without barriers to implementation. New knowledge learning is often met with apprehension and distrust by those within the targeted audience. When implementing a new knowledge plan, the project leader considered different personality types and learning methods and planned an educational session accordingly. Barriers to change included unique individual personalities and resistant attitudes towards new knowledge and change.

Implementation Plan/Procedures

The implementation of this project followed the DMAIC theoretical framework that is part of the Six Sigma initiative for quality improvement. The first phase was to define the problem. Defining the problem was carried out through discussions with the healthcare management team, orthopedic surgeons, and the project facility. Discussions

among the project team members identified a need to develop an educational session for the staff regarding the care of the patients with TJR. The second phase was to measure the stated problem. In order to measure the possible gap in practice, discussions took place with nurses, physicians, and administration to identify areas of improvement with patients undergoing TJR. This information was then taken into the third phase of development, the analysis phase. After performing an analysis of the requested areas of interest and conducting research on EVB, information about the care of the patients with TJR was then used to develop an educational session for the participants. Upon completion of the newly developed educational session, the project moved into the fourth phase of improvement. The educational session was carried out at the project facility over several days, with educational material distributed (see Appendix L). Pre- and post-tests were administered at each educational session. The fifth and final phase included comparing the pre-tests and post-tests and reporting data to the orthopedic medical director, the Joint Coordinator, and the nursing manager of the orthopedic care unit. The information obtained from this project indicated that continuing education specific to patients with TJR was needed. Based on the results of this project, it is now a requirement for new employees working with patients with TJR to attend informational sessions to care for those patients properly. In addition to the new employee education, those working with patients undergoing TJR will continue to have yearly educational sessions with yearly competency testing to ensure that all employees remain up to date on the EBP care of this patient population.

Measurement Instruments

Evaluation of the effectiveness of the educational sessions was carried out with the utilization of pre-and post-educational session testing. Each participant was administered the pre-test before attending an educational session on the care of patients with TJR. Pre-tests were used to measure the existing knowledge of the nursing staff about the care of patients with TJR. Upon completing 30-minute educational sessions consisting of a PowerPoint presentation, handouts of the PowerPoint presentation, and various dressings and other associated devices used in the care of patients with TJR, a post-test was administered. Post-tests were given to measure knowledge obtained from the educational session. A paired t-test was performed to compare the pre-and post-testing scores. Individual participant knowledge on the specific guidelines of post-op care of patients with TJR was carried out with a 20-question multiple-choice test. Educational sessions and pre-/post-tests were comprised of evidence-based guidelines and specific physician care guidelines. This project was created to improve the knowledge of those providing care to patients with TJR, improve patient care, and reduce SSIs and hospital readmission rates associated with patients with TJR procedures.

Data Collection Procedures

Before attending one of the educational sessions, each participant completed a pre-test to evaluate their level of knowledge concerning the care of patients undergoing TJR. The educational sessions were held with all participants at various times based on participant availability. Immediately following the educational session, each participant completed a post-test to evaluate the effectiveness of the educational materials and session. The pre- and post-testing (see Appendices J and K) provided the project leader a

way to determine if the educational sessions were successful. Comparing the pre- and the post-tests provided the data needed for analysis (see Appendices E, F, G). Results indicated an improvement in new knowledge retained by participants about the care of patients with TJR and brought attention to the lack of knowledge across the unit about the care for this population of patients.

Data Analysis

"In medical research, data are often collected in the form of matched pairs, where each observation obtained on one occasion is paired with the associated observation obtained on another occasion" (Guo & Yuan, 2017, p. 1). The paired t-test is utilized when comparing pre- and post-testing intervention differential and minor variance (Guo & Yuan, 2017). A paired t-test completed the data analysis to examine the significance of focused participant education on the TJR patient's care to determine if the mean difference between the two variables is zero (see appendix C). The project data analyzed was obtained from pre-tests of each participant before attending an educational session and compared with post-tests of each participant after attending an educational session (see Appendix E and Appendix F). The pre- and post-testing will compare the individual participant knowledge of the care of the patient with TJR. The paired t-test of the control group (n=23) will assess the statistical significance of the educational session on improving the knowledge of participants. Significance is determined by the p-value (<.05) of the study (see Figure 2, 3). The P-value, also known as the calculated probability, is the probability of finding the observed results when the null hypothesis is true or rejecting the null hypothesis when it is true (StatsDirect Limited, 2021). The null hypothesis assumes that the statistical difference is zero and the alternate hypothesis

assumes the opposite of the null hypothesis (StatsDirect Limited, 2021). Most researchers place statistically significant values on a p-value of $< .05$ and highly significant values if the p-value is $< .001$ (StatsDirect Limited, 2021). The project data analysis revealed the difference between the pre- and post-testing scores with a t-value = 7.091, resulting in a p-value of $< .05$, indicating an alternate hypothesis that the true mean is not equal to zero.

Cost-Benefit Analysis/Budget

In 2011, the Center for Medicare and Medicaid Services (CMS) developed the Bundled Payments for Care Improvement (BPCI) Initiative to promote improved quality and efficiency of patient care (Clair et al., 2016). The traditional payment models reward quantity, and the BPCI was instituted to reward quality instead of quantity (Clair et al., 2016). Facilities now receive payments in a bundled format; this includes any complications in the immediate post-op period, meaning an uncomplicated procedure is reimbursed the same as a multi-admission complicated procedure (Clair et al., 2016). With this payment model, most insurance companies have now adopted the same process. A postoperative complication of the TJR patient can result in the patient suffering pain, lost wages, and, more severely, potential loss of life. A facility can incur a loss of upwards of greater than \$100,000 per complication with the potential for even higher financial cost with an extensive, lengthy hospital stay as well as potential legal fees and lawsuit settlements (Clair et al., 2016).

This project development was funded solely by the DNP project leader. Cost included time associated with reviewing and researching topics, developing educational material, and delivering the educational material in written and verbal formats in excess of 630 hours as a requirement for completing the Doctor of Nursing Practice degree.

Costs were absorbed by the project leader, including \$229.95 in the printing of a total of 30 educational material packets and 30 pre- and post-tests. The cost to the facility included the salary of the Clinical Nurse Educator (CNE), nursing staff, and the information technology (I.T.) department for their participation. The average yearly salary of a CNE in Alabama is \$61,469 per year, or approximately \$29.55 per hour (salary.com, 2021). The additional time required for the CNE to review project materials was 10 hours of labor, resulting in a cost of approximately \$295.50 for the facility.

The average registered nurse salary in Alabama is \$67,522 per year or \$28.96 per hour (Incredible Health, 2021). The facility absorbed expenses related to educational sessions consisting of 30 minutes per nurse at an approximate rate of \$14.48. The total cost to the facility for attendance in this project for 23 participants was \$333.04. The findings of the cost-benefit analysis determined that the implementation of this project was financially justifiable.

Timeline

This DNP project was developed and implemented over seven months. Research and implantation extended from December 2020 through June 2021 (see Table 1). Phase one consisted of a thorough needs assessment of the facility with interviews with staff and physicians. Additionally, SSI and nursing education research were completed and evaluated during this phase, and the project goals and outcomes were developed. Phase two, January 2021, was utilized for the project, and educational materials and questionnaires were developed in conjunction with the education department, physicians, and the Total Joint Coordinator. Phase three occurred in February 2021, when project development was finalized and ready for dissemination. All material was sent to

administration, physicians, and nursing education within the facility for approval. Phase four was in March 2021, when project implementation with live educational sessions was conducted with participants, followed by a review of data obtained from pre- and post-test results. Phase five took place in April 2021. During this phase, data was gathered regarding SSI rates and meeting with a statistician to review all data for analyses. Phase six, in May 2021, was utilized for additional data review, research on SSI and nursing education, and the construction of the final manuscript was started. The seventh and final stage was in June 2021, where goals and outcomes were reevaluated for final manuscript completion.

Ethical Considerations/Protection of Human Subjects

Before implementing and evaluating this DNP project, authorization was obtained from the project facility and the Jacksonville State University Institutional Review Board (IRB) (see Appendix M). Participation in this project was voluntary. Participants signed a written informed consent before participation in the project. Risks and benefits and project details were explained to participants before administering the pre-test. Risks were minimal as the participants were completing questionnaires and not subject to any physical form of research. Participants were informed of their right to withdraw from the project at any time without penalty. All participants were issued an identification number which was only accessible by the project leader and was void of any possible identifiable personal data. All results of the pre- and post-tests were reported anonymously to project team members. All paper and electronic material, including educational materials, research data, statistical data, and pre- and post-testing evaluations, remained secure in a locked or password-protected location and was only accessible by the project leader.

Conclusion

Surgical site infections have severe implications for patients, providers, and facilities. Patients are subjected to undue pain and suffering, accompanying possible repeat surgery, prolonged hospital stays, and potential loss of limb and life. For providers and facilities, an SSI can result in loss of reputation, reimbursement, and loss of ability to practice medicine in the most severe cases. Many quality improvement processes are utilized at all levels of the surgical journey to prevent surgical site infections. This project focused on postoperative wound care and the various dressings used at the project facility.

