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Fall 12-18-2020

Development and Implementation of an Orthopedic Enhanced Recovery after Surgery Protocol

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Recommended Citation

McCoy, Beth, "Development and Implementation of an Orthopedic Enhanced Recovery after Surgery Protocol" (2020). *Doctor of Nursing Practice Projects*. 130.

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Introduction of the Problem

Total knee arthroplasty (TKA) and total hip arthroplasty (THA) surgeries have increased as life expectancy rates grow and more individuals desire an active lifestyle. Enhanced recovery after surgery (ERAS) protocols have been shown to decrease the financial impact and improve patient outcomes in total joint replacement surgeries. A community hospital in Illinois did not have any established ERAS protocols. This project aimed to develop and implement an ERAS protocol for total hip and knee arthroplasty.

Literature Review

ERAS protocols, also known as fast track or rapid recovery, were initially developed in 1997 by Henrik Kehlet for colorectal surgical procedures (Gwynne-Jones, Martin, & Crane, 2017). The last twenty years have seen significant growth in the development of protocols for orthopedic surgeries and other surgical specialties. Enhanced recovery after surgery protocols are described as multimodal treatment plans designed to shorten the time to recovery after surgery by maintaining preoperative organ function and reducing the surgical stress response following surgery (Melnik, Casey, Black, & Koupparis, 2011). Effective ERAS protocols address elements from preoperative to postoperative care, with input from multiple disciplines such as surgery, nursing, nutrition, anesthesia, and physical therapy (Soffin & YaDeau, 2016).

Preoperative education in many different forms can effectively reduce preoperative anxiety and provide better patient satisfaction. McDonald, Page, Beringer, Wasiak, & Sprowson (2014) found the mean postoperative anxiety score of 264 participants who received preoperative education prior to total hip or knee replacement to be 2.28 points lower (lower score indicates less anxiety) on a 60 point scale compared to individuals who did not receive preoperative education.

There are no studies specific to orthopedic surgeries and carbohydrate loading or shortened fasting times providing sufficient data to recommend inclusion in an ERAS protocol. Ljunggren & Hahn (2012) completed a randomized control study of 60 patients and found preoperative ingestion of clear liquid or nutritional supplement had no statistically significant effect on glucose clearance, postoperative complications, or emotional wellbeing. However, the risk versus benefit of carbohydrate loading and limited fasting found in ERAS protocols for colorectal surgery and other specialties suggest nutritional management with limited fasting and carbohydrate loading could be safely be applied to ERAS protocols for joint replacement surgeries (Ljunggren & Hahn, 2012; Soffin & YaDeau, 2016).

De Oliveira, Castro-Alves, Ahmad, Kendall, & McCarthy (2013) argue that there is strong evidence to support dexamethasone 4 mg administered intravenously at the time of incision to decrease postoperative nausea and vomiting. De Oliveira et al. (2013) studied 60 randomized clinical trials with 6696 participants who received dexamethasone 4 mg and found a reduction in 24-hour postoperative nausea and vomiting compared with the control group (odds ratio 0.31) Intermediate doses of dexamethasone 0.11-0.2 milligrams per kilogram did not provide patients with a statistically significant reduction in postoperative pain and opioid consumption (De Oliveira et al., 2013).

The predominant anesthetic technique found in the literature review is an opioid-free spinal anesthetic with or without a propofol infusion for sedation (Aasvang, Luna, & Kehlet, 2014). The literature does not provide a conclusive argument on local infiltration of anesthesia or a specific combination of drugs and dosages in total hip and knee arthroplasties. Andersen & Kehlet (2014) argue that as long as multimodal oral analgesia is given, there is little evidence to support local infiltration anesthesia or placement of a catheter to infuse local anesthetics

Early mobilization leads to shorter hospital stays and decreased postoperative complications, such as pulmonary embolism and deep vein thrombosis (Stowers et al., 2014). Meta-analysis by Guerra, Singh, & Taylor (2015) shows a reduction by 1.8 days in the length of hospital stay when patients ambulate within the first 24 hours. The utilization of multimodal analgesia and avoidance of patient-controlled analgesia have been found to facilitate early mobilization (Scott et al., 2012). The goals of adductor canal blocks are to preserve quadricep muscle strength and maintain early mobilization in the forty-eight hours post-surgery (Grevstad, Mathiesen, Lind, & Dahl, 2014; Jaeger et al., 2013; Perlas et al., 2013). Zhang et al. (2019) describe significantly greater quadricep muscle strength with adductor canal block compared with femoral nerve block at 4 ($p < .04$) and 48 hours ($p = 0.001$) postoperatively.

