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Educating Preoperative Staff on Operative Glycemic Control Guideline

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This is to certify that the doctoral study by

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has been found to be complete and satisfactory in all respects,
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Walden University
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Abstract

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MS, Walden University, 2015

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Project Submitted in Partial Fulfillment

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Abstract

Glycemic control of the perioperative patient improves patient outcomes, specifically prevention of surgical-site infections. The prevention of surgical-site infections helps to reduce complications that can increase length of stay and readmissions, thereby increasing healthcare costs. The purpose of this project was to provide an educational module to the same-day surgery nurses on a clinical guideline to maintain glycemic control of the perioperative patient to prevent surgical-site infections. Lewin's change theory guided the development of a clinical practice guideline (CPG) for nurses to standardize the glycemic management of the perioperative patient. This project was conducted to determine whether educating nurses through the implementation of the CPG would help to ensure glycemic control of the perioperative patient. Twenty-nine nurses were educated and tested on the CPG for glycemic management of the perioperative patient; pretest and posttest results were recorded and data were analyzed. Posttest results showed an increase in test scores. Results indicated that nurses' knowledge about glycemic control and understanding of the importance of glycemic management of the perioperative patient increased. These findings can bring positive social change by helping to improve patient outcomes and cost savings through the prevention of surgical-site infections.

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Dedication

The DNP project is dedicated to my husband and three daughters who supported me through this journey. Without their understanding and support, I would not have been successful.

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I would like to acknowledge Dr. Karen Vadyak and Dr. Joanne Minnick who guided and mentored me through the project

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Section 1: Nature of the Project

Introduction

Glycemic control can be associated with better outcomes for the surgical patient. Patients who maintain glycemic control have a reduced rate of in-hospital mortality and infection rates (Kwon et al., 2013). At the community hospital study site, glycemic control has been successfully maintained in the cardiac surgery patient; however, the glycemic control of general surgical patients, regardless of diabetic history, has not been maintained. To ensure positive outcomes for the diabetic and nondiabetic surgical patient, glycemic control should be maintained. Furthermore, to adhere to the American Diabetes Association (ADA; 2016) guidelines for glycemic control for all surgical patients, glycemic control must be maintained. The World Health Organization (WHO; 2016) also recommends glycemic control of the surgical patient to prevent surgical site infections (Allegranzi et al., 2016). Lastly, one of the 2017 National Patient Safety Goals (NPSG) includes using guidelines to reduce surgical infections (Joint Commission of Hospitals [JCAHO]a, 2017). The JCAHO's (2017) NPSG goal for glycemic control is 180mg/dl. When reviewing the blood sugar levels of preoperative and postoperative total joint replacement (TJR) patients, the director of nursing at the study site reported that a consistent number of patients were not being treated for their hyperglycemia. According to the director of the lab at the study site, blood glucose levels ranged from 61mg/dl to 408 mg/dl in the same day surgery (SDS) unit.

Since glycemic control can reduce surgical site infections (SSIs), blood sugars need to be managed in the pre-, peri-, and postoperative periods for all surgical patients

regardless of diabetic history (Al-Niaimi et al., 2015). When blood sugars have been managed with sliding scales of insulin, even if only 20 hours after surgery, SSIs have decreased by 35% (Wukich, Crim, Frykberg, & Rosario, 2014). Patients who have a hemoglobin A1C (HGA1C) of > 8% have a significant increase of surgical site infection (Wukich, Crim, Frykberg, & Rosario, 2014). Diabetics have at a minimum HGA1C level of > 6.5% (ADA, 2016); therefore, the diabetic patient is at higher risk for SSIs due to their HGA1C levels. Unfortunately, there are 7.2 million Americans that are undiagnosed with diabetes (Center of Disease Control and Prevention (CDC), 2017). These patients would benefit from glycemic control in the perioperative period.

SSIs have serious implications and can burden the healthcare system with increased hospital costs; reduced reimbursement; increased length of stay (LOS); and can be attributed to poor patient outcomes, contributing to an increase in morbidities and mortalities (CITE). Glycemic control is one intervention that can help reduce SSIs. Previous research has shown that cardiac surgery patients already have benefitted from tight glycemic control (Gelijins et al., 2014). However, the general surgical patient has not been routinely managed for glycemic control.

This DNP scholarly project centered on glycemic control of the diabetic and nondiabetic surgical patient to determine whether the glycemic control would reduce SSIs. The literature does support that glycemic control would help reduce SSIs; however, routine glycemic management had not been delivered to all total joint replacement patients. Education on the new CPG will ensure that these patients will benefit from glycemic management.

Problem Statement

Uncontrolled glycemic management can be a risk factor for SSIs in surgical patients. Though routine blood sugars are tested on known diabetics preoperatively, these blood sugars may or may not be treated. According to the lab director at the study site, from August 1, 2017 through September 30, 2017, 392 patients in the SDS unit had their blood glucose level obtained. Of these 392 samples, the blood sugar levels of 58 patients, or 15%, were greater than 180mg/dl. Furthermore, the lab director indicated that there was inconsistent documentation of those patients that had high blood glucose values in regards to the notification of a licensed healthcare professional. In response to the uncontrolled blood sugars in the perioperative setting, the Glycemic Management Committee created a policy that outlines glycemic control of the perioperative patient. The policy was adopted at the study site on October 10, 2017. The nurses in the perioperative setting needed education to implement this policy appropriately.

Purpose Statement

The purpose of this project was to provide an educational module to the SDS nurses on the new clinical guideline to maintain glycemic control of the perioperative patient to prevent SSIs. Prevention of SSIs improves patient outcomes and reduces hospital costs, while glycemic control is an intervention to prevent SSIs (Kwon et al., 2013). Offering glycemic control to perioperative patients may lead to fewer SSIs, and therefore, better patient outcomes. In this project, I defined glycemic control as a blood sugar level of < 180mg/dl (see Kremers et al., 2015). Once a patient's blood sugar is

greater than 180mg/dl, a low dose insulin sliding scale protocol will be initiated as per the perioperative glycemic control policy.

