OPTIMIZING PREOPERATIVE NUTRITION USING ENHANCED RECOVERY FROM

SURGERY (ERAS) GUIDELINES TO IMPROVE CLINICAL OUTCOMES

FOR PATIENTS UNDERGOING TOTAL JOINT REPLACEMENT

by

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A thesis submitted in partial fulfillment
of the requirements for the degree

of

Master of Science

in

Clinical Nurse Leader

MONTANA STATE UNIVERSITY
Bozeman, Montana

May 2022

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ABSTRACT

Surgical site infection (SSI) following total joint arthroplasty (TJA) is one of the most frequently encountered hospital-acquired conditions. Consequently, as the largest population of people in the United States known as the "baby boomers" continue to age, the need for TJA to treat arthritis is projected to grow exponentially as is the incidence of SSI. Evidence-based enhanced recovery after surgery (ERAS) guidelines have been shown to decrease the prevalence of postoperative complications, hospital length of stay, improve the patient's return to normal function, and quality of life. ERAS guidelines recommend screening for risk of malnutrition with referral to a registered dietician and consumption of a preoperative oral carbohydrate (POC) the night before and the day of surgery. Current research does not directly link the use of POC to decreased occurrence of SSI. It is hypothesized that implementing nutritional screening and POC will be associated with a decreased occurrence of postoperative SSI. The primary goal of this project is to build a consistent preoperative nutritional optimization program utilizing ERAS guidelines in the pre-anesthesia clinic (PAC) for patients aged 50-70 and scheduled for elective TJA.

CHAPTER ONE

INTRODUCTION

<u>Background</u>

Arthritis is the leading cause of adult disability in the United States (MacKenzie et al., 2020). Complaints of pain and loss of function resulting from arthritis peak in older populations (age 65 and older) but are seen as early as age 50. Treatment typically requires a surgical intervention called total joint replacement surgery also known as total joint arthroplasty (TJA). It is estimated that one million total hip arthroplasty (THA) and total knee arthroplasty (TKA) procedures are performed annually in the United States (Ripolles-Melchor et al., 2020). A background of the issues impacting the rise in TJA and the consequential rise in healthcare costs will be outlined.

<u>Contributing Factors</u>

There are many contributing factors generating the rise in demand for TJA. TJA impacts the largest population of adults in the United States, people aged 58-76, known as the "baby boomers" (Ripolles-Melchor et al., 2020). The United States Census Bureau (2022) estimates this population of Americans at 73 million. This generation is rapidly aging, and it is estimated by 2030 the number of individuals in America over the age of 65 will double, with people above 85 years of age constituting the fastest-growing segment of our society (MacKenzie et al., 2020). As this population continues to age, it is estimated by 2030 the need for THA will increase by 174% and TKA by 673% (Büttner et al., 2019).

The growing prevalence of obesity in the United States is escalating the diagnosis of osteoarthritis which is contributing to the increased demand for TJA (Büttner et al., 2019). Advances in technology have extended the range of patients eligible for TJA to include both younger adults, elderly adults, and patients with significant medical comorbidities. With the anticipated influx of patients needing TJA, it is imperative that healthcare providers adopt evidence-based practices that aid in successful recovery. Implementing evidence-based practices aimed at lowering the incidence of postoperative complications such as surgical site infections (SSI) will decrease hospital length of stay (LOS) and generate positive patient outcomes.

Surgical Site Infection (SSI)

TJA is a safe and successful treatment option for chronic hip or knee pain associated with osteoarthritis. As with any surgery, there are risks of post-operative complications, the most serious being SSI, which is the most frequently encountered hospital-acquired conditions following TJA (Kurtz et al., 2017; Papakostidis et al., 2021; Tsantes et al., 2019). Superficial SSI can interfere with healing tissue however deep tissue infections can compromise the integrity of the prothesis leading to implant failure. Another major consequence of SSI is the development of sepsis, the body's extreme and often life-threatening response to infection. Utilizing the data submitted to the National Surgical Quality Improvement Program (NSQIP) authors Bohl et al., (2016) calculated that approximately 1 in 300 patients develop sepsis following TJA and 3.7% of patients diagnosed with sepsis die within 30 days of surgery.

