Breaking the Fast: A Nutritional Intervention to Enhance Surgical Outcome

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THE AMERICAN HEALTH CARE SYSTEM is rapidly transforming to enhance patient care delivery, requiring innovation and change throughout health care organizations. Transformation requires collaboration among a multidisciplinary team to translate evidence-based interventions into practice. Enhanced Recovery after Surgery (ERAS) is a health care innovation that provides state-of-the-art interventions with an overarching goal of improving surgical patient outcomes. ERAS literature challenges traditional "nothing by mouth after midnight" strategies and supports routine preoperative and postoperative nutritional enhancement. Preoperative administration of a complex carbohydrate-rich drink has been shown to decrease hunger, thirst, postoperative nausea and vomiting associated with fasting, and metabolic stress on the body associated with starvation in postoperative patients. Providing patients a complex carbohydrate enhancement both preoperatively and postoperatively has improved patient outcomes and decreased overall costs in the surgical population.[1]

Purpose

The purpose of this evidence-based project (EBP) was to update practices pertaining to nothing by mouth status and provide surgical patients enhanced nutritional supplementation. The previous policy stated that all patients should follow nothing by mouth after midnight, meaning no fluids or solids could be consumed after this time. Within the perioperative area of nursing in our organization, there was an opportunity to evaluate the efficiency and quality of care for the surgical patient population. This project was developed to (1) implement elements of ERAS and update nothing by mouth practices and (2) improve our patient outcomes.

Process and Team

The Iowa model of EBP[2] was used as the framework for this project. ERAS, being a multimodal multidisciplinary team strategy, required the development of stakeholders with a vested interest in working toward change. This change required updates to an outdated policy and provisions to improve surgical patient outcomes. The team was led by a staff nurse, dietician, and a Clinical Nurse Specialist. Other key stakeholders and team members were the Director of Anesthesia, two orthopaedic surgeons, two general surgeons, nursing staff (office, inpatient, and outpatient), dieticians, pharmacy, and total hip and knee arthroplasty patients and hemicolectomy and total colectomy patients.

Synthesis of Evidence

A literature review was completed, focusing on the elements of ERAS with an emphasis on carbohydrate enhancement. ERAS protocols have shown improved patient outcomes and decreased length of hospital stay, resulting in decreased costs.[3] Traditionally, patients have been following nothing by mouth after midnight as a part of standing presurgical orders. The extent of nothing by mouth status continues perioperatively and postoperatively, influencing nutritional status and postoperative outcomes. It is known that extended periods of fasting before surgery and poor nutrition are associated with negative postoperative outcomes.[4,5] Preoperative fasting depletes glycogen stores and

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increases metabolic stress, hyperglycemia, and insulin resistance.[3,5] During surgery there is a release of stress hormones and inflammatory markers, which decreases the action of insulin by approximately 50%.[6] With insulin resistance, the uptake of glucose is decreased and the breakdown of glucose is increased, resulting in hyperglycemia. The metabolic and endocrine response to surgical stress creates a catabolic state; however, glycogen stores are quickly used, which causes skeletal muscle to be a source for hepatic gluconeogenesis.[5] Insulin resistance is associated with reduced muscle function, prolonged fatigue, greater inflammatory response, increased complications, poor wound healing, longer length of stay (LOS), and higher morbidity and mortality rates.[3,6]

The rationale for preoperative carbohydrate loading is to reduce the impact of surgical stress and diminish the effects of postoperative catabolism.[5,7] This results in increased insulin sensitivity and decreased insulin resistance, which enhances the uptake of carbohydrate and glycogen stores to supply gluconeogenic substrates during surgery and preserves lean body mass.[6,8,9]