Nature of Doctoral Project

For this DNP project, I reviewed the blood sugar results of the preoperative patients to identify whether any of those patients would have benefitted from glycemic control as determined by the clinical guideline. The SDS nurses were provided with an educational module that identifies the importance of glycemic control of the perioperative patient and the nursing interventions that are appropriate for the management of glycemic control based on the recommendations of the clinical guideline. I gave them a pretest to assess their baseline knowledge of SSI prevention and glycemic control, and then a posttest afterwards to evaluate their progression in knowledge of the clinical practice guideline (CPG) and current guidelines for management of glycemic control in the perioperative stage.

Significance to Practice

Uncontrolled blood sugar is a contributing factor to SSIs (Poggio, 2013). In 2013, SSIs were the second most common hospital-acquired infection (Poggio, 2013). Unfortunately, a mere year later, SSIs were the most common hospital-acquired infection with 2%–4% of surgical patients developing a SSI (Anderson et al., 2014). SSIs lead to increased mortality, morbidity, and healthcare costs (Anderson et al., 2014). SSIs can increase LOS an additional 7–11 days and can increase costs to $3.5–$10 billion annually (Anderson et al., 2014). The Surgical Care Improvement Program (SCIP) made a recommendation to prevent SSIs, which can prevent SSIs by 60% (Anderson et al.,

2014); however, they only recommended glycemic control for the cardiac surgery patient (JCAHOa, 2017). Glycemic control of all surgical patients may help reduce the risk for SSIs.

Summary

Cardiac surgery patients have been benefiting for glycemic control since 2010 (CITE). Researchers have suggested that all surgical patients may benefit from glycemic control in the prevention of SSIs, which lead to poor patient outcomes and increased healthcare costs (CITE). Glycemic control of the total joint replacement patient can help prevent SSIs, and therefore, improve patient outcomes, optimize reimbursements, and reduce healthcare costs.

A new CPG was established in the facility under study to improve and ensure that perioperative patients benefit from glycemic management. The new CPG was established to ensure continuity with glycemic management of the perioperative patient. A staff educational module needed to be offered to the perioperative nursing staff to implement the new CPG. This new CPG was a change in practice for the nursing staff to improve patient outcomes and quality of care. In Section 2, I will discuss the relevant model of and local background for the project, including the relevance to nursing practice and my role in this project.

Section 2: Background and Context

Introduction

A new CPG was established in this DNP project setting to help reduce SSIs in the perioperative period by establishing glycemic control. The new CPG was a change in practice for the SDS staff and was made to follow recommendations to control blood glucose levels in the perioperative setting to help prevent SSIs. By using Lewin's change theory, I created a staff educational module that supported this change in practice. SSIs have a multitude of complications associated with them and can increase LOS and costs to a facility (CITE). In this project, I created a staff educational module to answer the following practice-focused question: Will educating nurses about the significance of glycemic control of the perioperative patient help to ensure that this type of control is maintained through taking the appropriate actions of obtaining blood sugar specimens and notifying a licensed professional with the results? In the educational module I created, I ensured that the new CPG was implemented correctly to standardize the glycemic management of perioperative patients.

In Section 1, I discussed the practice problem, the purpose and nature of my project, and its significance to nursing practice. In Section 2, I will describe the model, local background, relevance to nursing, and my role in this project. Section 2 will describe the need for a change in practice through the education of the new CPG to ensure the perioperative patient benefits from glycemic control.

Model

I used Lewin's change theory as an appropriate model to guide this project. This theory has three stages: unfreezing, change, and refreezing (Petrprin, 2016). To follow the new CPG, nurses will need to replace old thinking with new concepts, specifically nurses will need to replace the practice of not consistently obtaining or reporting blood glucose levels. By unfreezing and changing the nurse's current knowledge and practice about perioperative glycemic control, use of the new CPG will attain improved patient outcomes.

Relevance to Nursing Practice

The reduction and prevention of SSIs will lead to better patient outcomes, thereby reducing healthcare costs. With reimbursement hinging on healthcare systems outcomes, SSI can lead to the overburdening of a system (Anderson et al., 2014). The Center for Medicare and Medicaid Services (CMS) will deny reimbursement to hospitals for SSIs so all interventions are necessary to prevent such infections (Anderson et al., 2014). Optimizing patient outcomes is one way to ensure success as a healthcare system. Furthermore, one 2017 NPSG is the reduction in SSI (JCAHO, 2017). SSIs have a significant impact on our healthcare system, so preventive interventions need to be instituted to address this issue. SSIs lead to poorer outcomes including an increased risk of mortality and an increase in lengths of stay by an additional 7-11 days (Anderson et al., 2014). An additional $3.5-$10 billion is spend annually for the treatment of SSIs (Anderson et al., 2014). This project will educate the nurses about the new CPG that outlines glycemic control of the perioperative to help prevent SSIs.

Local Background

Before this DNP project, the community hospital study site did not have a process in place for the glycemic control of the perioperative patient. At the time of the project, blood sugar levels may have been obtained by the SDS nurses; however, the results were not always treated or communicated to the doctor. From a retrospective review, the lab director indicated that 15% of the patients in SDS had blood glucose levels above 180mg/dl with incongruent documentation in regards to how these results were handled by the SDS nurse.

Role of the DNP Student

My role as the DNP student in this project was to develop an educational module using a CPG based on evidence-based practice (EBP) to educate the SDS nurses about the glycemic management of the perioperative. The clinical guidelines included the following:

- Scope:
  - All surgical patients are over the age of 18 years old.
  - Exception: Preadmission test with a blood glucose result of 70–105mg/dl.
- Inclusion procedures:
  - Joint replacement surgery,
  - Cardiothoracic surgery,
  - Abdominal surgery,
  - Vascular surgery, and
  - Patents with evidence of an infection.

- Procedure:
    - Obtain blood glucose level upon admission in SDS via a finger stick glucometer reading.
    - If blood glucose level > 180mg/dl, a consult to the hospitalist is obtained to receive glycemic management orders.
    - When patient is admitted to the post-anesthesia care unit, a finger stick blood sugar specimen will be obtained to further management and evaluation to maintain normoglycemia.