SSI requires antibiotic treatment and frequently results in readmission to the hospital. In more severe cases of SSI a return to surgery is warranted to remove the infected tissue or remove the prosthetic joint implant (Centers for Disease Control and Prevention, 2022). SSI can negatively impact the healing process resulting in poor outcomes, decreased patient satisfaction and quality of life. Patients may experience increased pain, slower recovery, loss of physical function, long-term disability, and death. Treatment of a SSI is also costly, it may include additional outpatient visits, medications, x-rays, hospitalizations, and surgical procedures all of which financially impact both the patient and the healthcare facility.

<p align="center">Financial Impact</p>

It is projected the volume of TJA's will substantially increase in the next decade. It is also estimated SSI will be implicated in over 220,000 cases per year at a cost of more than $1.62 billion (Berríos-Torres et al., 2017). The financial impact of readmission due to SSI following TJA will be staggering.

Nationally hospital readmission following TJA occurs 3.4% to 6.6% within 30 days and 3.5% to 15.6% within 90 days (Papakostidis et al., 2021). The results of one study implicated SSI as the cause of readmission following THA at 31.8% and 34.2% following TKA (Hollenbeak et al., 2020). The cost of treating SSI following TJA can exceed $90,000 when a prosthetic joint implant is involved (Berríos-Torres et al., 2017). Readmission to treat SSI accounts for an economic healthcare burden of 1.1 billion dollars annually (Kurtz et al., 2017).

In 2016, to incentivize improvement in patient outcomes following TJA the Centers for Medicare & Medicaid Services (CMS) implemented the Comprehensive Care for Joint Replacement (CJR) program. The program instituted a penalty upon readmission through the Medicare Hospital Readmissions Reduction Program (HRRP) reducing financial reimbursement to facilities for 30-day and 90-day hospital readmissions following TJA (Weinberg et al., 2016); Cary et al., 2019). Facilities with a readmission rate of more than 3% following TJA incurred an average of $77,519 in additional revenue losses due to HRRP penalties (Hollenbeak et al., 2020). Hollenbeak et al., (2020) also found that 22.3% of private acute care hospitals had received readmission penalties. Implementing strategies such as nutritional optimization can decrease the incidence of SSI following TJA and lower healthcare costs.

Preoperative Nutrition

It is well known that adequate preoperative nutrition is imperative for postoperative healing and recovery (Tsantes et al., 2019). Patient preoperative nutritional status plays a significant role in preventing post-operative infection especially SSI (Ljungqvist et al., 2020). Reducing surgical stress and maintaining glycemic control have also been identified as vital for postoperative healing and recovery (Ljungqvist et al., 2020; Tsantes et al., 2019). Both surgical stress and preoperative fasting directly contribute to insulin resistance resulting in postoperative hyperglycemia and impaired immune function, resulting in increased risk for SSI (Burgess et al., 2018; Hirsch et al., 2021; Talutis et al., 2020).

The abbreviation NPO is defined as "nil per os" meaning nothing by mouth. Historically this is a practice implemented at midnight the night prior to surgery (Ackerman et al., 2020). The negative effects of preoperative malnutrition caused by implementing NPO status is well-researched with patient populations undergoing elective colorectal surgery (Ljungqvist et al., 2020). Preoperative fasting places the patient in a suboptimal nutritional state, exacerbating the surgical stress response which increases the risk of postoperative complications, extended length of stay (LOS), hospital readmission, morbidity, and mortality (Deng et al., 2018). Further, on the day of surgery patients complain of thirst, hunger, headaches, and anxiety (Wischmeyer et al., 2018). Carbohydrate loading on the day of surgery provides an optimal metabolic state, a fed rather than a fasted state, reducing insulin resistance by 50% which minimizes surgical stress and improves surgical outcomes (Ackerman et al., 2020). The Enhanced Recovery After Surgery (ERAS) Society published evidence-based research supporting the practice of consuming clear liquids and a clear complex carbohydrate-rich drink on the day of surgery to reduce postoperative complications (MacKenzie et al., 2020).

ERAS Background & History

The concept of patient-centered, evidence-based ERAS guidelines were developed by Danish surgeon Henrik Kehlet in 1997. The ERAS Society consists of a multidisciplinary team of healthcare providers from all over the world working together to implement evidence-based guidelines to improve surgical outcomes. The goal was to facilitate a multimodal, multidisciplinary team approach to reduce the patient's surgical stress response, optimize physiological function, and promote fast recovery for elective

colorectal surgery (Morrell et al., 2021). The ERAS guidelines have begun to encompass many surgical specialties to include TJA.