The National and European Anesthesia Society recommendations for preoperative fasting allow patients clear fluids up to 2 hours and solids up to 6 hours before anesthesia.[10,11] Recommendations for carbohydrate treatment include preoperative oral carbohydrate treatment of a clear liquid fluid containing a high concentration of complex carbohydrate 2 to 3 hours before anesthesia; specifically, 400 mL of a 12.5% drink mainly of maltodextrin as a preoperative drink.[11] ERAS recommends the patient should consume 800 mL of a 12.5% carbohydrate beverage the night before surgery, followed by a 400 mL of the same carbohydrate drink the following morning, 2 to 3 hours before surgery.[5] The 50 g carbohydrate produces an insulin release that is similar to what is seen after a mixed meal is consumed.[6] The ERAS Society recommendations state that the diabetic patient can receive carbohydrate treatment given along with diabetic medication.[11]

Practice Change

Before the EBP changes, surgical patients were instructed to follow nothing by mouth after midnight the night before the scheduled surgery. This meant that the patient could not ingest anything after midnight except a sip of water with instructed medications. Instructions were received from the outpatient nurse the night before the scheduled surgery. All surgeries would be canceled by the anesthesiologist if these instructions were not followed.

The ERAS Society guidelines of allowing carbohydrate-enhancing supplementation before surgery were adopted by our surgeons and anesthesia team. The team chose the product ClearFast, a 355 mL bottle of 50 g carbohydrate that provides 14% carbohydrate per milliliter of mainly maltodextrins used as complex carbohydrate. This product met the criteria found within our evidence and was acceptable for our patients to consume as they found the taste of the product pleasant. The EBP protocol stated, "Clearfast would be administered to all planned total hip and total knee arthroplasty and hemicolectomy and total colectomy patients. 400 mL of Clearfast would be given at 8 p.m. the night before surgery and three hours before the scheduled surgical time. Two bottles of Clearfast would also be given in the immediate postop phase." All patients were instructed to bring in the two caps from their preoperative Clearfast bottles as a process measure to monitor patient compliance. Queries were added to nursing documentation to hardwire documentation for data collection.

Implementation Strategies

The implementation of incorporating carbohydrate enhancement and updating practice required both systematic workflow changes and an educational strategy for dissemination into practice. A key strength of implementing this EBP process was involving key stakeholders such as bedside clinicians, nurses, patients, and organizational leaders. Nursing Shared Governance teams were involved in practice and policy changes to ensure integration and sustainability of the carbohydrate enhancement element of ERAS. Engaging the Department Head of Anesthesiology in this EBP process was also an integral component in the success of the practice and policy change.

Creating awareness and communicating the importance of carbohydrate enhancement and implementation of this process was accomplished

through educational presentations to providers, nurses, preanesthesia surgical services staff, and patients. Resource and educational materials were developed to disseminate information to nursing staff and patients. The team determined that the patient would receive the carbohydrate enhancement drink on the day of their preoperative visit. To monitor compliance the patients were instructed to bring in the two caps of the carbohydrate enhancement drink on arrival the day of surgery. Order sets were developed and integrated into the electronic medication record to ensure that the patient received their carbohydrate enhancement drinks preoperatively. Finally, queries were added to electronic nursing documentation to hardwire a pathway for data collection. Postimplementation data were analyzed and the results were shared with the key stakeholders to ensure that the "nothing by mouth" policy change and implementation of carbohydrate enhancement provided the patient with a positive outcome.

Evaluation

Effectiveness of the nutritional intervention was determined by analyzing postimplementation data collected for patients undergoing colon, hip, and knee surgeries during the months of April, May, and June of 2017. In an attempt to limit variability of the sample, only planned surgeries were included. Outcomes for patients who received the nutritional intervention of carbohydrate enhancement were compared with those who did not. Time spent in the recovery room, average length of stay (ALOS), comparison to geometric mean length of stay (GMLOS), and cost were analyzed according to the surgery type because of unique characteristics specific to the patient population and procedure being performed that might be impactful. Additional data were collected but analyzed differently. These data included nausea and vomiting, blood sugars, and infections. Comparison groups were for patients receiving nutritional supplement and those not receiving supplement. Because of the small sample size, analysis was not performed comparing groups by surgical procedure (ie, knee, hip, colon). During the postimplementation data collection timeframe, there were 47 planned surgeries that met inclusion criteria for colon, hip, or knee surgery. The nutritional intervention of carbohydrate enhancement was delivered to 4 of 6 colon, 11 of 16 hip, and 22 of 25 knee surgery patients. In all surgery types, time spent in the recovery room was less for patients who received the carbohydrate-enhancing supplement. Average time spent in the recovery room was 8 minutes less for colon surgery patients who received the nutritional intervention, 11 minutes less for hip, and 6 minutes less for knee.