An educational, EBP-based module can give guidance to the nurse on the value of the glycemic management of the perioperative patient that will help prevent SSIs. I also delegated the role of resource to the SDS nurses to the director of perioperative services to help ensure that glycemic management is maintained. The director of perioperative services could also then educate the staff.

Summary

I provided an educational module to the staff at the community hospital study site to ensure that the new CPG was implemented safely as well as to answer the practice-focused question. The literature supported that glycemic management of the perioperative patient helps reduce SSIs (CITE). At the time of the project, this was not being accomplished at the community hospital study site. This project helped to ensure that glycemic management was established in the SDS setting through the appropriate education on the new CPG.

In Section 3, I will outline the literature that supports glycemic management of the perioperative patient to prevent SSIs necessary to create the educational module curriculum as well as the methods used for project design. I will also discuss the pre-/posttest design, data collection, analysis, and evaluation. Through a comparison of the pre-test and posttest scores, I evaluated the effectiveness of my education to support the nurses' implementation of the new CPG

Section 3: Collection and Analysis of Evidence

Introduction

For this DNP project, I offered educational classes to the SDS nurses and staff about glycemic management of the perioperative patient based on the new CPG in June 2018. I offered four classes within the month to accommodate all the staff. The SCIP (2002) project made recommendations to help prevent SSIs, with one being the tight glycemic control of the cardiac surgical patient, regardless of diabetic history. However, research has been conducted and published that supports glycemic control for all surgical patients. Furthermore, the literature suggests that hyperglycemia can lead to an increase in SSIs for the surgical patient (Kremers et al., 2015). To assess the SDS nurses' baseline knowledge on the glycemic management of the operative patent, I distributed a pretest to them(see Appendix A). Upon completion of the educational module, the SDS nurses were given a posttest to determine their knowledge of the new CPG (see Appendix C).

Practice-Focused Questions

Question 1: Will educating nurses about the significance glycemic control of the perioperative patient help to ensure that glycemic control is maintained in the perioperative patient through the appropriate obtaining of blood sugar specimens and notification to the licensed professional of results?

Question 2: Will posttest scores increase when compared to pre-test sores after education is provided about the new CPG?

Sources of Evidence

To locate sources for this literature review, I completed a Boolean search in PubMed and Cochrane databases using combinations of the following keywords: *surgical patient, surgical site infections, peri-operative period, blood glucose, glycemic control, diabetes, insulin, orthopedic surgical patient,* and *total joint replacement surgical patient*. My inclusion criteria for this literature review included articles published by peer-reviewed journals between 2013 and2018. Through this literature review, I found 25 articles that were related to glycemic management in the perioperative setting, and 13 of those articles were used to support this project.

When reviewing the literature, I found numerous articles that supported and/or recommended glycemic control of the cardiac surgical patient. Glycemic control has been associated with a decrease in SSIs in this patient population (Schneider et al., 2017)Using the results of IHI's project JOINTS (2017) study, practitioners have begun to evaluate whether the glycemic control of general surgical patients would be beneficial as well in preventing SSIs.

Allegranzi et al. (2016) published an article recommending interventions based upon evidence-based and expert consensus as national guidelines to prevent SSIs developed by the WHO. In the review, sixteen recommendations from WHO pertain to the intraoperative and post-operative periods (Appendix D). Included in these recommendation is glycemic control of both the diabetic and nondiabetic perioperative patient.

The CDC (2017) published recommended guidelines for the prevention of SSIs. These recommendations were based on a systematic review. Their core recommendation in relation to glycemic control was that perioperative glycemic control should be implemented so that blood glucose levels are less than 200mg/dl (Berrios-Torres et al., 2017).

When reviewing the recommendation to maintain glycemic control of the surgical patient, Berrios-Torres , Umscheid, Bratzler, Leas, Stone, Kelz, & Schecter (2017)were only able to give this core recommendation from the CDC a conditional recommendation. The research used to make this recommendation was not clear as to what the target glucose level should be and whether tight versus conventional glycemic control is appropriate (Berrios-Torres et al., 2017).The results of Berrios-Torres et al. (2017) literature review confirmed that glycemic control does decrease SSIs; however, defining glycemic control has not been established.

Anderson et al. (2014) published a revised recommendation to the 2008 "Strategies to Prevent Surgical Site Infections in Acute Care Hospitals" based on the expert guidance of the Society of Healthcare Epidemiology of America, the Infectious Disease Society of America, the American Hospital Association, the Association for Professionals in Infection Control and Epidemiology, and the JCAHO. Anderson et al.'s recommendations:

- Control blood glucose during the immediate postoperative period for cardiac surgery patients (i.e., Quality of Evidence I) and non-cardiac surgery patients (i.e., Quality of Evidence II).

- Perform surveillance for SSI.
- Increase the efficiency of surveillance through utilization of automated data.
- Provide ongoing feedback of SSI rates to surgical and perioperative personnel and leadership.

Glycemic control of the non-cardiac surgical patient was given a Quality of Evidence II ranking (Anderson et al., 2014). This was based on the grades of recommendations, assessment, development, and evaluation and the Canadian task force on preventive healthcare (Anderson et al., 2014). The true effect of a moderate quality of evidence is likely to be close to the estimated size and direction of the effect, but there is a possibility that it is substantially different (Anderson et al., 2014). . "Evidence is rated as moderate quality when there are only a few studies, and some have limitations but not major flaws, there is some variation between studies, or the confidence interval of the summary estimate is wide" (Anderson et al., 2014, p. 607). In this recommendation, glycemic control is determined by a blood glucose level of 180mg/dl or lower (Anderson et al., 2014). Intensive glycemic control postoperative was not recommended because that was not associated with a reduction in SSIs, and there is a higher risk for adverse events such as stroke and death (CITE).

To evaluate Andersons's recommendations, Prada, Ortega, Marino, Herrero, & Gracia (2017) implemented them when working with vascular surgery patients. In the prospective observational study, the researchers used six of Anderson's recommendations including postoperative glycemic control (Prada et al., 2017). For the 192 patients in the study, the rate of SSI was reduced from 4.9% to 0% in clean surgeries and 33.3% to

13.9% in contaminated surgeries (Prada et al., 2017). Lastly, the LOS for the clean surgical patient was reduced form 22.37 days to 13.7 days (Prada et al., 2017).

