Mitigating the Risk of Surgical Site Infections in Orthopedic Patients

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One of the issues observed in nursing today is surgical site infections (SSI) particularly in patients who are status post orthopedic surgery total knee replacement and hip arthroplasty. The Joint Commission lists surgical site infections as one of the National Patient Safety Goals. A surgical site infection is defined as an infection that occurs in the part of the body that has been operated on. This infection can range from a minor infection requiring an individual to complete a required course of antibiotics, or it can be severe resulting in sepsis and death. According to the Agency for Healthcare Research and Quality it is estimated that 10 million patients undergo surgery each year. of these patients, surgical site infections are likely to occur in at least 2% to 4% (Surgical Site Infections, 2019). In order to improve health outcomes, it is the job of the nurse to promptly recognize a patient who has a surgical site infection, mitigate the contributing factors, and have knowledge pertaining to the current guidelines and hospital policies.

Patients who are status post total knee replacement or hip arthroplasty are at a greater risk of developing surgical site infections due to the nature of the surgery including the placement of a prosthesis. “It is estimated that approximately half of SSIs are deemed preventable using evidence-based strategies” (Berríos-Torres et al., 2017, 784). SSIs are one of the leading causes of readmission to the hospital as they increase both morbidity and mortality. The CDC classifies surgical site infections into three categories based on how deep the infection lies beneath the skin which include superficial incisional SSI, deep incisional SSI, and organ/space SSI. Fields et al., (2020) explains these classifications as “superficial (confined to the skin or subcutaneous tissue),

deep (involving the muscle or fascia layers), or organ-space (involving the internal anatomic region where the operation was performed)" (Fields et al., 2020, 1087). Criteria for all include purulent (foul smelling) discharge from the incision, localized redness and pain, and fever (>38°C). Since surgical site infections are considered preventable, they are used as an indicator to determine how well the hospital is doing. The Centers for Medicare and Medicaid Services require hospitals to report SSI rates…" (Surgical Site Infections, 2019). As a result, hospitals are penalized by not getting reimbursed.

In an article published by Fields et al., (2020) the major guidelines that were put in place to mitigate the causative factors of SSIs were discussed. The guidelines include "parenteral antimicrobial prophylaxis, alcohol-based skin preparation, perioperative glycemic control, temperature regulation to normothermia, and maintenance of normal tissue oxygenation" (Fields et al., 2020, 1087). Of these guidelines it is essential to maintain perioperative glycemic control. This means that serum blood sugar levels are carefully monitored to prevent hyperglycemia which may be a factor contributing to the development of an SSI. A study of 13,800 patient conducted by Jeon et al., (2012) found no association between glycemia and SSIs. This is contrary to what previous research has determined. "A number of observational studies on the impact of pre-, peri-, or post-operative glucose control have found that post-operative hyperglycemia is associated with increased risk of SSIs" (Jeon et al., 2012, n.p.).

Another guideline put in place is the administration of antibiotics prophylactically. According to a research article published by Hussain et al., (2019) "Appropriate prophylactic antibiotic administration is just one measure of the multifactorial approach used in the prevention of SSI" (Hussain et al., 2019, 164). One of the common drugs to give for antibiotic prophylaxis

in surgical patients is Cefazolin (Ancef). Hussain et al., also sought out to find if there was a difference between the dosing required of Cefazolin to prevent surgical site infections in patients weighing ≥ 120 kg (n = 102) compared to those weighing < 120 kg. A total of 152 patients were in each group and the surgical specialty was equally divided between the two groups. 98 people from both groups received general surgery, 41 gynecological, and 13 orthopedic. Ultimately no statistical relationship was found between the dose of 2g of Cefazolin in these two groups. Following a regimen of antibiotics can cause a host of side effects including lack of appetite, abdominal pain, diarrhea, and nausea/vomiting. Antibiotics should only be taken when they are indicated or when it is necessary to do so. It is also important to finish the full course of antibiotics that are prescribed and to not skip/miss a dose. It is interesting to note that in this study the research conducted pointed to a different discovery, that SSIs were more prevalent in the obese group at a rate of almost double that of the non-obese group (Hussain et al., 2019). Obesity may be a contributive factor to the development of a surgical site infection.