Inpatient ALOS was also less for patients who received the carbohydrate-enhancing supplement. ALOS was 4.75 days shorter for the colon and 1 day shorter for the hip surgery patients who received the intervention. Knee surgery patients had an ALOS of 2 days without nutritional supplementation versus 1.95 days. Both hip and colon surgeries that received the nutritional intervention of carbohydrate enhancement had a higher percentage of patients with LOS less than the GMLOS. A full 64% of hip surgery patients who received the nutritional intervention were under the GMLOS compared with 40% of those who did not. Seventy-five percent of colon surgery patients who received the nutritional intervention were under the GMLOS compared with 50% who did not. Furthermore, all surgery types included in the sample who received the nutritional intervention had a higher percentage of patients (82%) with an LOS less than the GMLOS. Only 56% of the patients who did not receive the nutritional intervention had an LOS less than the GMLOS.

Overall costs were reduced for the colon and hip surgical patients who received the nutritional intervention of carbohydrate enhancement. For colon surgeries, the financial impact was more significant with a reduction of $9,638. For hips, the cost savings was equivalent to $1,533. There were six diabetic patients included in the sample. Four who received the carbohydrate enhancement had an average preoperative glucose of 157 and average postoperative glucose of 181 compared with 167 and 231, respectively, for the 2 diabetic patients who did not. There was one surgical site infection in the sample, and it occurred in a patient who did not receive the nutritional intervention.

In addition to the reductions in recovery room time, LOS, and overall costs, patients who received the nutritional intervention were very complimentary of the carbohydrate supplement. They

verbalized appreciation of being able to drink up until 3 hours before their scheduled surgical time and enjoyed the taste of the supplement.

Implications for Practice

Enhanced nutritional supplementation is an important ERAS strategy used to improve patient care outcomes and the experience of the surgical patient population. In addition to the reductions in recovery room time, LOS, and overall costs, patients who received the nutritional intervention were very complimentary of the carbohydrate supplement. There were limitations, inclusive of a small sample size and multiple ERAS strategies being implemented close to the same time, which made it difficult to determine one benefit over another. The timeframe of data collection and manual data collection added to the limitations. In addition, we experienced practical questions regarding some patients with diabetes. During the time of our literature review, the guidelines for the preoperative carbohydrate loading included patient with diabetes. The ERAS Society recommendations state that diabetic patient can receive carbohydrate treatment given along with diabetic medication.[11] Since our project's implementation, literature review implications for practice have been published, which state that there are hypothetical risks to carbohydrate loading drink in individuals with diabetes and no robust evidence to support specific recommendations for this population. Clinical judgment is required on an individual basis.[12] Research is needed to further clarify use of preoperative carbohydrate loading for patients with diabetes.

Conclusions

Transforming health care through the implementation of carbohydrate enhancement in the surgical patient population has proven to be an important strategy in improving the patient's experience, quality of care, and reduction in overall costs. Patients have been complementary of the nutritional supplement and ability to drink clear liquids up to 3 hours preoperatively. Implementing ERAS protocols within the perioperative phase provides an opportunity of success for patients and the perioperative team. Through this EBP we have been able to extend carbohydrate enhancement to include a larger population of surgical patients. The results of incorporating carbohydrate enhancement into our practice have transformed an outdated policy into a successful practice resulting in improved surgical patient outcomes.

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