The goals and objectives of this quality improvement project were to increase knowledge of the patients with TJR for all those caring for the patient in the immediate postoperative period. By providing the educational EBP guidelines needed to reduce postoperative surgical site infections, those caring for the patients with TJR have increased their confidence and knowledge of the appropriate patient care. The participants obtained new knowledge on the various types of post-surgical wound dressings and the associated care guidelines through the educational sessions evidenced by the increase in post-testing scores. Verabilization of confidence and understanding by the participants have been reported to the project team members following the implementation of the educational sessions. In the two months following the completion of the project, there were zero readmissions to the facility for SSI. The positive outcomes reinforced the need for the implementation of this project. Successful implementation of this project also resulted in content about care related to patients with TJR being included in new hire orientation classes and yearly competency evaluations for all staff on the

orthopedic unit. In addition to the changes at the project facility, the newly implemented educational sessions provided supporting evidence for Total Joint Accreditation by the Joint Commission.

REFERENCES

- Abboud, E., Settle, J., Legare, T., Marcet, J., Baillo, D., & Sanchez, J. (2014). Silver-based dressings for the reduction of surgical site infection: Review of current experience and recommendation for future studies. *Burns*, *40*(1), S30-S39. doi: 10.1016/j.burns.2014.09.011
- Abu-Sheasha, G., Yassine, O., Anwar, M., & Bedwani, R. (2018, September). Cost of surgical site infection in Egyptian University Hospital: Informing a decision to implement an infection control program using simulation. *Operations Research for Health Care*, *18*, 26-32. doi.org/10.1016/j.orhc.2017.11.001
- Advanced Tissue. (2015). *Unique Surgical Wound Care Concerns for Diabetics*.
Advanced Tissue: <https://advancedtissue.com/2015/10/unique-surgical-wound-care-concerns-for-diabetics/>
- Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, *50*(2), 179-211. doi:10.1016/0749-5978(91)90020-T
- Allegranzi, B., Bischoff, P., de Jonge, S., Kubilay, N., Zayed, B., Gomes, S., . . . Solomkin, J. (2016, December). New WHO recommendations on intraoperative and postoperative measures for surgical site infection prevention: an evidence-based global perspective. *The Lancet Infectious Diseases*, *16*(12), e288-e303. doi: 10.1016/S1473-3099(16)30402-9
- Anderson, P., Savage, J., Vaccroa, A., Radcliff, K., Arnold, P., Lawrence, B., & Shamji, M. (2017, March). Prevention of Surgical Site Infection in Spine Surgery. *Neurosurgery*, *80*(35), S114-S123. doi:doi.org/10.1093/neuros/nyw066

- Atesok, K., Papavassiliou, E., Heffernan, M., Tunmire, D., Sitnikov, I., Tanaka, N., & Theiss, S. (2019, January 3). Current Strategies in Prevention of Postoperative Infections in Spine Surgery. *Global Spine Journal*, *10*(2), 183-194. doi: 10.1177/2192568218819817
- Ban, K., Minei, J., Laronga, C., Harbrecht, B., Jensen, E., Fry, D., . . . Durane, T. (2016, May). American College of Surgeons and Surgical Infection Society: Surgical Site Infection Guidelines, 2016 Update. *Journal of the American College of Surgeons*, *224*(1), 59-74. doi:10.1016/j.jamcollsurg.2016.10.029
- Barillo, D. J., & Marx, D. E. (2014, December). Silver in medicine: A brief history BC 335 to. *Burns*, *40*(1), S3-S8. doi: 10.1016/j.burns.2014.09.009
- Barkley, T. W., & Myers, C. M. (2015). *Practice Considerations for Adult-Gerontology Acute Care Nurse Practitioners* (2nd ed., Vol. 2). West Hollywood, CA, USA: Barkley & Associates.
- Bärnighausen, T. T. (2017, September 1). Quasi-experimental study designs series— paper 4: uses and value. *Journal of Clinical Epidemiology*, *89*, 21-29. <https://doi.org/10.1016/j.jclinepi.2017.03.012>
- Bishop, R., Cross, K., Dubois, R., Haley, J., Harris, C., Kuhnke, J., . . . Somayaji, R. (2018, January 24). Prevention and Management of Surgical Wound Complications. *Foundations of Best Practice for Skin and Wound*. <https://www.woundscanada.ca/docman/public/health-care-professional/bpr-workshop/555-bpr-prevention-and-management-of-surgical-wound-complications-v2/file>

Centers for Disease Control [CDC]. (2021, January). *Surgical Site Infection*. Retrieved from Centers for Disease Control:

<https://www.cdc.gov/nhsn/pdfs/psscmanual/9pscscscurrent.pdf>

Centers for Disease Control. (2021, June 26). *Communication of Possible Healthcare-associated Infections across Healthcare Settings*. Centers for Disease Control:

<https://www.cdc.gov/nhsn/hipaa/fp-fp-comms-under-hippa.html>

Chatterley, L. (2017, May 13). Improving Nurse Knowledge and Attitudes of Early Mobilization of the Postoperative Patient. Rhode Island, USA: Rhode Island College Digital Commons.

<https://digitalcommons.ric.edu/cgi/viewcontent.cgi?article=1190&context=etd>

Clair, A., Evangelista, P., Lajam, C., Slover, J., Bosco, J., & Iorio, R. (2016, February).

Cost Analysis of Total Joint Arthroplasty Readmissions in a Bundled Payment Care Improvement Initiative. *The Journal of Arthroplasty*, 31(9), 1862-1865.

doi:10.1016/j.arth.2016.02.029.

Comfere, N., Matulis, J., & O'Horoa, J. (2020, August). Quality improvement and

healthcare: The Mayo Clinic quality Academy experience. *Journal of Clinical Tuberculosis and Other Mycobacterial Diseases*, 20(100170). doi:

10.1016/j.jctube.2020.100170

Dahiya, P., Gupta, V., Pundir, S., & Chawla, D. (2016, April). Study of Incidence and

Risk Factors for Surgical Site Infection after. *International Journal of*

Contemporary Medical Research, 3(4), 1102-1104. doi: 10.1590/1518-

8345.1502.2848

- Darouiche, R. (2019). *Hospital Infection Control Surgical site infections*. Infection Control Adviser: <https://www.infectiousdiseaseadvisor.com/home/decision-support-in-medicine/hospital-infection-control/surgical-site-infections/>
- Dessy Alexa, M., Yuk, F. J., Maniya, A. Y., Connolly, J. G., Nathanson, J. T., Rasouli, J. J., & Choudhri, T. F. (2017). Reduced Surgical Site Infection Rates Following Spine Surgery Using an Enhanced Prophylaxis Protocol. *Cureus*, 9(4). doi:10.7759/cureus.1139
- Feney, A., Asante, F., Otiekou, E., Bowan, A., & Enemark, E. (2020, June). Attributable cost and extra length of stay of surgical site infection at a Ghanaian teaching hospital. *Infection Prevention In Practice*, 2(2), 1-8. doi.org/10.1016/j.infpip.2020.100045
- Gagnon, M. C. (2015). Applying the Theory of Planned Behaviour to understand nurse intention to follow recommendations related to a preventive clinical practice. *Journal of Research in Nursing*, 20(7), 582-593. doi:10.1177/1744987115611715
- Go Lean Six Sigma. (2021, June). *DMAIC – The 5 Phases of Lean Six Sigma*. Retrieved from Go Lean Six Sigma: <https://goleansixsigma.com/dmaic-five-basic-phases-of-lean-six-sigma/>
- Goswami, K., Stevenson, K., & Parvizi, J. (2020, March). Intraoperative and Postoperative Infection Prevention. *The Journal of Arthroplasty*, 35(3), s2-s8. doi: 10.1016/j.arth.2019.10.061
- Grossman, S., & Porth, C. (2014). *Porth's Pathophysiology Concepts of Altered Health States* (9th ed.). Philadelphia: Wolters Kluwer Health / Lippincott Williams & Wilkins.

- Guo, B., & Yuan, Y. (2017). In medical research, data are often collected in the form of matched pairs, where each observation. *Statistical Methods in Medical Research*, 26(3), 1323-1340. doi:10.1177/0962280215577111
- Hess, C. (2015, March). Defining Lab Tests for Wound Care. *Advances in Skin and Wound Care*, 28(3), 144. doi: 10.1097/01.ASW.0000461295.42250.ec
- Hutzler, L., & Williams, J. (2017, 10). Decreasing the Incidence of Surgical Site Infections Following Joint Replacement Surgery. *Bulletin of the NYU Hospital for Joint Disease*, 75(4), 268+.
<https://link.gale.com/apps/doc/A517345689/AONE?u=jack26672&sid=AONE&xid=0417e319>
- Incredible Health. (2021, April 09). *Average Registered Nurse Salary in Alabama*. IncredibleHealth.com: <https://www.incrediblehealth.com/blog/rn-salary-alabama/>
- Kalb, K. A., O'Conner-Von, S. K., Brockway, C., Rierson, C. L., & Sendelbach, S. (2015, July). Evidenced-Based Teaching Practice in Nursing Education: Faculty Perspectives and Practices. *Nursing Education Perspectives*, 36(4), 212-219. doi:10.5480/14-1472
- Kujath, P., & Michelsen, A. (2008). Wounds – From Physiology to Wound Dressing. *Deutsches Ärzteblatt Internationa*, 105(13), 239-248. doi: 10.3238/arztebl.2008.0239
- Lasater, K. B., & Mchugh, M. W. (2016, April). Nurse staffing and the work environment linked to readmissions among older adults following elective total hip and knee replacement. *International Journal for Quality in Health Care*, 28(2), 253-258. doi:10.1093/intqhc/mzw007