ERAS Guidelines

The ERAS guidelines contain several components, but the two this project will focus on are preoperative malnutrition screening and patient consumption of a preoperative oral carbohydrate (POC) drink the night before and the day of surgery. ERAS guidelines recommend a thorough preoperative evaluation of individualized patient risks for surgical complications to include screening for malnutrition (MacKenzie et al., 2020). ERAS guidelines stress the importance of first identifying preoperative malnutrition. Malnutrition compromises recovery after surgery, placing patients at increased risk for postoperative complications. There is a strong correlation between poorly nourished patients and higher incidence of delayed wound healing, persistent wound drainage, surgical site infection, prosthetic joint infection, additional surgery, and extended hospitalization (Ljungqvist et al., 2020; MacKenzie et al., 2020). It is estimated that between 24%-65% of patients undergoing surgery are at nutrition risk (Wischmeyer et al., 2018).

ERAS guidelines challenged the traditional preoperative NPO after midnight protocol and support preoperative nutritional enhancement. ERAS guidelines recommend consuming a POC drink to decrease metabolic stress associated with preoperative starvation as well as symptoms of hunger, thirst, postoperative nausea, and vomiting associated with fasting (Wall, Schneiderman & Duke, 2019).

Optimizing the patient's preoperative nutritional status will aid in wound healing, promote return to normal mobility and function, prevent losses in lean body mass, maintain immune function, and minimize the risk of postoperative complications (MacKenzie et al., 2020). Evidence-based research conducted by ERAS Society confirmed eliminating the practice of NPO or overnight fasting prior to surgery improved surgical outcomes by decreasing surgical complications (Ljungqvist et al., 2020). ERAS guidelines recommend consuming clear liquids on the day of surgery and a preoperative oral carbohydrate (POC) drink the night before surgery and up to two hours before initiation of anesthesia, to avoid the negative effects of preoperative fasting (Kaye et al., 2019; Ljungqvist et al., 2020). Carbohydrate loading with a clear POC drink prepares the body for the stress of surgery by supporting increased metabolic demands initiated by the body's stress responses, which decreased postoperative complications, improve patient safety, and surgical outcomes (Ackerman et al., 2020; Sarin et al., 2017; Talutis et al., 2020; Wischmeyer et al., 2018). The consequential outcomes of acquiring a SSI related to inadequate preoperative nutrition contribute to increased patient morbidity, mortality, and exorbitant healthcare costs (Wischmeyer et al., 2018; Berríos-Torres et al., 2017).

Robust research using ERAS protocols in colorectal surgery has led to the development of evidence-based processes. Collaboration with anesthesia directed the development of ERAS protocols specific to eliminating NPO policies prior to surgery. The research revealed positive patient outcomes with consumption of a POC drink before colorectal surgery (Ackerman et al., 2020; Ljungqvist et al., 2020). The vast research supporting use of ERAS guidelines with positive outcomes in colorectal surgery suggest

identifying malnutrition and nutritionally optimizing patients prior to elective TJA can

capture similar positive outcomes.

CHAPTER TWO

LITERATURE REVIEW

The volume of TJA procedures performed in the United States are expected to grow exceptionally as is the accompanying incidence of SSI. Implementing evidence-based guidelines is essential to change the poorly projected course for patients undergoing elective TJA. The literature review will provide the foundation and purpose of the quality improvement project. ERAS guidelines and pathways will be identified and supported in the literature review. The theoretical framework utilized to guide the project will be presented.

Definition of Terms

- o Centers for Disease Control (CDC) is a federal agency within the Department of Health and Human Services that supports the use of evidence-based guidelines to decrease SSI.

- o Centers for Medicare & Medicaid Services (CMS) is a federal agency within the Department of Health and Human Services (HHS) responsible for determining hospital reimbursement based on patient outcomes following TJA.

- o Enhanced Recovery After Surgery (ERAS) is a continuously evolving set of evidence-based guidelines recommended to improve surgical outcomes.