In a meta-analysis by de Vries, . Gans, Solomkin, Allegranzi, Egger, Dellinger, & Boermeester (2016), glycemic control was determined by a blood glucose level of less than 150mg/dl. When evaluating the 15 random-control trials used in this study, de Vries at al. found that intensive glucose control protocols reduced SSIs more than conventional glucose control protocols. Though there were more incidents of hypoglycemia, there were fewer reports of adverse events (De Vries et al., 2016).

Kwon et al. (2013) conducted a study using Washington State's quality improvement benchmarking-based initiative for Surgical Care and Outcomes Assessment program. This study included 11,633 patients that were hyperglycemic whose blood sugar levels were tested the day of surgery, postop Day 1, and postop Day 2 (Kwon et al., 2013). Hyperglycemia was defined as a blood glucose greater than 180mg/dl (Kwon et al., 2013). When reviewing outcomes for these patients, the researchers found that the uncontrolled blood sugar resulted in increased infections, preoperative interventions, and death. Patients who received insulin on the day of surgery had no significant increase in infections, preoperative interventions, or death (Kwon et al., 2013). The conclusion from this study was that glycemic control of all surgical patients' results in less adverse outcomes (Kwon et al., 2013).

Kremers et al. (2015) used a retrospective cohort study of 153 VHA centers nationwide over a 10-year time frame to evaluate whether patients who underwent total knee or total hip arthroplasty with diabetes were more likely to developed prosthetic joint

infection (PJI) if their glucose was not controlled compared to those who were controlled. When patients' glucose levels preoperatively were greater than 194mg/dl, there was an increase in PJI as well as death (Kremers et al., 2015). This was similarly found in patients with hyperglycemia postoperatively (Kremers et al., 2015). One limitation of Kremers et al.'s study that was identified was poor perioperative surveillance. Their cohort mostly included males that had comorbidities. Lastly, the International Clarification of Diseases (ICD)-9 coding procedures were used to select patients, so the results may or may not be inclusive of all patients (Kremers et al., 2015). Though this study did not identify that HGA1Cs are helpful in the prediction of patients at risk for SSIs, preoperative hyperglycemia does increase risk for PJI (Kremers et al., 2015).

Wurkich et al. (2014) also reported higher incidents of SSIs in uncontrolled diabetic patients undergoing foot and ankle surgery. In their prospective study, the frequency of SSIs was determined by comparing patients who undergoing foot and ankle surgery who had diabetes and those without. The patients were broken up into four groups: Group 1 included nondiabetic patients without neuropathy, Group 2 were nondiabetics with neuropathy, Group 3 were diabetics without complications, and Group 4 was diabetics with at least one complication (CITE). The researchers concluded that diabetics with complications had an increased risk of SSIs and that patients with neuropathy also had an increased risk of SSIs as compared to those without.

Lastly, glycemic control has been studied in specific surgical procedures such as gynecological surgeries. Al-Niaimi et al. (2015) identified that gynecological oncology patients were at risk for SSIs especially those with diabetes. In a retrospective study, 327

patients were categorized into three groups whose blood sugar levels were over 139mL/dL preoperatively (Al-Niaimi et al., 2015). Group 1 consisted of diabetic patients with controlled blood sugars using a sliding scale subcutaneous coverage, Group 2 consisted of patients whose blood sugars were controlled using an insulin infusion, while Group 3 consisted of patients that had no history of diabetes or hyperglycemia (Al-Niaimi et al., 2015). The results concluded that the patients in Groups 2 and 3 had very similar rates of SSIs, 19% and 21% respectively; however, the patients in Group 2 had an SSI rate of 29% (Al-Niaimi et al., 2015). Tight glycemic control in patients with diabetes or hyperglycemia will minimize SSIs for the gynecological oncology surgical patient (Al-Niaimi et al., 2015).

Analysis and Synthesis

Project Design

I created an educational module using the Quality and Safety Education for Nurses (QSEN) model for the curriculum to educate the staff nurses in SDS on the perioperative glycemic control policy (see Appendix A). The SDS nurses received a pretest to determine their baseline knowledge (see Appendix B). I created the pretest and posttest based on the content in the educational module and curriculum. The tests consist of multiple choice and true and false questions. The SDS nurses were then given a posttest to evaluate their knowledge after the education was provided (see Appendix D). The nursing staff anonymously answered the pretest and posttest questions. The pretest and posttest have no identifiers to ensure anonymity of the nurses and staff. Before

beginning this project, I received approval from Walden University's Institutional Review Board (IRB; Approval No. 00003022).

Sample

The 29 nurses that were working in the SDS setting received the educational module. This program will also be open to the midlevel practitioners and medical staff. I identified these participants as the appropriate audience for this education.

Data Collection

Four educational classes were offered to the SDS staff. I provided the presentation in a classroom setting for each class. All SDS staff were invited to attend this class that reviewed the new CPG. All 29 staff nurses attended one of the sessions. Unfortunately, no midlevel providers chose to attend the educational sessions.

Before the class began, the staff was provided with a paper pretest to determine their baseline knowledge. I then delivered the presentation including an opportunity for questions and answers. Once the class was concluded, the staff was provided with a posttest. After each class, I graded the pretests and posttests recorded the results in an Excel spreadsheet. I used the spreadsheet to determine whether posttest scores were higher than pretest scores. The pretest, education, and posttest were provided and completed in June 2018.

Data Analysis

A comparison of the pre-test results and post-test results helped me determine the effectiveness of the educational module. After each class, I recorded the pretest and posttest correct and incorrect responses in an Excel spreadsheet using SPSS software.

This record allowed for the comparison of the scores. The overall pretest and posttests scores could also be reviewed. Once all four classes concluded, I created an Excel spreadsheet that compiled all of the data to analyze the overall results from all of the classes. A simple sample proportion statistical analysis was done.