- Marx, D., & Barillo, D. (2014). Silver in medicine: The basic science. *Burns*, 40, S9-S18.
- Merck Sharp & Dohme Corporation. (2019). *Staphylococcus aureus Infections*. Retrieved from Merck Manual Consumer Version:
<https://www.merckmanuals.com/home/infections/bacterial-infections-gram-positive-bacteria/staphylococcus-aureus-infections>
- National Council of State Boards of Nursing, Inc. (2021, May 14). *Evidence-based Regulation of Nursing Education*. National Council of State Boards of Nursing, Inc: <https://www.ncsbn.org/668.htm>
- Panayi, A. L. (2017, February 2). Evidence-based review of negative pressure wound therapy. *World Journal of Dermatology*, 6(1), 1-16. doi:10.5314/wjd.v6.i1.1
- Robinson, K. C. (2019, April 16). Addressing Gaps in M.S. Patient Care Via Personalized Continuing Education. *American Academy of Neurology*, 92(15 (supplement)), p1.9-078. https://n.neurology.org/content/92/15_Supplement/P1.9-078.abstract
- salary.com. (2021, June 26). *Hospital Nurse Educator*. Salary.com:
<https://www.salary.com/research/salary/recruiting/hospital-nurse-educator-salary/al>
- Simpson KR, Lyndon A, Ruhl C. (2016). Consequences of Inadequate Staffing Include Missed Care, Potential Failure to Rescue, and Job Stress and Dissatisfaction. *J Obstet Gynecol Neonatal Nurs*, 45(4), 481-90. doi:10.1016/j.jogn.2016.02.011
- Skube, S., Hu, Z., Arsoniadis, E., Simon, G., Wick, E., Ko, C., & Melton, G. (2017). Characterizing Surgical Site Infection Signals in Clinical Notes. *Studies in health technology and informatics*, 245, 955-959. doi:10.3233/978-1-61499-830-3-955

StatsDirect Limited. (2021, June 24). *P-values*. StatsDirect:

https://www.statsdirect.com/help/basics/p_values.htm

Tong, S., Davis, J., Eichenberger, E., Holland, T., & Fowler, V. (2015, July).

Staphylococcus aureus Infections: Epidemiology, Pathophysiology, Clinical Manifestations, and Management. *Clinical Microbiology Reviews*, 28(3), 603-661. doi: 10.1128/CMR.00134-14

Vowden, K., & Vowden, P. (2017). Wound dressings: principles and practice. *Surgery*,

35(9), 489-494. <https://doi.org/10.1016/j.mspur.2017.06.005>

Wang, C., Zhang, Y., & Qu, H. (2019). Negative pressure wound therapy for closed

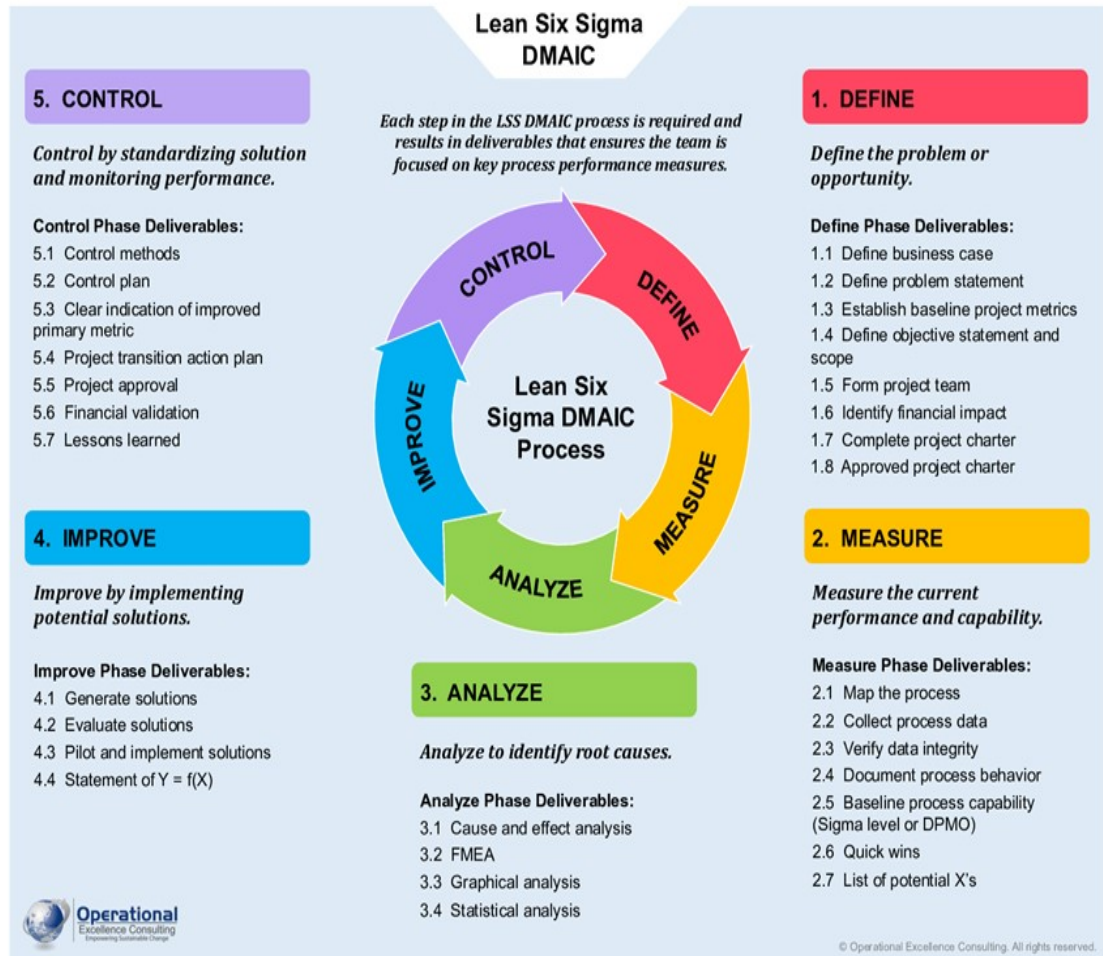
incisions in orthopedic trauma surgery: a meta-analysis. *Journal of Orthopaedic Surgery and Research*, 14(1), 427. doi:10.1186/s13018-019-1488-z

APPENDIX A

Theoretical Framework / Evidenced Based Model

Figure 1

Theoretical Framework Design



APPENDIX B

Timeline

Table 1

Simplified Project Timeline

Task	Actual month 1	Month 2	Month 3	Month 4	Month 5	Month 6
Project Team Development	Process development	Ask and evaluate staff willing to participate in the advanced wound care team				
Task 2 (Example: Plan development)	Continued review of advanced silver dressings with final dressing choices chosen	Team development / Process team assignments				
Task 3 (Example: Staff Education)	Analyze the cost of dressings		Team training / Implementation	Implementation		
Task 4				Continued team training and evaluation	Evaluation of process	
Task 5				Any adjustments as issues develop	Medical staff review of findings	
Task 6					Process improvement plan adjustments	Implementation complete and final staffing acquired and training fully complete.

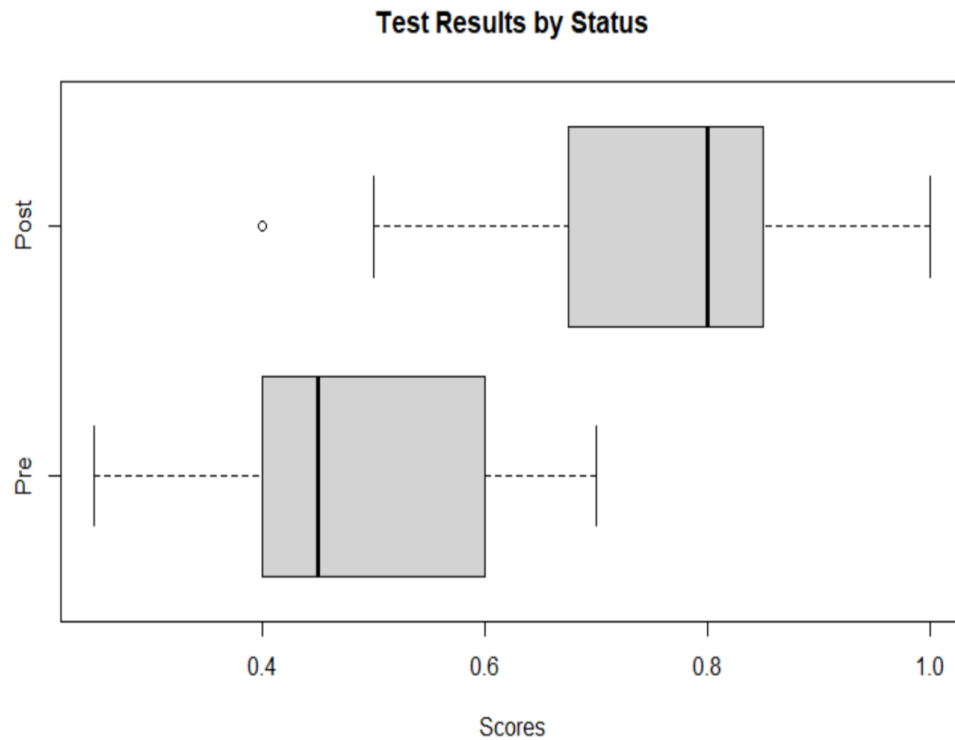
APPENDIX C

Classical Data Analysis

Figure 2

Classic Analysis

Overall Test Scores (by pre or post status)



One Sample t-test

data: DiffScore
t = 7.0912, df = 22, p-value = <0.05
alternative hypothesis: true mean is not equal to 0
95 percent confidence interval:
0.1968819 0.3596398
sample estimates:
mean of x
0.2782609

Statistically significant difference. There seems to be an increase in test scores for these individuals.