In a cross-sectional study conducted by Skeie et al., (2018) the relationship between nutritional risk (undernutrition) and surgical site infections was studied. A significant relationship was found between SSIs and patients at nutritional risk. “There was a significant higher incidence of SSI among patients at nutritional risk (11.8%), as compared to those who were not (7.0%) (p = 0.047)” (Skeie et al., 2018, 1). It is interesting to note that a way to recognize patients who are at a higher risk of developing an SSI if they are underweight (reduced dietary intake). In order to have proper wound healing it is essential to eat a well-balanced diet. In the study this was assessed by the Nutritional Risk Screening tool. Previous research has indicated that patients who answer yes to the questions of the screening tool showing high

nutritional risk, the morbidity and mortality for the following year increases as compared to those who answer no and show no nutritional risk (Skeie et al., 2018). There are two key elements to a diet for wound healing and they are protein and vitamin C. A deficiency in either protein or vitamin C can impair wound remodeling/tissue repair and can affect the immune system (Guo & DiPietro, 2009). Nutritional intake plays a key role in minimizing surgical site infections.

There are many best nursing practices aimed at reducing the number of patients who develop surgical site infections that are status post total knee replacement or hip arthroplasty. Nurse educators must provide adequate education to nurses in particular nurses who work in the PACU and recovery unit. This allows nurses to be familiar with SSIs and know the signs and symptoms so that they spot the infection as soon as it develops. The use of surgical safety checklists is also useful, they function as a guide to follow so that the causative factors of SSIs can be mitigated. These "checklists are effective at preventing intraoperative and postoperative complications…" (Surgical Site Infections, 2019). For example, one of the items on the surgical safety checklist is did the patient wash themselves with soap or an antiseptic agent the night before the day of surgery (Berríos-Torres et al., 2017). Another factor that can be looked at is if the patient's blood glucose levels are under control. It is optimal for patients to have normal blood sugar levels pre, peri, and postoperative. Patients need to be carefully monitored for hyperglycemia. Administering prophylactic antibiotics is another way to mitigate the risk of developing an SSI. It is also important that when patients arrive to the recovery unit, that they eat foods rich in protein and vitamin C as they are good for wound healing and aid the immune system.

There is an action plan that a nurse can follow in order to reduce the number of patients who develop SSIs. Patients should be in good health prior to surgery. If the patient is overweight or obese it is important that they lose weight so that they can lower their BMI. It is known that patients with a higher BMI are more likely to develop an SSI. The nurse can determine if the patient complied with measures to control the blood sugar level. For example, have they used their glucometer at home, do they keep a food log, have they been exercising, and have they been taking their medication. They can be educated on proper diet, maintain a well-balanced prior to surgery and after surgery for recovery. The completion of the surgical safety checklist in pre-op testing with the addition of the Nutritional Risk Screening tool to assess if the patient is at a nutrition risk are all excellent safety measures.

In order to understand SSIs, it is important to know the skillset of the nurse involved directly with the care of the patient. On a recovery unit in one of the hospitals on the northeast the student nurse care for patients who are admitted on the unit from PACU. Surgeries include total knee replacement and hip arthroplasty as well as spinal surgery such as a laminotomy. The nurse provides a thorough head to toe assessment as well as a focused assessment regarding the surgical site. Dorsalis Pedis and posterior tibial pulses are assessed bilaterally, as well as numbness and tingling in the lower extremities, asking the patient to wiggle their toes and to lift their legs up. Assessment of the surgical site is also performed to ensure the initial dressing is clean, dry, and intact. Ancef 2g/50mL IVPB is given in two doses eight hours apart. Pain is managed with Oxycodone, Hydromorphone, and Acetaminophen.

Future research needs to be geared towards operative approaches to manage SSIs. Healthcare is ever evolving thus the approach that we will need to take to manage SSIs will need

to be different. Now a days there are sutures that prevent SSIs by using antibacterial coating directly on the suture. Surgeries are increasing in number; this means that interventions are necessary to optimize patient care so that patients minimize the amount of time they spend in the hospital. Patient safety must be promoted at all times, it is our number one priority. SSIs can jeopardize the health of the patient and they can be prevented. It is essential to obtain knowledge related to content by reading the literature and incorporating those skills into clinical practice. More and more surgeries are being performed each and every day while the rate of SSIs keep on rising. This is a sign that something isn't right because surgical site infections can be eliminated completely by keeping up on research, following the latest guidelines, and implementing hospital policies at all times.

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