- o Insulin resistance is defined as an impaired response of the body to insulin resulting in elevated blood glucose levels often seen in response to surgical stress (Ljungqvist et al., 2020; MacKenzie et al., 2020).

- o Sepsis is defined by the Society of Critical Care Medicine (2022) as a life-threatening organ dysfunction due to a dysregulated host response to infection.

- o Surgical site infection (SSI) is defined by the CDC (2022) as an infection that occurs after surgery in the part of the body where the surgery took place.

- o Surgical stress response is defined as the systemic response of the body to surgical injury often associated with insulin resistance (Ljungqvist et al., 2020; MacKenzie et al., 2020).

- o TJA is defined by the American Academy of Orthopedic Surgeons (2022) as a surgical procedure to remove a damaged joint due to arthritis or trauma and implant a prosthesis to restore joint function.

A literature search was conducted to explore the evidence of using the ERAS recommended guidelines of performing a preoperative malnutrition screening and consuming a POC drink to decrease the incidence of SSI and hospital readmission for patients undergoing elective TJA. An exhaustive computerized search of the literature was performed using the databases CINAHL, Cochrane Library, Google Scholar, Medline, and PubMed. Inclusion criteria was restricted to articles published in English within the last 5 years. Publications specific to the use of ERAS guidelines for preoperative nutritional screening and consuming a POC drink for patients undergoing elective TJA were searched. Key search words in various combinations included: enhanced recovery after surgery, ERAS, preoperative carbohydrate drink, complex carbohydrate-rich drink, carbohydrate enhancement, hip replacement, hip arthroplasty,

knee replacement, knee arthroplasty, postoperative outcomes, quality improvement, malnutrition, surgical site infection, SSI, readmission, and postoperative complications.

Both qualitative and quantitative research methods were reviewed to include randomized controlled design, systematic review with meta-analysis, audit, observational and retrospective analysis. Full texts were analyzed and summarized for strength, weaknesses, and limitations. Eight articles and two books met inclusion criteria and were evaluated for use of a nutritional screening tool and using a POC drink as recommended in the ERAS guidelines. Several articles were obtained from the references listed in the published studies and from the two published books written by the ERAS Society.

Postoperative nutritional interventions did not meet the inclusion criteria as this project is focused on preoperative nutritional optimization. ERAS guidelines specific to fractured hips were excluded due to urgent surgical needs of the injury and inability to preoperatively optimize nutritionally.

<div align="center">Synthesis of Research</div>

Research concluded that decreasing surgical stress and maintaining glycemic control to decrease insulin resistance and postoperative hyperglycemia is imperative to decrease the risk of SSI. As early as 2009, the ERAS Society began recommending shortening the duration of preoperative fasting (NPO status) and administration of a POC drink to lower the risk of postoperative infection in colorectal and gynecological surgeries. Several systematic reviews and meta-analyses confirmed eliminating NPO practices and consuming a POC drink did decrease insulin resistance and improved patient symptoms of hunger, thirst, fatigue, and headache. The literature repeatedly

recommends patient consumption of a POC drink to decrease insulin resistance which will decreases postoperative hyperglycemia and impairment to immune function, as well as improves patient adverse symptoms related to fasting.

It is well documented in the literature that nutrition is a strong independent predictor of postoperative survival and malnutrition is associated with delayed tissue healing, wound infection, sepsis, and increased risk of mortality. The literature supported applying ERAS guidelines such as implementing a comprehensive presurgical evaluation to include utilizing a nutritional screening tool to identify patients at risk for malnutrition and implementing nutritional consults prior to elective TJA to decrease postoperative complications and decrease hospital LOS. Research has consistently shown the use of ERAS guidelines results in significant improvement in patient outcomes, specifically a decrease in post-surgical complications, decreased length of hospitalization, decreased morbidity, and decreased 30-day mortality rate. The cost-effective benefits of using ERAS guidelines as calculated by decreased LOS or number of days hospitalized is well evidenced in the literature.

Research Gaps

The consensus is the use of ERAS guidelines can accelerate recovery without increasing readmission rates, but research is lacking in evidence specifically measuring consumption of a POC drink and decreased incident of SSI and readmission rates. Research specific to optimizing the nutritional status of patients prior to elective TJA is severely lacking. The gap analysis revealed a dire need for several randomized controlled

studies to establish practices to standardize a process of assessing for malnutrition and developing evidence-based intervention to optimizing nutrition prior to TJA.