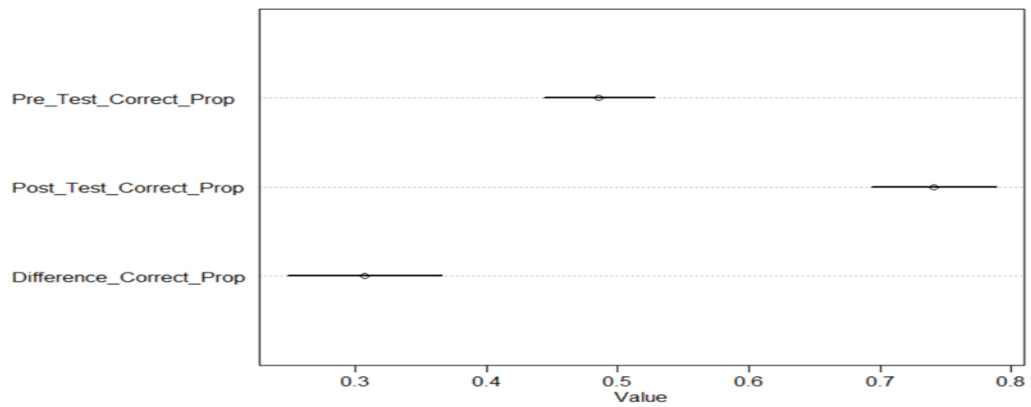
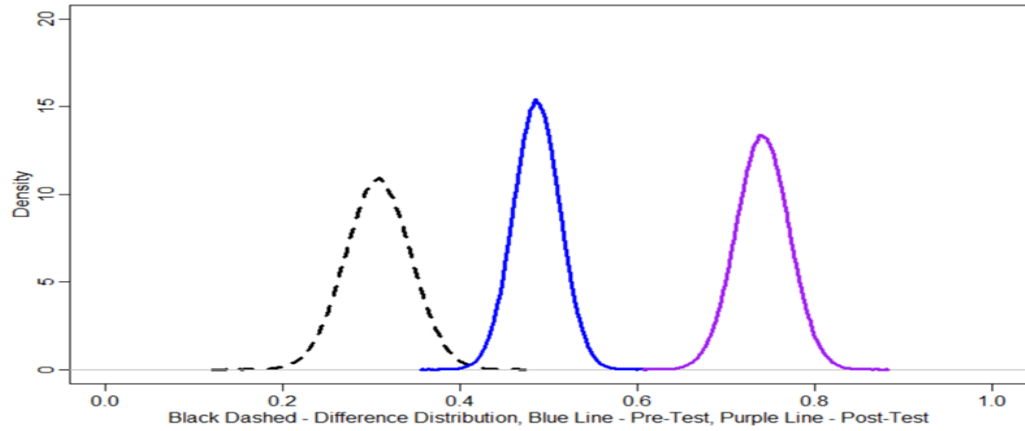
APPENDIX D

Bayesian Data Analysis

Figure 3

Bayesian Analysis

Overall Test Scores (by pre or post status)



	mean	5.5%	94.5%
Pre_mu	0.49	0.44	0.53
Post_mu	0.74	0.69	0.79
Diff_mu	0.31	0.25	0.37

The credible interval for the difference in pre and post-status proportion of correct answers does not contain zero, which means the difference values are plausibly different.

APPENDIX E

Pre-Test Score by Question

Table 2

Pre- Test Individual question analysis

	Total Correct	Total Incorrect	Individual Choice Answers	Correct answer
	19	4	2	1. The use of negative pressure therapy reduces fluid pooling in the wound bed to prevent
			19	a. Infection
			0	b. Skin maceration
			2	c. Excessive drainage requiring dressing to be changed to soon
			2	d. Any amount of drainage so the dressing never has to be changed
1	16	6	16	2. Negative pressure wound therapy can be used on closed incisions.
			7	a. True
			0	b. False
	23	0	0	3. Silver dressings are changed
			23	a. Every day
			0	b. Every 48 hrs
			0	c. Every 7 or 14 days, depending on dressing type
			0	d. Only at the patient's post-surgical office visit
	15	8	0	4. Gauze dressings are to be changed
			2	a. Every day
			15	b. Every shift
			6	c. Only when freshly soiled or accidentally removed and can not reinforce effectively.
			0	d. Only reinforce and never change until the patient's post-surgical follow-up office visit
	23	0	0	5. Patients should be OOB for the 1 st time
			23	a. As soon as arrive to floor
			0	b. 1hr after arrival to floor
			0	c. 2hr after arrival to floor
			0	d. Post-op day 1
	7	16	7	6. Neurovascular checks should be performed every
			0	a. 2hr x 24hrs
			15	b. 2hr x length of stay
			1	c. 4hr x 24hrs
				d. 4hr x length of stay

No	Total	Total	Individual																	
Ans	Correct	Incorrect	Choice	Answers																
0	23	0			7.	A patients bedding should be changed entirely														
				0	a.	Once per admission														
				23	b.	Daily														
				0	c.	Only when soiled														
				0	d.	The bed pad is all that needs to be changed														
0	7	16			8.	rTSA patient has an increased risk of shoulder dislocation with														
				7	a.	external rotation and abduction														
				6	b.	internal rotation and abduction														
				7	c.	external rotation and adduction														
				3	d.	exeternal rotation and abduction														
0	12	11			9.	The TKA patient arrives in the unit at 1830 after surgery and asks to use the restroom at 2100; what is the best response?														
				2	a.	Sure, let me get the bedpan														
				4	b.	Would you like to try to walk to the restroom?														
				16	c.	I will assist you to the restroom														
				1	d.	What would you prefer the bedpan or ambulate to the restroom?														
0	21	2			10.	You are behind on all scheduled medications. The patient asks to go to the restroom. It is ok to put the patient on a bedpan since you are behind on other tasks?														
				1	a.	True														
				21	b.	False														
				1	c.	It depends on if the patient has ambulated with PT previously														
1	15	7			11.	Total joint replacement patients should only ambulate in the hall with physical therapy assistance.														
				3	a.	True														
				15	b.	False														
				4	c.	It depends on if the patient has ambulated with PT previously														
0	23	0			12.	Advanced silver infused dressings are														
				0	a.	Antibacterial														
				23	b.	Antimicrobial														
				0	c.	Bactericidal														
				0	d.	Bacteriostatic														

No	Total	Total	Individual	
Ans	Correct	Incorrect	Choice	
			Answers	
0	23	0		13. When assisting a TKA patient out of bed, you should
			0	a. Position the bed, is in the lowest position to ensure the patient uses the legs to push themselves up to standing
			0	b. Pull the patient to a standing position by holding under the patient in the axilla
			0	c. Raise the bed to position the patient's legs are at a 90° angle
			23	d. Raise the bed to a slightly higher position to ensure the patient does not have to use the legs as much to push up to standing
0	9	14		14. A total hip patient should never sleep on the surgical side when side sleeping
			14	a. True
			9	b. False
0	19	5		15. Anterior hip precautions include all except
			19	a. It is ok to step back with the surgical extremity
			1	b. No external hip rotation
			2	c. Do not cross legs
			1	d. No hip extension
0	18	5		16. Total knee precautions include except
			18	a. It is ok to use the bed's knee gatch function while the patient is awake in the bed and can move around
			1	b. No pillows or blankets under the knee
			4	c. It is never ok to use the bed's knee gatch function
			0	d. No rotation of the knee
0	17	6		17. Total shoulder precautions include except
			1	a. No reaching behind the back
			17	b. May reach across the front of the body
			0	c. No lifting with surgical extremity
			5	d. No active or passive range of motion of the surgical extremity
0	22	1		18. It is ok to remove the shoulder sling if the patient is in the bed
			1	a. True
			22	b. False

No	Total	Total	Individual															
Ans	Correct	Incorrect	Choice	Answers														
0	17	6			19. If the patient comes out of surgery with the silver dressing in place and has drainage requiring a dressing change, is it ok to use gauze and Tegaderm or a PICO dressing instead?													
			6		a. True													
			17		b. False													
1	13	10			20. All are true statements about antiplatelet therapy and surgical wound healing, except leading to delayed wound healing													
			2		a. Without blood thinner medication, a DVT can decrease perfusion and lead to limb ischemia													
			7		b. Antiplatelet medication can increase drainage leading to delayed wound healing													
			13		c. Antiplatelet therapy decreases fibrin production the is needed for clot production, and without clot production, the patient will have unnecessary drainage													
			0		d. The patient is at an increased risk of bleeding													