Project Evaluation

From the results of this project, I determined whether glycemic management benefited perioperative patients by minimizing the incidence of hyperglycemia in the perioperative patient. Furthermore, the reduction of SSIs through glycemic management meets SCIP guidelines necessary for compliance with the NPSG (JCOHAb, 2017). Lastly, the reduction of SSI reporting in hospital comparisons will positively affect hospitals. The results of this project can be disseminated through the connected 18 hospitals in the system to positively impact care. The blood glucose levels of the perioperative patient can be evaluated at 3 months, 6 months, and 1 year to determine whether glycemic control was maintained. Also, the SSI rate for 2017 can be compared with the SSI rate for 2018 at the community hospital to determine whether the glycemic control prevented SSIs.

Summary

With this DNP project, I sought to increase awareness on glycemic control in the of the perioperative patients by providing an educational module on glycemic control in the SDS setting preoperatively. My goal was to minimize the potential for the development of a SSI postoperatively. I also sought to educate nurses and staff on the current guidelines on glycemic management in the perioperative period to prevent SSIs in

surgical patients. My expected finding was that the SDS nurses would score higher on their posttest to indicate that they obtained knowledge on the new CPG. With this new knowledge, the nurses can safely and effectively ensure glycemic management of the perioperative patent to help reduce and prevent SSIs.

In Section 4, I will discuss the results of this project, the implications, strengths and weaknesses, and my recommendations based on the results of this project. In this project, I was able to determine that the nurses did have more knowledge about glycemic management of the perioperative patient to support the implementation of the new CPG. This educational module would be appropriate for other discipline members who participate in the care of these patients to further support the nurses and this new CPG.

Section 4: Findings and Recommendations

Introduction

SSIs are associated with multiple complications, an increase in LOS, and additional healthcare expenditures (Anderson et al., 2014). Healthcare practitioners that provide glycemic management to the perioperative patient help reduce the risk of the development of SSIs (Anderson et al., 2014). Prior to October 2017, at the community hospital study site there were not any protocols to ensure the glycemic management of the perioperative patient. The glycemic management of these patients was determined by the discretion of the physician. In response to the recommendations from CDC, WHO, and the ADA on glycemic management, the administrative team created a task force to implement a policy to standardize the management of glycemic management of the perioperative patient. Once the policy was approved, the nursing staff in the perioperative units needed to be educated about the policy. The purpose of this project was to provide an educational module to the SDS nurses on the new clinical guideline to maintain glycemic control of the perioperative patient to prevent SSIs. The module was provided to the nurses about the significance of glycemic control of the perioperative patient to ensure blood sugar specimens are obtained and then the licensed professional is notified with the results.

To develop the educational module, I conducted a literature review based on a Boolean search in the PubMed database using a combination of the following keywords: *surgical patient, surgical site infections, peri-operative period, blood glucose, glycemic control, diabetes, insulin, orthopedic surgical patient,* and *total joint replacement*

surgical patient. My Inclusion criteria for this literature review included articles published by peer-reviewed journals between 2013 and 2018. From this review of the literature, I found multiple research studies based on the recommendations from the CDC, WHO, and the ADA that supported glycemic management of perioperative patent as a strategy to prevent SSIs in this patient population.

Once the education module was developed, I gave the staff nurses in the perioperative areas a pretest to determine their baseline knowledge of glycemic management of the perioperative patient and knowledge of the current recommendations. The pretest was collected and then the staff nurses were presented with the educational module based on current recommendations from the extant research and institutional policy. After the module was competed, the staff nurses took a posttest to evaluate the effectiveness of the educational module. Both pretest and posttests were answered anonymously. The pretest and posttest questions were the same test, per the recommendation of the Walden University IRB.

Findings and Implications

A pretest/posttest design is an effective tool to evaluate an educational module because it can help to determine the amount of learning (Kuehn, 2016). Since the same tests were distributed, I analyzed each question to determine what percentage of nurses answered it correctly on the pretest, what percentage of nurses answered the question correctly on the posttest, and whether there was an increase in the percentage of nurses that answered the question correctly after the educational module was presented (see Table 1). For this educational module, all questions except for Question 5 either had the

same percentage of correctly-answered responses or an increase in correctly-answered responses (see Table 1). Table 1 shows the percentage of correct answers for the pretests and posttests administered. The detailed list of questions is available are in Appendix B.

Table 1

Pre-/Posttest Results of Educational Module

Question	Pretest	Posttest	Pre/Posttest Difference	% Pretest	% Posttest	Pre/Posttest % Difference
Question1	29	29	0	100	100	0
Question2	18	26	8	62	90	28
Question3	5	27	22	17	93	76
Question4	29	29	0	100	100	0
Question5	29	20	-9	100	69	-31
Question6	19	25	6	66	86	20
Question7	10	24	14	34	83	49
Question8	6	23	17	21	79	58

One limitation for this project was the sample size. In this community hospital, the perioperative nursing staff consisted of only 29 staff nurses. Small sample sizes may overestimate the positive and negative associations in a study (Hacksaw, 2008). Another limitation to this project was that the IRB recommended that the pretest and posttest be the same test. For the original educational module, I created a simpler, shorter pretest to evaluate general baseline knowledge of glycemic management of the perioperative patient. A longer, more comprehensive posttest was created to evaluate the knowledge specific to the educational module. Following the instructions of the IRB, these tests needed to be changed so that the pretest and posttest were the same.

One unexpected finding in this project was that the percentage of nurses that answered Question 5 correctly decreased post-educational module. This decrease in percentage may be due to the nurses overanalyzing the patients now that they knew to

assess for blood glucose levels. This question was also a true/false question, which may have also led the nurses to overanalyzing the patient in the question. The issue of overanalyzing has been seen in other processes in healthcare. For example, in a stroke alert, nursing staff have often mistaken any change in neurological symptoms as a stroke; therefore, processes need to be in place to help streamline the stroke alert process (Stecker, Michel, Antaky, Wolin, & Koyfman, 2016). In Stecker et al.'s (2016) study, the nurses were determining that all patients with neurological symptomatology was a possible stroke. In the case of this project, the nurses may have determined that all patients should have blood glucose obtained to ensure glycemic management.