Developing and educating key stakeholders regarding the implementation of an ERAS protocol for total joint replacement surgery has been shown to improve patient satisfaction, decrease complications, reduce costs, and shorten the length of hospital stays (Paton et al., 2014; Wainwright et al., 2019). Total hip and knee replacement surgeries utilizing ERAS protocols have been shown to reduce the length of hospital stays from 4-10 days to 1-3 days, and 15% of patients can have their procedure completed as an outpatient (Aasvang et al., 2015).

Project Methods

The goal of this quality improvement project was to develop and implement an ERAS protocol for total knee and hip arthroplasty. A multidisciplinary team consisting of nurses, anesthesia, surgeons, dietary, and physical therapy met to develop appropriate components to be included in an ERAS protocol. Key components identified include patient and family education, opioid sparing multimodal analgesia, nausea and vomiting prophylaxis, limited fasting, optional 50 gm carbohydrate beverage up to two hours preoperatively, and early mobilization

postoperatively. The target population for the protocol were individuals 18 years and older at a community hospital in central Illinois. After the successful implementation of this quality improvement project, practitioners understand and feel comfortable utilizing an orthopedic ERAS protocol. Project implementation took place at a 250-bed hospital in Illinois. This project was declared exempt from the Institutional Review Board at Southern Illinois University at Edwardsville, due to its non-experimental nature, quality improvement design, and lack of any patient information being obtained.

In order to implement a change in practice to an ERAS protocol, Lewin's change model was used as the conceptual framework. In July of 2020 a pretest was given to surgeons, anesthesia staff, and preoperative and postoperative nursing staff to evaluate their current knowledge of ERAS protocols. The eleven-question pre-test included four demographic and seven knowledge questions in the form of multiple choice and true/false. After the pretest was given, an educational PowerPoint presentation highlighting the goals, key elements, and benefits of an ERAS protocol was presented to staff. After a month's utilization of the ERAS protocol, a post-test was given to evaluate the effectiveness of the PowerPoint presentation. The post-test followed the same form as the pre-test. Post test questions also assessed the understanding and willingness of staff to support an ERAS protocol, along with demographic questions that will serve to draw correlations between the pre/post education.

Evaluation

The pre-test survey identified that 47.1 % of the respondents had prior ERAS education. Prior to the ERAS education, all but one respondent felt that the implementation of an ERAS protocol would be beneficial. One hundred percent of the respondents felt that the PowerPoint education was beneficial, and the ERAS protocol was easy to use. After the PowerPoint

education, all respondents correctly identified common medications utilized in multimodal analgesia, and the components and goals of an ERAS protocol.

Impact on Practice

Implementing and sustaining an ERAS protocol requires the collaboration of many departments and personnel. Nutrition staff assisted in obtaining the pre-surgical drink which allowed patients to carbohydrate load two hours prior to surgery. Physical therapy staff provided day of surgery therapy allowing earlier mobilization and earlier discharge from the hospital. Standardized protocols provide nursing staff with clear guidelines and improved efficiency. During the implementation of this ERAS protocol, multidisciplinary collaborative groups were developed to audit and evaluate the effectiveness of the ERAS protocol. Well executed ERAS protocols involve multiple disciplines working together, which has been shown to decrease opioid consumption, decrease complications, decrease the length of hospital stay, and decrease the financial impact to healthcare systems, and improve patient satisfaction (Aasvang, Luna, Kehlet, 2015; Auyong et al., 2015; Garson et al., 2014; Wainwright et al., 2019; Yanik et al., 2018). During follow up discussions with orthopedic surgeons, all stated that on post-operative visits with patients they perceived that patients experienced better pain control, increased satisfaction with reduced fasting times pre-operatively, reduced hospital stays, and earlier mobilization since the implementation of ERAS protocols.

Limitations

The data results were based on a limited sample size of 34 participants. A larger sample size may have offered more representative results. The PowerPoint presentation was offered one time to each

department, and a more representative sample size may have been obtained if multiple presentations had been offered.

Conclusion

This quality improvement met the primary goal of creating a standardized ERAS protocol for orthopedic surgery. After completing the education and implementation of the ERAS protocol, healthcare providers could describe different aspects of the protocol, understand the significance of the ERAS theory, and feel confident utilizing the protocol. This project can be sustained by continued use of the educational PowerPoint to educate new staff regarding the key components, benefits, and goals of an ERAS protocol. Reports have been set up to track metrics regarding outcomes such as length of hospital stay and complications. Order sets have been established within EPIC to provide easier use of the established ERAS protocol.

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