APPENDIX F

Post-Test Score by Question

Table 3

Post-test individual question analysis

	Total Correct	Total Incorrect	Individual Choice Answers	Correct answer
	19	4	2	1. The use of negative pressure therapy reduces fluid pooling in the wound bed to prevent
			19	a. Infection
			0	b. Skin maceration
			2	c. Excessive drainage requiring dressing to be changed to soon
			2	d. Any amount of drainage so the dressing never has to be changed
1	16	6	16	2. Negative pressure wound therapy can be used on closed incisions.
			7	a. True
			7	b. False
	23	0	0	3. Silver dressings are changed
			0	a. Every day
			23	b. Every 48 hrs
			0	c. Every 7 or 14 days, depending on dressing type
			0	d. Only at the patient's post-surgical office visit
	15	8	0	4. Gauze dressings are to be changed
			0	a. Every day
			2	b. Every shift
			15	c. Only when freshly soiled or accidentally removed and can not reinforce effectively.
			6	d. Only reinforce and never change until the patient's post-surgical follow-up office visit
	23	0	0	5. Patients should be OOB for the 1 st time
			23	a. As soon as arrive to floor
			0	b. 1hr after arrival to floor
			0	c. 2hr after arrival to floor
			0	d. Post-op day 1
	7	16	7	6. Neurovascular checks should be performed every
			0	a. 2hr x 24hrs
			15	b. 2hr x length of stay
			1	c. 4hr x 24hrs
			1	d. 4hr x length of stay

No	Total	Total	Individual																	
Ans	Correct	Incorrect	Choice	Answers																
0	23	0			7.	A patient's bedding should be changed entirely														
			0		a.	Once per admission														
			23		b.	Daily														
			0		c.	Only when soiled														
			0		d.	The bed pad is all that needs to be changed														
0	7	16			8.	rTSA patient has an increased risk of shoulder dislocation with														
			7		a.	external rotation and abduction														
			6		b.	internal rotation and abduction	credit given for b & c with typo in answer													
			7		c.	external rotation and adduction	Should be internal rotation and adduction													
			3		d.	external rotation and abduction														
0	12	11			9.	The TKA patient arrives in the unit at 1830 after surgery and asks to use the restroom at 2100;														
						what is the best response?														
			2		a.	Sure, let me get the bedpan														
			4		b.	Would you like to try to walk to the restroom?														
			16		c.	I will assist you to the restroom														
			1		d.	What would you prefer the bedpan or ambulate to the restroom?														
0	21	2			10.	You are behind on all scheduled medications. The patient asks to go to the restroom.														
						It is ok to put the patient on a bedpan since you are behind on other tasks?														
			1		a.	True														
			21		b.	False														
			1		c.	It depends on if the patient has ambulated with PT previously														
1	15	7			11.	Total joint replacement patients should only ambulate in the hall with physical therapy assistance.														
			3		a.	True														
			15		b.	False														
			4		c.	It depends on if the patient has ambulated with PT previously														
0	23	0			12.	Advanced silver infused dressings are														
			0		a.	Antibacterial														
			23		b.	Antimicrobial														
			0		c.	Bactericidal														
			0		d.	Bacteriostatic														

No	Total	Total	Individual																	
Ans	Correct	Incorrect	Choice																	
			Answers																	
0	23	0		13. When assisting a TKA patient out of bed, you should																
			0	a. Position the bed, is in the lowest position to ensure the patient uses the legs to push themselves up to standing																
			0	b. Pull the patient to a standing position by holding under the patient in the axilla																
			0	c. Raise the bed to position the patient's legs are at a 90° angle																
			23	d. Raise the bed to a slightly higher position to ensure the patient does not have to use the legs as much to push up to standing																
0	9	14		14. A total hip patient should never sleep on the surgical side when side sleeping																
			14	a. True																
			9	b. False																
0	19	5		15. Anterior hip precautions include all except																
			19	a. It is ok to step back with the surgical extremity																
			1	b. No external hip rotation																
			2	c. Do not cross legs																
			1	d. No hip extension																
0	18	5		16. Total knee precautions include except																
			18	a. It is ok to use the bed's knee gatch function while the patient is awake in the bed and can move around																
			1	b. No pillows or blankets under the knee																
			4	c. It is never ok to use the bed's knee gatch function																
			0	d. No rotation of the knee																
0	17	6		17. Total shoulder precautions include except																
			1	a. No reaching behind the back																
			17	b. May reach across the front of the body																
			0	c. No lifting with surgical extremity																
			5	d. No active or passive range of motion of the surgical extremity																
0	22	1		18. It is ok to remove the shoulder sling if the patient is in the bed																
			1	a. True																
			22	b. False																

No	Total	Total	Individual																
Ans	Correct	Incorrect	Choice	Answers															
0	17	6			19. If the patient comes out of surgery with the silver dressing in place and has drainage requiring a dressing change, is it ok to use gauze and Tegaderm or a PICO dressing instead?														
			6		a. True														
			17		b. False														
1	13	10			20. All are true statements about antiplatelet therapy and surgical wound healing, except leading to delayed wound healing														
			2		a. Without blood thinner medication, a DVT can decrease perfusion and lead to limb ischemia														
			7		b. Antiplatelet medication can increase drainage leading to delayed wound healing														
			13		c. Antiplatelet therapy decreases fibrin production the is needed for clot production, and without clot production, the patient will have unnecessary drainage														
			0		d. The patient is at an increased risk of bleeding														

APPENDIX G

Individual Participant Scores

Table 4

Participant scores

ID Number	Pre-Test	Post-Test
001	10/20	17/20
003	13/20	19/20
004	9/20	17/20
008	7/20	18/20
010	9/20	16/20
011	10/20	16/20
012	6/20	20/20
013	9/20	15/20
014	7/20	8/20
015	9/20	14/20
016	9/20	17/20
017	5/20	13/20
018	12/20	13/20
019	13/20	11/20
020	6/20	16/20
021	6/20	15/20
023	11/20	15/20
025	12/20	18/20
026	9/20	10/20
027	13/20	18/20
028	13/20	16/20
029	11/20	12/20
030	14/20	17/20

APPENDIX H

Consent Form to Participate in a Research Study

ID# _____

Date: _____

Research Topic: Improving patient outcomes with post-op education for nurses caring for patients undergoing total joint replacement

Principal Investigator: Amanda Collier, MSN, AGACNP-BC

Jacksonville State University: Doctor of Nursing Practice Candidate

Phone: 205-281-3192

Email: asalze@stu.jsu.edu

Research Facility:

Princeton Baptist Medical Center, 6West Unit, 701 Princeton Ave SW, Birmingham AL 35211

Purpose of Study: You are being asked to take part in a research study. Before you decide to participate in this study, it is essential that you understand why the research is being done and what it will involve. Please read the following information carefully. Please ask the researcher if there is anything that is not clear or if you need more information. The purpose of this study is to determine if increasing postoperative education of nurses caring for the total joint replacement patient improves patient outcomes and increases nurse knowledge of these patients' care guidelines.

Study Procedures:

- 1) Pre-testing of knowledge on the care of the total joint replacement patient of each nursing staff participant.
- 2) Attendance of an approximately 30-minute educational session consisting of:
 - a) Educational handout
 - b) Education PowerPoint presentation to be given by the principal investigator
 - c) Question and answer opportunity
- 3) Post-testing of knowledge on the care of the total joint replacement patient on each nursing staff participant.

Principal Investigator Responsibilities:

- 1) Administer and coordinate the pre and post-test of the nursing staff.
- 2) Develop and instruct an educational session on the care of the total joint replacement patient.

- 3) Gather and analyze all data obtained through pre and post-testing of the nursing staff.
- 4) Gather and analyze facility data, including:
 - a) Number and type of joint replacement patient by procedure type.
 - b) Post-surgical follow-up call data. Data obtained by the Joint Coordinator per follow-up call protocol and documented in the patient electronic medical record.
 - c) Number and type of post-surgical readmission rates and outcomes.
 - d) Staffing grid considerations before education and after education.
 - e) Nursing staff thoughts before and after the educational session.
- 5) Principle investigator will be available for additional questions and or concerns by any participant or any research-related emergency at the contact number given.
- 6) Principle investigator will provide the research purpose and outcome at the conclusion of the study upon written request.

Risks of Participation:

Participants are not likely to experience any physical, psychological, emotional, economic, social, or legal risk other than those generally experienced during an educational evaluation, performance evaluation, and testing. There will be no penalty or retribution if the participant withdraws before the research conclusion, and the participant may withdraw at any time.

Benefits of Participation:

- 1) Increased knowledge of total joint replacement patient care guidelines.
- 2) Increased patient satisfaction outcomes.
- 3) Reduced patient post-surgical infection rates.
- 4) Increase productivity of participating staff.
- 5) Increase in nursing staff morale and better staffing diversification.

Confidentiality:

- 1) No participant identifiers shall be documented on pre or post-testing sheets. Each person will be assigned an identification number to use as a reference.
- 2) All individual information obtained will remain confidential and will not be released or shared with any identifiable data without specific written consent unless otherwise required by law.
- 3) All notes, documentation, patient information, and data rates will remain in a password-protected computer to remain in the principal investigator's custody.