Summary

In summary, review of the literature confirmed that applying ERAS guidelines such as implementing a comprehensive presurgical evaluation, utilizing a nutritional screening tool to identify patients at risk for malnutrition and implementing nutritional consults prior to elective TJA is crucial in decreasing complications following surgery. Optimizing nutritional status preoperatively for all patients undergoing elective TJA can decrease postoperative complications, shorten recovery time, decrease hospital length of stay, improve return to normal function, and quality of life (Ljungqvist et al., 2020; MacKenzie et al., 2020). Positive results were obtained when applying evidence-based ERAS guidelines of discontinuing preoperative NPO policies and promoting consumption of a POC drink the night before and day of surgery. ERAS guidelines provide a consistent foundation to nutritionally optimize patient prior to elective TJA and positively change the course of total joint recovery. ERAS guidelines offer an evidence-based process of abating some of the more common risks of poor surgery outcomes and have been shown to improve patient recovery, return to physical function and overall quality of life following elective surgery. Utilization of ERAS guidelines will have a positive financial impact by alleviating extended hospital length of stays, readmissions and returns to surgery.

Problem Statement

Despite the abundant evidence supporting the benefits of using ERAS guidelines, compliance is inconsistent. According to the Centers for Disease Control and Prevention's (CDC) it is estimated that 50% of SSI's are preventable by using evidence-based guidelines (Berríos-Torres et al., 2017). Identifying and correcting barriers interfering with implementation of ERAS guidelines needs to be explored to improve patient safety and surgical outcomes following TJA.

Purpose of Project

Forming a collaborative multidisciplinary team to facilitate strategic thinking to provide high-quality patient care that improves functional recovery and quality of life is essential. It is important to develop a consistent process to identify and optimize preoperative nutritional status using ERAS guidelines for patients scheduled for elective TJA.

Although the literature clearly links the patient's surgical stress response and associated insulin resistance to an increased risk of SSI it does not directly link consumption of a POC drink to decreased incidence of SSI. It is hypothesized that consumption of a POC drink both the night before surgery and the day of surgery will be associated with a decreased incident of SSI.

The purpose of the quality improvement project is to establish a consistent process of preparing patients for the stress of TJA. This project focuses on two specific guidelines published by the ERAS Society, malnutrition screening and consumption of

preoperative oral carbohydrates (POC), that will most likely decrease the incidence of SSI and hospital readmission. The relationship between patient consumption of a POC and the incidence of postoperative surgical site infection at 30-day and 90-day intervals will provide measurable outcomes.

Theoretical Framework

The Health Promotion Model designed by Nola J. Pender is in direct alignment with the patient-centered ERAS pathways and will provide the framework to guide the project. Pender defines health as a positive dynamic state rather than simply the absence of disease. The theoretical framework focuses on promoting healthy behaviors to obtain desired outcomes while considering the patient's unique personal characteristics and experiences. The overall goal of the project is to implement a preoperative nutritional support program for patients undergoing elective TJA.

The Health Promotion Model aligns with the focus of the project in two ways. First, the model requires investigation of prior patient behaviors, beliefs, and characteristics to build a patient specific plan of care. The foundation of the project is grounded in the thorough and individualized preoperative evaluation. Patient experiences, beliefs and current state of health are explored, including a screening for malnutrition.

Second, the model directs the development of positive patient experiences, patient specific education, and patient self-efficacy to motivate commitment to the plan of care to improve surgical outcomes, by educating and encouraging patients to prepare nutritionally for surgery. Employing the theoretical framework will aid in understanding unique patient characteristics which can improve patient compliance with the ERAS

guideline of consuming a POC. Patient commitment to the pre-surgical plan is imperative

to obtaining evidence-based data to support implementing a change in practice. It is

important to appreciate the unique differences in patients.

CHAPTER THREE

METHODS

Introduction

It is well documented in the literature that non-compliance with evidence-based clinical guidelines increases the risk of postoperative complications such as SSI after TJA (Berríos-Torres et al., 2017). ERAS guidelines have been shown to decrease the incidence of postoperative complications, hospital length of stay, and improve patient return to normal function, and quality of life (Ljungqvist, Francis & Urman, 2020; MacKenzie, Cornell & Memtsoudis, 2020).