From the results of this educational module, I found that nurses in the perioperative setting were unfamiliar with the current guidelines for the glycemic management of surgical patients. Hospitals need to adopt policies to help guide this management to ensure that all surgical patients are benefitting from glycemic control. Once a policy was adopted, the perioperative nursing staff needed education on the policy and current recommendations for the effective implementation of the policy.

Additional projects would be useful using a different pretest and posttest methodology. Using the same pretest/posttest method of evaluation may be difficult because the students may have learned from the pretest alone or the students may just concentrate on content that they knew they would be tested on. Also, it is difficult to determine statistical significance in a pretest and posttest design. If there is not a significant change in posttest scores, it can be hypothesized that no learning has occurred, especially if the pretest scores are high. Furthermore, since this was an anonymous test,

determining why the questions were answered incorrectly was impossible to evaluate and those nurses providing incorrect answers could not be provided with more education.

The reduction and prevention of SSIs will lead to better patient outcomes, thereby reducing healthcare costs. With reimbursement hinging on healthcare systems outcomes, SSI can lead to the overburdening of a system (CITE). CMS will deny reimbursement to hospitals for SSIs, so all interventions are necessary to prevent such infections (Anderson et al., 2014). Optimizing patient outcomes is one way to ensure success as a healthcare system. Furthermore, one of the 2017 NPSGs is the reduction of SSIs. SSIs have a significant impact on our healthcare system, so preventive interventions need to be instituted to address this issue

Recommendations

Based on this project, I found that an educational module to support glycemic management of the perioperative patient would be an effective methodology to ensure that staff nurses are aware of institutional polices and current recommendations for this practice. The glycemic management of perioperative patients will benefit the patients by decreasing complications, such as SSIs, and decreasing LOS in the hospital. Furthermore, hospitals will benefit from this practice through improved outcomes for their patients and costs savings to the institution. To ensure safe, quality practice, hospital administration need to establish clear policies and guidelines for glycemic management and educate perioperative nursing staff for effective implementation.

Strengths and Limitations

One strength of this study was the use of a pre-/posttest design that was validated and was a good determinate of knowledge after an educational intervention (Kuehn, 2016). A pre-/posttest is an effective design to compare the knowledge of a group before and after an educational intervention. Through the pretest, baseline knowledge can be evaluated, and then the results can be compared to the posttest after education has been provided (Kuehn, 2016). However, one limitation of the study was the use of the same questions in the pre- and posttests, as recommended by the IRB. The concern was if the nurses paid closer attention to the education that they knew they may be tested on or by already taking the test, the correct answers on the posttest were just a reflection of passive knowledge. Another limitation was the sample size. The perioperative nursing staff only consisted of 29 nurses. A larger sample size may have helped determine the validity and reliability of the test. Future studies would benefit from a larger sample and different pre- and posttest questions.

Summary

For this project, a pretest/posttest design was effective to evaluate the effectiveness of the educational module. Overall, the post-education test results were higher than the pretest results. Upon conclusion of the education, the new CPG can be initiated so that perioperative patients can benefit from glycemic management. Other disciplines within the project facility should be made aware of the education so that those disciplines can effectively support the initiative of glycemic control to prevent SSIs as

well. In Section 5, I will identify how the results of this project were disseminated and provide a self-analysis of my work.

Section 5: Dissemination Plan

Introduction

Upon completion of the educational module, the staff nurses had an increased awareness of glycemic management of the perioperative patient and an understanding of the new CPG as evidenced by the increase in test results. Since multiple departments and disciplines are affected by the new CPG, the results of this project should be disseminated to these other areas. In Section 5, I will outline how these other departments and disciplines will be made aware of this project and the results. Furthermore, I will self-analyze my contributions in this project.

Dissemination

The results of this project will be presented in the nursing leadership meeting, the infectious control committee meeting, and the quality committee meeting. By presenting the results to the committee meetings, the quality department and the infection control department can review SSIs that developed post-education to analyze whether glycemic management of those patents was a contributing factor to the development of the SSI. Furthermore, inpatient nurses should be familiar with the perioperative glycemic management protocol to support the perioperative services initiative.

Other disciplines would also benefit from this education on glycemic management, particularly medicine and pharmacy. All medical practitioners should be aware of the need to ensure glycemic management of the perioperative patent to help prevent SSIs. Ideally, glycemic management should begin in the preoperative period before the patient enters the hospital. Pharmacists should also be aware of the

perioperative glycemic management to provide recommendations to licensed independent practitioners (LIPs)to ensure this control is achieved.

Self-Analysis

Prior to this DNP project, the perioperative department did not have a clear protocol as to the glycemic management of the perioperative patient. Instead, glycemic management was determined by the discretion the surgeon. The study site institution identified the lack of continuity for glycemic management as a concern and recognized that this management was not in alignment with the current recommendations of the CDC, WHO, and ADA. A committee was formed, which I participated in, to create the protocol. The streamlined glycemic management protocol was approved by the committee to help prevent SSIs in the perioperative patient. My role in this committee was to provide education to the perioperative nursing staff on the new CPG. As an educator, my goals are to ensure the EBP is implemented through an educationally sound presentation to nurses. I chose to use the QSEN design to create a curriculum to ensure that all learning domains were addressed. The nurses were taught the knowledge, skill, and attitude necessary to safety initiate the new CPG. My long-term professional goal is to teach in the academic setting where QSEN is used for curriculum development.

At the completion of the project, the perioperative nurses gained knowledge of new CPG as evidenced by the increase in posttest scores. Now that the education is complete and the test scores improved, I would like to see the rates of SSIs and the glycemic control of those patients to determine whether there is any correlation between the glycemic management and incidence of SSIs. From this project, I was able to

participate in a committee who was implementing EBP through a new CPG, which was a significant practice change. As the educator, I was able to appreciate the need for well-created processes and then education about these processes for the success of the initiative. One challenge for me was to be assertive about the need for education to ensure that all staff were clear on their roles in the new CPG. I also recognized the need for me to be more assertive in ensuring that the policy was written and created using EBP.