APPENDIX I
**SIGNATURE PAGE OF CONSENT FORM
FOR RESEARCH INVOLVING ADULTS**

Permission Form for
Research on

Improving patient outcomes with post-op education for nurses caring for patients
undergoing total joint replacement

Title of Project

I have read a description of the research project/study, and I understand the procedure described on the attached pages. I also have received a copy of the description of the project.

I _____ agree to participate in the study.
(Complete Name)

Signature

Date

APPENDIX J

Pre-test

Improving patient outcomes with post-op education for nurses caring for patients undergoing total joint replacement

ID# _____

Date: _____

1. The use of negative pressure therapy reduces fluid pooling in the wound bed to prevent
 - a. Infection
 - b. Skin maceration
 - c. Excessive drainage requiring dressing to be changed too soon
 - d. Any amount of drainage so the dressing never has to be changed
2. Negative pressure wound therapy can be used on closed incisions.
 - a. True
 - b. False
3. Silver dressings are changed
 - a. Every day
 - b. Every 48 hrs
 - c. Every 7 or 14 days, depending on dressing type
 - d. Only at the patient's post-surgical office visit
4. Gauze dressings are to be changed
 - a. Every day
 - b. Every shift
 - c. Only when freshly soiled or accidentally removed and can not reinforce effectively.
 - d. Only reinforce and never change until the patient's post-surgical follow-up office visit
5. Patients should be OOB for the 1st time
 - a. As soon as arrive to floor
 - b. 1hr after arrival to floor
 - c. 2hr after arrival to floor
 - d. Post-op day 1
6. Neurovascular checks should be performed every
 - a. 2hr x 24hrs
 - b. 2hr x length of stay
 - c. 4hr x 24hrs
 - d. 4hr x length of stay
7. A patients bedding should be changed entirely
 - a. Once per admission
 - b. Daily
 - c. Only when soiled
 - d. The bed pad is all that needs to be changed

8. rTSA patient has an increased risk of shoulder dislocation with
 - a. external rotation and abduction
 - b. internal rotation and abduction
 - c. external rotation and adduction
 - d. external rotation and abduction
9. The TKA patient arrives in the unit at 1830 after surgery and asks to use the restroom at 2100; what is the best response?
 - a. Sure, let me get the bedpan
 - b. Would you like to try to walk to the restroom?
 - c. I will assist you to the restroom
 - d. What would you prefer, the bedpan, or ambulate to the restroom?
10. You are behind on all scheduled medications. The patient asks to go to the restroom. It is ok to put the patient on a bedpan since you are behind on other tasks?
 - a. True
 - b. False
 - c. It depends on if the patient has ambulated with P.T. previously
11. Total joint replacement patients should only ambulate in the hall with physical therapy assistance.
 - a. True
 - b. False
 - c. It depends on if the patient has ambulated with P.T. previously
12. Advanced silver infused dressings are
 - a. Antibacterial
 - b. Antimicrobial
 - c. Bactericidal
 - d. Bacteriostatic
13. When assisting a TKA patient out of bed, you should
 - a. Position the bed, is in the lowest position to ensure the patient uses the legs to push themselves up to standing
 - b. Pull the patient to a standing position by holding under the patient in the axilla
 - c. Raise the bed to position the patient's legs are at a 90° angle
 - d. Raise the bed to a slightly higher position to ensure the patient does not have to use the legs as much to push up to standing
14. A total hip patient should never sleep on the surgical side when side sleeping
 - a. True
 - b. False
15. Anterior hip precautions include all except
 - a. It is ok to step back with the surgical extremity
 - b. No external hip rotation
 - c. Do not cross legs
 - d. No hip extension

16. Total knee precautions include except
 - a. It is ok to use the bed's knee gatch function while the patient is awake in the bed and can move around
 - b. No pillows or blankets under the knee
 - c. It is never ok to use the bed's knee gatch function
 - d. No rotation of the knee
17. Total shoulder precautions include except
 - a. No reaching behind the back
 - b. May reach across the front of the body
 - c. No lifting with surgical extremity
 - d. No active or passive range of motion of the surgical extremity
18. It is ok to remove the shoulder sling if the patient is in the bed
 - a. True
 - b. False
19. If the patient comes out of surgery with the silver dressing in place and has drainage requiring a dressing change, is it ok to use gauze and Tegaderm or a PICO dressing instead?
 - a. True
 - b. False
20. All are true statements about antiplatelet therapy and surgical wound healing, except
 - a. Without blood thinner medication, a DVT can decrease perfusion and lead to limb ischemia leading to delayed wound healing
 - b. Antiplatelet medication can increase drainage leading to delayed wound healing
 - c. Antiplatelet therapy decreases fibrin production the is needed for clot production, and without clot production, the patient will have unnecessary drainage
 - d. The patient is at an increased risk of bleeding

APPENDIX K

Post-test

Improving patient outcomes with post-op education for nurses caring for patients undergoing total joint replacement

ID# _____

Date: _____

1. The use of negative pressure therapy reduces fluid pooling in the wound bed to prevent
 - a. Infection
 - b. Skin maceration
 - c. Excessive drainage requiring dressing to be changed to soon
 - d. Any amount of drainage so the dressing never has to be changed
2. Negative pressure wound therapy can be used on closed incisions.
 - a. True
 - b. False
3. Silver dressings are changed
 - a. Every day
 - b. Every 48 hrs
 - c. Every 7 or 14 days, depending on dressing type
 - d. Only at the patient's post-surgical office visit
4. Gauze dressings are to be changed
 - a. Every day
 - b. Every shift
 - c. Only when freshly soiled or accidentally removed and can not reinforce effectively.
 - d. Only reinforce and never change until the patient's post-surgical follow-up office visit
5. Patients should be OOB for the 1st time
 - a. As soon as arrive to floor
 - b. 1hr after arrival to floor
 - c. 2hr after arrival to floor
 - d. Post-op day 1
6. Neurovascular checks should be performed every
 - a. 2hr x 24hrs
 - b. 2hr x length of stay
 - c. 4hr x 24hrs
 - d. 4hr x length of stay

7. A patient's bedding should be changed entirely
 - a. Once per admission
 - b. Daily
 - c. Only when soiled
 - d. The bed pad is all that needs to be changed
8. rTSA patient has an increased risk of shoulder dislocation with
 - a. external rotation and abduction
 - b. internal rotation and abduction
 - c. external rotation and adduction
 - d. external rotation and abduction
9. The TKA patient arrives in the unit at 1830 after surgery and asks to use the restroom at 2100; what is the best response?
 - a. Sure, let me get the bedpan
 - b. Would you like to try to walk to the restroom?
 - c. I will assist you to the restroom
 - d. What would you prefer the bedpan or ambulate to the restroom?
10. You are behind on all scheduled medications. The patient asks to go to the restroom. It is ok to put the patient on a bedpan since you are behind on other tasks?
 - a. True
 - b. False
 - c. It depends on if the patient has ambulated with P.T. previously
11. Total joint replacement patients should only ambulate in the hall with physical therapy assistance.
 - a. True
 - b. False
 - c. It depends on if the patient has ambulated with P.T. previously
12. Advanced silver infused dressings are
 - a. Antibacterial
 - b. Antimicrobial
 - c. Bactericidal
 - d. Bacteriostatic
13. When assisting a TKA patient out of bed, you should
 - a. Position the bed, is in the lowest position to ensure the patient uses the legs to push themselves up to standing
 - b. Pull the patient to a standing position by holding under the patient in the axilla
 - c. Raise the bed to position the patient's legs are at a 90° angle
 - d. Raise the bed to a slightly higher position to ensure the patient does not have to use the legs as much to push up to standing

14. A total hip patient should never sleep on the surgical side when side sleeping
 - a. True
 - b. False
15. Anterior hip precautions include all except
 - a. It is ok to step back with the surgical extremity
 - b. No external hip rotation
 - c. Do not cross legs
 - d. No hip extension
16. Total knee precautions include except
 - a. It is ok to use the bed's knee gatch function while the patient is awake in the bed and can move around
 - b. No pillows or blankets under the knee
 - c. It is never ok to use the bed's knee gatch function
 - d. No rotation of the knee
17. Total shoulder precautions include except
 - a. No reaching behind the back
 - b. May reach across the front of the body
 - c. No lifting with surgical extremity
 - d. No active or passive range of motion of the surgical extremity
18. It is ok to remove the shoulder sling if the patient is in the bed
 - a. True
 - b. False
19. If the patient comes out of surgery with the silver dressing in place and has drainage requiring a dressing change, is it ok to use gauze and Tegaderm or a PICO dressing instead?
 - a. True
 - b. False
20. All are true statements about antiplatelet therapy and surgical wound healing, except
 - a. Without blood thinner medication, a DVT can decrease perfusion and lead to limb ischemia leading to delayed wound healing
 - b. Antiplatelet medication can increase drainage leading to delayed wound healing
 - c. Antiplatelet therapy decreases fibrin production the is needed for clot production, and without clot production, the patient will have unnecessary drainage
 - d. The patient is at an increased risk of bleeding

APPENDIX L

Educational Material

Figure 2

Education



Total Knee Arthroplasty

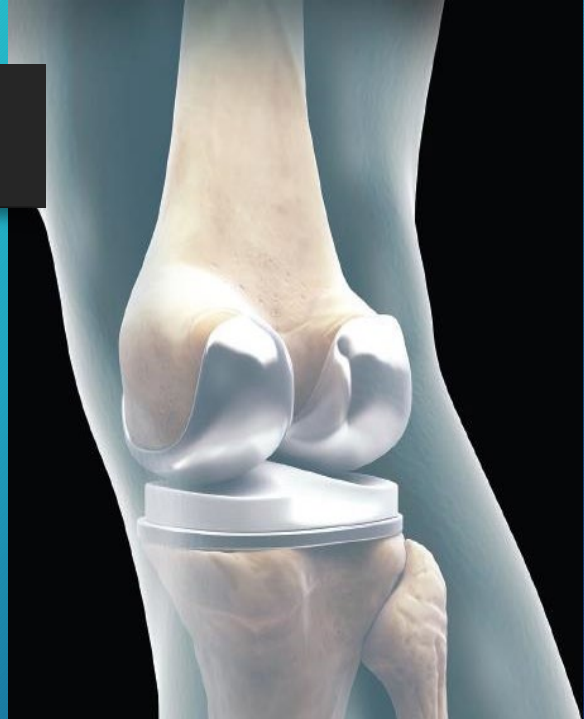
- Most common reasons:
 - Osteoarthritis
 - Rheumatoid arthritis
 - Traumatic osteoarthritis and traumatic lower extremity injuries.