To mitigate the risk of postoperative complications, ERAS guidelines recommend presurgical nutritional screening to identify patients at risk for malnutrition (Ljungqvist, Francis & Urman, 2020; MacKenzie, Cornell & Memtsoudis, 2020). It is also recommended that patients consume a POC to optimize both hydration and the nutritional status needed to meet the anticipated metabolic demands associated with surgical injury and stress. (Ljungqvist, Francis & Urman, 2020; MacKenzie, Cornell & Memtsoudis, 2020).

It is hypothesized that implementing ERAS guidelines will be associated with a decreased incidence of postoperative SSI. The goal of this project is to establish a consistent process of preparing patients for the metabolic stress of TJA using ERAS guidelines specifically screening for malnutrition and patient consumption of a POC. In this chapter the proposed plan for this quality improvement project will be discussed. The

following will be noted: design, setting, planning, patient population, implementation, timeline, and budget.

Design

This quality improvement project is focused on using ERAS guidelines for patients scheduled for elective TJA, emphasizing evaluation of policy, processes, and outcomes. An evaluation of the current processes is a crucial first step in the development of a precise, reliable, and sustainable quality improvement change (Langley et al., 2009). To facilitate ongoing data collection and the development of measurable outcomes the model for improvement Plan-Do-Study-Act (PDSA) cycles will be utilized. The use of PDSA methodology is widely accepted in healthcare and provides a foundation for continuous quality improvement by testing change and analyzing outcome variations (Langley et al., 2009; Leis & Shojania, 2017). Identification of key barriers to the process will guide action plan development and execution. A pilot program will further inform the necessary process changes.

Project Setting

The setting for this project will occur in a rural, 125 bed, level III trauma designated facility. The setting for data collection will take place in two departments: the pre-anesthesia clinic (PAC) and the preoperative admission area on the day of surgery. The major stakeholders most impacted by the outcomes of this project are the patient, surgeon, nursing staff, facility, Centers for Medicare & Medicaid Services, and private

insurance carriers. While this project is applied to an inpatient setting, potential benefits also exist with application in an ambulatory setting.

<p align="center">Planning</p>

The major underpinning of ERAS guidelines is to utilize a multidisciplinary team approach to providing safe, quality patient care (Ljungqvist, Francis & Urman, 2020; MacKenzie, Cornell & Memtsoudis, 2020). Establishing a committee with representation from key departments is essential. The team should consist of a representative from each discipline to include the surgeon, physician assistant, anesthesia, clinical nurse leader (CNL), nurse navigator, registered dietician, preoperative nurse, and an informatics representative to facilitate program changes in the electronic health record (EHR). Creating a multidisciplinary team lead by a CNL will provide the foundation necessary to synthesize evidence-based information to design, implement, and evaluate patient-care processes and models of care delivery (AACN, 2013). The CNL is uniquely trained in using quality processes and improvement science to evaluate care, ensure patient safety with evidence-based changes and improve outcomes (AACN, 2013). Regularly scheduled committee meetings to foster team communication and collaboration are paramount to the success of the project. CNL leadership will be instrumental in breaking down barriers and building bridges of collaboration to ensure success for this project.

Preoperative Evaluation

Consistency in the implementation of the ERAS guidelines is imperative to positive patient outcomes (Ljungqvist, Francis & Urman, 2020; MacKenzie, Cornell &

Memtsoudis, 2020). The first step is to uniformly evaluate all patients scheduled for

elective TJA and to perform a screening for malnutrition in the PAC. To obtain valid

patient outcome data the project requires a dependable process beginning with a thorough

evaluation of individualized patient risks for surgical complications. To evaluate surgical

risk and mitigate complications, patients scheduled for elective total joint replacement

surgery will be scheduled for a preoperative evaluation in the PAC. The CNL will be

instrumental in facilitating collaboration between the physicians performing total joint

replacement surgery and the members of the anesthesia physician group managing the

PAC to implement preoperative evaluation in the PAC for all patients scheduled for

elective TJA.