Summary

The purpose of this DNP project was to increase awareness of glycemic control in the perioperative period of patients by distributing an educational module on glycemic control to nurses in the SDS setting. The goal of the education was to present a new CPG that would minimize the potential for the development of a SSI postoperatively through glycemic management. With this project, I educated the perioperative nurses on the current guidelines on glycemic management in the perioperative period, which may prevent SSIs in surgical patients. A pre-/posttest design was used to evaluate whether new knowledge was obtained. From the pretest/posttest results, I concluded that the perioperative nursing staff obtained new knowledge through an increase in test results. With this new knowledge, the perioperative nursing staff can advocate for glycemic management, which will help prevent SSIs and all the related complications and costs.

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Appendix A: Operative Glycemic Management Education Plan

Purpose:
To enhance the clinical practice of nurses in the assessment, interventions and outcomes for the glycemic management of a perioperative patient

Target Audience:
SDS nurses

Behavioral objectives**:**

1. The RN will discuss the recommendations for glycemic management of the perioperative patient
2. The RN will identify the patients who would benefit from blood glucose monitoring
3. The RN will discuss the process for obtaining blood glucose levels in the SDS setting
4. The RN will select the nursing interventions to be provided when hyperglycemia is determined

Component	Element (knowledge, skills, attitudes)	Teaching Strategy	QSEN Category
1. Recommendation for glycemic management of the operative patient a. CDC guideline for glycemic management for greater than 200mg/dl b. WHO guideline to create protocols for perioperative glucose control for all patients c. Bench-mark based initiate that establishes blood glucose levels greater than 180mg/dl increased i. Infections ii. Perioperative interventions iii. Death	Knowledge Attitude	PowerPoint Presentation	Patient Centered Care Safety QI EBP
2. Clinical Practice Guideline a. To ensure optimal	Knowledge Attitude	PowerPoint Presentation	Patient Centered

outcomes, perioperative patents will have norm-glycemia maintained b. Complications from uncontrolled hyperglycemia will be prevented such as SSIs			Care Safety QI EBP
3. Patient Population a. Adult patients (>18 years old) i. Blood glucose not in reference range 70-105mg/dl b. Procedure i. Joint Replacement ii. Cardio-thoracic iii. Abdominal iv. Vascular v. Patients with infection	Knowledge Attitude	PowerPoint Presentation	Patient Centered Care Safety QI EBP
4. Procedure a. Obtain blood glucose i. Document results b. Notify Hospitalist when blood glucose is above 180mg/dl c. Obtain blood glucose level upon admission to PACU	Knowledge Skill	PowerPoint Presentation Annual competency maintained	EBP Teamwork & Collaboration Patient Centered Care Informatics

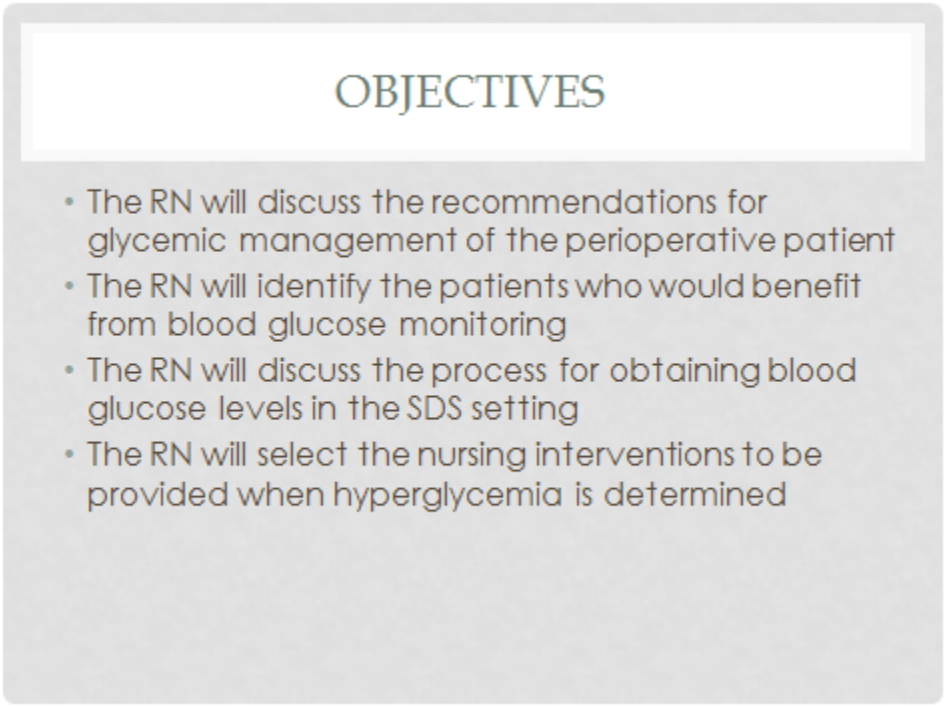
Appendix B: Pretest/Posttest

1. The CDC recommends glycemic control to prevent _____ in the perioperative patient.
    a. Hypoxia
    b. Surgical Site Infections (SSIs)
    c. Arrhythmias
2. WHO recommends glycemic management in which perioperative patient?
    a. Diabetic patients
    b. Nondiabetic patients
    c. Both diabetic and nondiabetic patients
3. In a benchmark study, when should glycemic management begin for the perioperative patient?
    a. 300mg/dl
    b. 200mg/dl
    c. 180mg/dl
    d. 150mg/dl
4. The purpose of glycemic management of the perioperative patient is to (choose all that apply):
    a. Reduce SSIs
    b. Decease surgical time
    c. Improve outcomes
    d. Maintain sterility
5. An adult patient with a blood glucose level on their preadmission test is 85mg/dl. The nurse: should obtain a blood glucose level in the SDS unit.
    a. True
    b. False

6. An adult patient with a blood glucose level on their preadmission test is 185mg/dl and is going for a total hip replacement surgery, the nurse:
    a. Should obtain a blood glucose level in the SDS unit.
    b. Should NOT obtain a blood glucose level

7. If an adult patient has a blood glucose level of 200mg/dl, what should the SDS nurse do (choose all that apply):
    a. Nothing, the result is not high
    b. Obtain a consult for the Hospitalist
    c. Document the blood sugar level
    d. All of the above
8. As per the clinical guideline, when is a consult to the Hospitalist necessary:
    a. 300mg/dl
    b. 200mg/dl
    c. 180mg/dl
    d. 150mg/dl

Appendix C: PowerPoint



HYPERGLYCEMIA AND SSI

- In 2016 the WHO also published recommendations for SSI prevention.
- One of their recommendations included the use of protocols for intensive perioperative blood glucose control for both diabetic and non-diabetic adults undergoing surgical procedures, to reduce the risk of SSI (Allegranzi et al., 2016).