The damaged cartilage surfaces at the ends of the femur & tibia are removed & a small amount of underlying bone.

The removed cartilage and bone is replaced with metal components that recreate the surface of the joint.

The undersurface of the patella (kneecap) is cut & resurfaced with a plastic button.

A medical-grade plastic spacer is inserted between the metal components to create a smooth gliding surface.



Nursing Care Of The TKA Patient

- Check pulses of affected extremity every 4hrs x 24hrs, then with each shift and as needed.
- Daily CHG bath
- Daily linen change or anytime soiled
- Monitor dressing for changes with each ambulation and as needed.
- Use extension of surgical extremity when sitting
- Raise the bed to allow smooth exit without having to use legs to push up as far.
- Total Knee Precautions
 - No pillows/blankets under the knee.
 - No knee gatch elevation these things can lead to contracture and limited ROM.
 - Don't rotate the knee in or out, particularly when walking or doing your exercises. Keep the knee pointed straight ahead.

Nursing Care Of The TKA Patient

- OOB 1hr after arrival to the floor if received general anesthesia
- OOB 1hr after full sensation returned if had spinal
- All meals to be eaten in a chair
- OOB all-day
- Ambulate in halls with PT and with staff assist if stable
- ICS 10 x hr
- Bedside commode over the toilet, no bedpan use – certain adjustments may apply
- Encourage the patient to do ankle pumps in bed
- SCD on when in bed
- Keep rooms clutter-free to avoid trips and falls.

Total Hip Arthroplasty

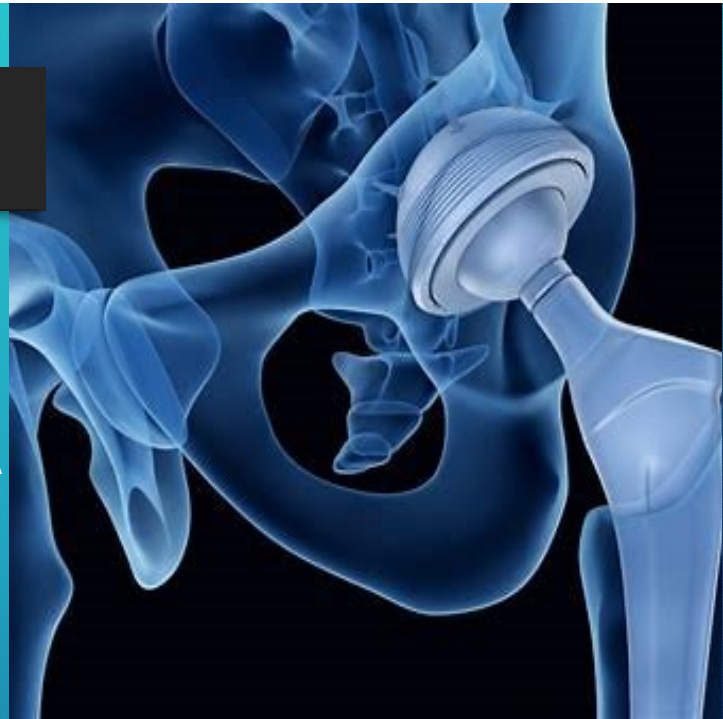
- Most common reasons
 - Osteoarthritis
 - Osteonecrosis
 - Rheumatoid arthritis

In a total hip replacement the damaged bone and cartilage is removed and replaced with prosthetic components.

The femoral head is removed/replaced with a metal stem in the hollow center of the femur. A metal/ceramic ball is placed on the upper stem & replaces femoral head that was removed.

The damaged cartilage surface of the socket (acetabulum) is removed and replaced with a metal socket.

A plastic, ceramic, or metal spacer is inserted between the new ball and the socket to allow for a smooth gliding surface.



Nursing Care Of The THA Patient

- Check pulses of affected extremity every 4hrs x 24hrs, then with each shift and as needed.
- Daily CHG bath
- Daily linen change or anytime soiled
- Monitor dressing for changes with each ambulation and as needed.
- Use extension of surgical extremity when sitting
- Raise the bed to allow smooth exit without having to use legs to push up as far.
- Anterior hip precautions:
 - Do not step backwards with surgical leg. No hip extension. • Do not allow surgical leg to externally rotate (turn outwards). • Do not cross legs. Use a pillow between legs when rolling. • Sleep on the surgical side when side lying.

Nursing Care Of The THA Patient

- OOB 1hr after arrival to the floor if received general anesthesia
- OOB 1hr after full sensation returned if had spinal
- All meals to be eaten in a chair
- OOB all-day
- Ambulate in halls with PT and with staff assist if stable
- ICS 10 x hr
- Bedside commode over the toilet, no bedpan use – certain adjustments may apply
- Encourage the patient to do ankle pumps in bed
- SCD on when in bed
- Keep rooms clutter-free to avoid trips and falls.

Reverse Total Shoulder Arthroplasty

- Most common reasons:
 - Completely torn rotator cuffs with severe arm weakness
 - Severe arthritis & rotator cuff tearing (cuff tear arthropathy)
 - Previous shoulder replacement failure

In reverse total shoulder replacement, the joint is removed and the socket and metal ball are switched in location. The ball is attached to the shoulder bone & the socket is attached to the upper arm bone. Allowing use of the deltoid muscle instead of the torn rotator cuff to lift the arm.



Nursing Care Of The rTSA Patient

- **Dislocation Precautions**
 - Patients following a rTSA do not dislocate with the arm in abduction and external rotation.
 - Typically dislocate with the arm in internal rotation and adduction in conjunction with extension. For example, tucking in a shirt or performing bathroom / personnel hygiene with the operative arm is a dangerous activity particularly in the immediate peri-operative phase.
 - No reaching across body to wash under opposite axilla or wash opposite shoulder
 - No shoulder motion behind lower back and hip (no combined shoulder adduction, internal rotation and extension)
 - No reaching behind back. For example, Tuck in shirt, To pull belt through the back loops, Reach to back pocket to get wallet out, Fasten bra (if applicable), Perform personal hygiene
 - No glenohumeral joint extension beyond neutral(always need to be able to see the elbow)

Other Precautions:

- No use of surgical extremity until approved
- No shoulder AROM or passive range of motion (PROM).
- No lifting of objects with operative extremity.
- No supporting of body weight with involved extremity

Nursing Care Of The rTSA Patient

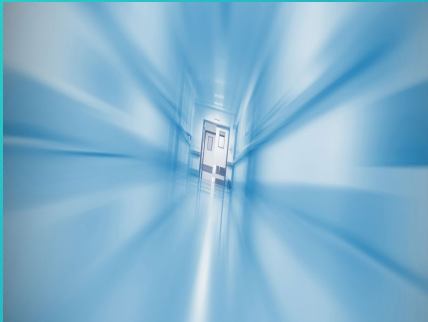
- Daily CHG bath
- Daily linen changes or anytime soiled
- OOB 1hr after arrival to floor
- OOB all day
- All meals to be eaten in chair
- Advise patient to notify staff immediately when sensation begins to return, and treat with by mouth medication immediately
- Maintain proper placement of shoulder sling and abduction pillow

Total Joint Replacement Procedures

Total Knee Arthroplasty		Total Hip Arthroplasty		Total Shoulder Arthroplasty	
Case Total		Case Total		Case Total	
• 2018	193	• 2018	211	• 2019	75
• 2019	122	• 2019	176	• 2020	59
• 2020	86	• 2020	138		

** 2020 counts reduced due to the ongoing COVID pandemic

Readmission Rates



This Photo by Unknown Author is licensed under [CC BY-NC-ND](#)

THA 2020

138 total cases - 8 patient re-admit - rate of 5.80%

TKA 2020

86 total cases - 7 patient re-admit - rate of 8.14%

rTSA 2020

59 total cases with zero re-admits - rate of 0.0%

Post-Op Complications

TKA

Bleeding
SSI
Pneumonia
Traumatic injury from fall
Wound dehiscence

THA

Bleeding
SSI
Pneumonia
Traumatic injury from fall
Wound dehiscence

TSA

Bleeding
SSI
Pneumonia
Traumatic injury from fall
Wound dehiscence

Optifoam AG Silver Dressing

• <https://www.medline.com/product/Optifoam-Gentle-AG-Post-Op-Foam-Dressings/Post-Op-Dressings/Z05-PFT37348?question=&index=PZ&indexCount=2>

• Medline Optifoam Gentle Ag Post-Op Dressings with Silver is highly absorbent and creates an ideal healing environment. Optifoam Gentle Ag is a powerful antimicrobial* protection from a gentle and repositionable foam dressing. Optifoam Gentle Ag+ eliminates 99.99% of bacteria within two hours and remains effective for up to seven days. The ionic silver provides an effective barrier for managing repeated bacterial introduction. For increased patient comfort, these strips use a thin and conformable adhesive border that is waterproof, flexible and breathable.