Malnutrition Screening Tool

Further, the consistent use of a valid screening tool to identify patients at risk for

malnutrition is essential for this project, the screening tool selected to identify risk for

malnutrition is the peri-operative nutrition score (PONS). The Duke University PONS is

a tool to quickly identify risk of malnutrition before elective surgery. The PONS screen is

a tool deduced from the validated Malnutrition Universal Screening Tool (MUST). The

PONS tool identifies risk for malnutrition based on 4 criteria (BMI < 18.5 for patients

≤65 years old or BMI < 20 for patients older than 65 years, unintentional weight loss >

10% in last 6 months, <50% of normal oral diet intake in the last week, or a serum

albumin level < 3 g/L. (Williams et al., 2020). Each question in the PONS tool is

assigned 1 point for a "positive" response. A score of ≥ 1 signifies risk for malnutrition

and the maximum PONS score is 4 (Williams et al., 2020). Patients identified as at risk

for malnutrition on the PONS screening will be referred to the registered dietician (RD)

for nutritional counseling and optimization prior to surgery.

Preoperative Oral Carbohydrate (POC)

Patients identified to be within defined limits on the PONS tool (low risk for

malnutrition) will be directed to follow the ERAS protocol of consuming two POC

drinks. To decrease variability in product outcomes the facility will provide the patients

with two commercially prepared POC drinks. One POC will be consumed the night

before surgery and the second POC will be consumed two hours prior to admission on the

day of surgery. The nurse navigator in the pre-anesthesia clinic will provide education on

the importance of consuming the POC as directed, but patient compliance is voluntary.

Patient compliance is vital to patient outcomes and an important data point.

As part of the admission process on the day of surgery the preoperative nurse will

conduct a survey specific to compliance with consuming the POC and reported barriers.

This will be documented in the EHR. Data identifying barriers to compliance will be

important to further influence and process changes. To improve conformity a free text

area will be placed in the EHR for further documentation. Patients choosing not to

comply with the consumption of the POC will be a valued comparison group to the

patients that were compliant at the 30- and 60-day postoperative follow-up to measure for

SSI occurrence.

Patient Population

Screening for the project population will begin with all patients seen in the PAC for preoperative surgical clearance in preparation for elective total hip or knee joint replacement surgery. The inclusion group will include both male and females aged 50-70 who are identified as low risk for malnutrition using the PONS tool. It is well known that patients with the diagnosis of diabetes require specific and individualized nutritional optimization beyond the scope of this project, therefore, patients with diabetes will not be included in the data collection for this project.

Consent will be obtained by the patient allowing access to documentation in the EHR during project timeline and future contact by phone at 30- and 60-day increments to evaluate SSI occurrence. This quality improvement project is observational in design which may allow for institutional review board (IRB) exception. Collected data needs to be kept secure and private in accordance with Healthcare Information Privacy and Portability Act (HIPPA) regulations. Data to be collected will include patient demographics: name, phone number, age, sex, type and date of surgery, PONS score, compliance with POC and occurrence of SSI.

Implementation

There will need to be three mandatory educational in-services. The first in-service will be for providers and nurse navigators in the PAC. It is important to provide education on the practice and benefits of consistently utilizing the PONS tool to identify patients at risk for malnutrition as this has proven to be a high-risk indictor for the

occurrence of SSI (Ljungqvist, Francis & Urman, 2020; MacKenzie, Cornell & Memtsoudis, 2020). The PONS consists of three data points. A point is obtained on the PONS if the calculated BMI is less than 18.5 (< 20 if age 65 or older), 10% loss in weight in the last six months or reports eating less than 50% of normal diet in preceding week. Any yes answer results in a referral to a registered dietician. It is also important to accurately document the PONS score and referrals to the registered dietician in the EHR. This process is estimated to take less than 5 minutes to complete. Any patient referred to the dietician will not be included in the data collection for this project.

The second mandatory in-service will be for the nurse navigators who provide preoperative patient education. It is important to follow a consistent but individualized approach to patient education. Promoting patient participation in the opportunity to decrease their own risk of SSI by consuming the POC as directed is paramount to compliance. Additional time needed to educate the patient on the use and benefit of the POC is minimal as it is already part of the teaching materials reviewed with the patient. It is estimated to take 1-2 minutes to apply additional attention to compliance with consuming the POC and properly documenting the task in the EHR.