World Health Organization

HYPERGLYCEMIA AND SSI

- In 2017, the CDC published core recommendations for the prevention of SSIs.
- One of these recommendations included perioperative glycemic control implementation to ensure that blood glucose levels are less than 200mg/dl (Berrios-Torres et al., 2017).

CDC
CENTERS FOR DISEASE CONTROL AND PREVENTION

HYPERGLYCEMIA AND SSI

- In a benchmarked-based initiative, Kwon et al. (2013) established that blood glucose levels greater than 180mg/dl in the perioperative patient was linked to increase in infections, preoperative interventions, and death.

OPERATIVE GLYCEMIC MANAGEMENT GUIDELINE

- In response to these recommendations, a new clinic practice guideline has been established.
- The purpose of the guideline is to ensure optimal outcomes for the operative patient by maintaining normo-glycemia.
- Through this guideline, complications form uncontrolled hyperglycemia will be prevented such as SSIs.

PATIENT POPULATION

- All adult patients (greater than 18 years old) whose blood glucose is NOT within the reference range of 70 – 105 mg/dl preoperatively and is undergoing the following procedures will have a blood glucose level obtained:
  - Joint replacement surgery
  - Cardio-thoracic surgery
  - Abdominal surgery
  - Vascular surgeries
  - Pateints with evidence of an infection undergoing ANY surgical procedure

PROCEDURE

- SDS nurses will obtain a blood glucose level in the SDS unit via a fingerstick and a glucometer reading
- If the blood glucose result is greater than 180mg/dl, a consult to the Hospital is required to determine glycemic management
- When the patient is admitted to the post anesthesia care unit (PACU), a blood glucose level fingerstick specimen with glucometer reading for further evaluation and management

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Appendix D: WHO Recommendations

WHO Recommendation	Intervention
The panel suggests the use of protocols for intensive perioperative blood glucose control for both diabetic and non-diabetic adults undergoing surgical procedures, to reduce the risk of SSI (Allegranzi et al., 2016).	
Perioperative oxygenation	The panel recommends that adult patients undergoing general anesthesia with endotracheal intubation for surgical procedures should receive an 80% fraction of inspired oxygen (FiO2) intraoperatively and, if feasible, in the immediate postoperative period for 2–6 h, to reduce the risk of SSI (Allegranzi et al., 2016, p. e288)
Maintaining normal body temperature	The panel suggests the use of warming devices in the operating room and during the surgical procedure for patient body warming with the purpose of reducing SSI (Allegranzi et al., 2016)
Maintenance of adequate	The panel suggests the use of goal-directed fluid

circulating volume	therapy (GDFT) intraoperatively to reduce the risk of SSI (Allegranzi et al., 2016).
Wound protector devices	The panel suggests considering the use of wound-protector devices in clean-contaminated, contaminated, and dirty abdominal surgical procedures for the purpose of reducing the rate of SSIs (Allegranzi et al., 2016).
Drapes and Gowns	The panel suggests that either sterile disposable non-woven or sterile reusable woven drapes and surgical gowns be used during surgical operations for the purpose of preventing SSI and suggests that plastic adhesive incise drapes with or without antimicrobial properties should not be used(Allegranzi et al., 2016).
Incisional wound irrigation	The panel suggests considering the use of irrigation of the incisional wound with an aqueous povidone-iodine solution before closure for the purpose of preventing SSI, particularly in clean and clean-contaminated wounds

	(conditional recommendation, low quality of evidence); but the panel suggests that antibiotic incisional wound irrigation before closure should not be done; insufficient evidence was available to recommend for or against saline irrigation of incisional wounds before closure for the purpose of preventing SSIs (Allegranzi et al., 2016).
Prophylactic negative-pressure wound therapy	The panel suggests the use of prophylactic negative-pressure wound therapy (pNPWT) on primarily closed surgical incisions in high-risk wounds, for the purpose of preventing SSI, while taking resources into account (Allegranzi et al., 2016)
Antimicrobial-coated sutures	The panel suggests the use of triclosan-coated sutures to reduce the risk of SSIs, independent of the type of surgery (Allegranzi et al., 2016).
Laminar airflow ventilation in the content of operating room ventilation	The panel suggests that laminar airflow ventilation systems should not be used to reduce the risk of SSIs for patients undergoing total arthroplasty surgery

	(Allegranzi et al., 2016)
Antimicrobial prophylaxis in the presence of drain and optimal timing for wound drain removal	The panel suggests not continuing perioperative antibiotic prophylaxis because of the presence of a wound drain. They also suggest removing the wound drain when clinically indicated, but they found no evidence to recommend an optimal time for wound drain removal (Allegranzi et al., 2016).
Wound dressing	The panel suggests not using any type of advanced dressing over a standard dressing on primarily closed surgical wounds for the purpose of preventing SSIs (Allegranzi et al., 2016).
Postoperative surgical antibiotic prophylaxis prolongation	The panel recommends against the prolongation of surgical antibiotic prophylaxis (SAP) administration after completion of the operation for the purpose of preventing SSIs (Allegranzi et al., 2016).

Appendix E: Abbreviations

ADA: American Diabetes Association

CDC: Center for Disease Control

CPG: Clinical Practice Guideline

EBP: Evidence-Based Practice

PACU: Postanesthesia Care Unit

SDS: Same Day Surgery

SSI: Surgical Site Infection

WHO: World Health Organization