* Antimicrobial-agent that prevents or kills the replication of microorganisms



Nursing Care For Optifoam AG Silver Dressing

- Leave in place 7-14 days depending on which used
- Reinforce instead of replace if possible and wound has not been exposed.
- If wound is exposed or dressing is saturated with drainage remove dressing evaluate incision for complications and replace dressing.
- When changing the dressing use strict sterile technique. Cleanse wound with wound cleanser before new dressing applied.
- Always document in EPIC when assess the dressing and any interventions that were required.

PICO Single Use Negative Pressure Wound Therapy

<https://www.youtube.com/watch?v=sNuT3dKR7iQ>

PICO sNPWT's unique AIRLOCK™ Technology layer distributes pressure evenly across the zone of injury consistently for up to 7 days, depending on exudate levels. Optimal fluid management to prevent pooling of fluid in the wound and to help minimise the risk of maceration. Softport allows PICO to be used on weight-bearing areas, with negative pressure delivered effectively even under compression. A gentle silicone contact layer designed to help minimise pain and trauma on application and removal. Designed to treat the underlying zone of injury and reducing lateral tension. In-vitro testing demonstrated that once bacteria is within the dressing, over 99% is locked away from the wound in the PICO dressing with AIRLOCK Technology.



Nursing Care Of The PICO Dressing

- Leave in place 7-14 days depending on which used
- Reinforce instead of replace if possible and wound has not been exposed.
- If wound is exposed or dressing is saturated with new drainage remove dressing evaluate incision for complications and replace dressing.
- When changing the dressing use strict sterile technique.
- Do NOT change dressing unless it is actively draining, old dry drainage on bandage is ok.
- Maintain intact tubing. Do Not allow tubing to be pulled on. (tends to get caught in the foot rest of the chairs in rooms)
- Ensure the power box is always on. If the battery goes out change immediately. The power is the only way the suction remains functional.
- Always document in EPIC when assess the dressing and any interventions that were required.

Sterile Dressing with Gauze and Tegaderm



- Used to be the standard dressing for all ortho patients.
- Still used on some surgeries such as TFN.
- Dressing is applied sterile in the OR.
- Provides a barrier to the environment to limit wound exposure.
- With the development of advanced dressings these standard sterile dressing is used less frequently.

Nursing Care Of The Gauze Dressing

- Reinforce instead of replace if possible and wound has not been exposed.
- If wound is exposed or dressing is saturated with drainage remove dressing evaluate incision for complications and replace dressing.
- When changing the dressing use strict sterile technique. Cleanse wound with wound cleanser before new dressing applied.
- Always document in EPIC when assess the dressing and any interventions that were required.

Surgical Anesthesia

- Spinal / Regional

TKA & THA - Cordry

rTSA – All cases

Provides lasting pain relief for several hours post-op
Delayed return of sensation in extremity. Possible longer wait time for first PT visit
Decreased risk of lung injury from ventilator
Earlier recovery of bowel function,
Less need for systemic opioids (narcotics) and less nausea as a result,
Easier breathing resulting from better pain control,
Easier participation in physical therapy
Patient can feel less groggy and more awake

- General

THA - TKA - Featheringill

Patient induction is faster.
Physician preference

Multimodal Pain Management

- Use of multiple modes of pain control
 - Spinal / regional anesthesia
 - Cold therapy
 - Early ambulation
 - Frequent ambulation
 - Physical therapy exercises
 - Oral narcotic pain meds
 - Oral anti-inflammatory meds
 - Patient education and preparation pre-operatively (Joint Camp)

Cold Therapy

- Proven reliability and effectiveness
- Strong pump for optimal durability
- High flow rate results in even pad temperature
- Provides motorized cold treatment for 6 - 8 hours

<https://www.breg.com/wp-content/uploads/woocommerce-store-catalog-pdf-download/breg-polar-care-cube-1610665589.pdf>



Daily Activities

- Participate in all physical therapy session, if the patient declines have a discussion with them about its importance.
- To prevent respiratory illness ensure the patient is using an incentive spirometer: 10 breaths/hour, instruct on correct usage.
- All meals to be eaten while sitting in chair. Patient needs to remain out of bed majority of the day.

Importance of Ambulation



- Lower extremity strength will return faster
- Regain the loss of proprioception (sensing of self / muscle movement)
- Reduce risk of respiratory illness
- Prevent stiffness and contracture of extremity

Importance of Blood Thinner Medication Compliance

Types Used

- Eliquis
- Xarelto

Studies have indicated a rate of 40%-60% asymptomatic DVT without DVT prophylaxis use either mechanical or pharmacological

Blood Thinner Effect On Wound Healing

- How is this related to wound healing
 - Increased risk of bleeding and drainage leading to readmissions, re-explorations, and prolonged hospital stays. Increases risk of infection with the excessive drainage

Patient Discharge Education

- Patient attends a Joint Boot Camp prior to surgery and receives education on all aspects of process.
- Make sure the patient is prepared and understands all discharge instructions.
- Encourage positive patient and nursing attitude as this has its affects on patient compliance and healing.
- Advise all patients to maintain a clear floor space at home, no loose rugs, cords.
- If has tile or wood flooring ALWAYS wear no slip shoes, NEVER wear plain socks.

When To Call The Doctor

- Excessive bleeding
- Ineffective pain management
- No return of sensation within 1-2 hr after spinal anesthesia
- Excessive swelling of surgical extremity.

References

- American Academy of Orthopedic Surgeons. (2021). Shoulder Joint Replacement. Retrieved from Ortho Info: <https://orthoinfo.aaos.org/en/treatment/shoulder-joint-replacement/#:~:text=The%20typical%20total%20shoulder%20replacement,press%20fit%22%20into%20the%20bone>
- Aumiller, W. D., & Dollahite, H. A. (2016, March). Advances in total knee arthroplasty, *Journal of the American Academy of Physician Assistants*, 29(3), 27-31. doi:10.1097/01.JAA.0000480563.76217.ac
- Breg. (2021). Polar Care Cube™. Retrieved from Breg: <https://www.breg.com/products/cold-therapy/devices/cube-cold-therapy/>
- Cordry, R. (2021, Jan). Dr. (A. Collier, Interviewer)
- George, M. (2018). Methods of DVT Prophylaxis after Total Knee Arthroplasty. In A. Rozim Zorzi, & J. Batista de Miranda, *Primary Total Knee Arthroplasty* (pp. 41-54). IntechOpen. Retrieved from <https://www.intechopen.com/books/primary-total-knee-arthroplasty/methods-of-dvt-prophylaxis-after-total-knee-arthroplasty>
- Rajae, S. S., Campbell, J. C., Mirocha, J. M., & Paiement, G. D. (2018). Increasing Burden of Total Hip Arthroplasty Revisions in Patients Between 45 and 64 Years of Age. *The Journal of Bone and Joint Surgery*, 100(6), 449-458. doi:10.2106/JBJS.17.00470
- Smith & Nephew. (2021). Use of PICO in orthopedic surgery. Retrieved from Smith & Nephew: <https://www.smith-nephew.com/key-products/advanced-wound-management/pico/pico-orthopaedic-evidence/#>
- The American Society of Regional Anesthesia and Pain Medicine. (2021). Risks and benefits of regional anesthesia. Retrieved from ASRA: <https://www.asra.com/patient-information/regional-anesthesia/risks-and-benefits>

APPENDIX M

Jacksonville State University International Review Board Approval

Figure 5

JSU IRB Approval letter



January 25, 2021

Dear Amanda Collier:

Your proposal submitted for review by the Human Participants Review Protocol for the project titled: "Improving Patient Outcomes with Post-Op Education for Nurses Caring for Patients Undergoing Total Joint Replacement", has been reviewed and approved as exempt. If the project is still in process one year from now, you are asked to provide the IRB with a renewal application and a report on the progress of the research project.

Sincerely,

A handwritten signature in blue ink that reads 'Joe Walsh'. Below the signature is the printed name 'Joe Walsh' and the title 'Executive Secretary, IRB'.

JW/dh

201 Bibo Graves Hall
700 Polkton Road North
Jacksonville, AL 36255-1802
P: 904.749.1264
P: 904.749.1291
E: jwalsh@jcu.edu
www.jcu.edu

An Equal Opportunity/ Affirmative Action Employer

APPENDIX N

Facility Approval of Project



Amanda Collier has permission to implement a DNP project representing Jacksonville State University on 6 West floor at Princeton Hospital.

 Amanda Collier 11/19/20