Lastly, there will need to be a mandatory in-service for the preoperative nurses to provide education on value and prerequisite of obtaining patient compliance survey upon admission on the day of surgery. This activity is estimated to take less than 5 minutes. There will be a need for non-clinical personnel to enter chart review data and survey data into a spreadsheet and a CNL to analyze the data and disseminate the findings.

Outcome Analysis

The first PDSA cycle will require a chart review to determine if the new components of the process were completed. This will include provider completion of the PONS, nursing documentation of patient education, and patient reported compliance with consuming the POC. The focus of the first analysis is to identify provider compliance and barriers to completing the PONS and nurse navigators' compliance and barriers to providing patient education on consumption of POC. Lastly, patient survey results will be analyzed to identify compliance and barriers to consuming the POC as directed.

Two patient groups will be formed. Group one will consist of patients undergoing elective TJA that were identified as low risk for malnutrition on the PONS and documented as consuming the POC as directed. Group two will be patients undergoing elective TJA that were identified as low risk for malnutrition on the PONS, with documented noncompliance with consumption of the POC.

The short-term analysis is to evaluate compliance with ERAS guidelines by staff and patients. The long-term analysis is to evaluate the incidence of SSI at 30-day and 60-day intervals for patients with low risk for malnutrition that consumed a POC per ERAS guidelines prior to surgery. Evaluating the data collection specific to SSI following TJA will be obtained through collaboration with the risk management department utilizing the CDC's National Healthcare Safety Network (NHSN) healthcare-associated infection tracking system. Ongoing PDSA cycles and outcome analysis will guide the development of the end goal, which is to implement a sustainable, comprehensive, evidence-based presurgical nutritional optimization program for the facility.

Project Limitations

Due to the rural aspect of the facility, resulting in a smaller volume of elective TJA and only two surgeons performing these procedures inference of outcomes may be skewed. Measuring outcomes for a longer time frame may provide a larger sample size to strengthen the validity of the outcome results.

Promoting support from the surgeons to refer all elective TJA patients to the PAC for surgical clearance may be a barrier, especially as the referral is a financial consequence to the patient. An option to this proposal is to have the PONS tool utilized in the surgeon's office upon scheduling patient for elective TJA to facilitate early identification of patients at risk and in need of preoperative nutritional optimization. Promoting cooperation from staff to mindfully participate in the process change may be a barrier at first, but dissemination of current SSI occurrence with patient consequences will increase awareness. Demonstrating the minimal time needed to complete the added tasks and the ease of utilizing the automated request to complete the PONS with automatic referral to dietician built into the EHR will also increase compliance.

Timeline

The project has three phases separated into 30-day increments. To attain an adequate sample size, the project timeline for the initial phase of this QI project will be 30 days with time extensions as needed. The first 30 days will consist of enrolling participants who meet project criteria. Data collection in the first 30 days will focus on nurse compliance with utilizing the PONS tool, and patient compliance with consuming the PCO as directed. The second and third phase of the project require a phone interview

with the patient at 30 and 60-day post-surgery to assess incidence of SSI. Due to the rural

location and smaller volume of elective TJA it is estimated that 30 days will provide a

sample size of 50 subjects to screen for enrollment in the project. While the sample size

is small limitation in validity should be considered. However, findings may contribute to

additional investigations and policy modification.

Budget

The staff time commitment to the project is expected to be minimal as the new

processes are a mere extension of the processes already in place. There will be a cost to

the facility to purchase the POC. Opportunities are available from various pharmaceutical

companies to trial product which would be a financial benefit to explore.

Summary

In summary, the purpose of this quality improvement project is to provide

consistent, value-based, quality patient care that optimizes their nutritional status and

decreases the incidence of SSI. Although this study is specific to TJA, the plan can be

executed in any elective surgical procedure for patients found to be low risk for

underlying malnutrition using the PONS screening tool and compliant with consuming

the POC. Utilizing ERAS guidelines to optimize preoperative nutrition has been shown to

be highly effective in reducing postoperative complications such as SSI and is easy to

implement. Decreasing the incidence of SSI immensely impacts patient postoperative

outcomes, quality of life, and overall healthcare cost.

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APPENDICES

APPENDIX A:

PONS tool

preoperative nutrition score (PONS) assessment tool
2017 International Anesthesia Research Society