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# Surgical Site Infection Rates After Implementation of the Surgical Care Improvement Project Initiative

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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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2020

Abstract

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MS in Nursing, Walden University, 2018

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Project Submitted in Partial Fulfillment

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Doctor of Nursing Practice

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Abstract

Surgical site infections (SSIs) reflect a serious complication in modern healthcare and are a substantial burden to healthcare systems and service payers worldwide in terms of patient morbidity, mortality, and additional costs. The Surgical Care Improvement Project (SCIP), introduced in 2006, was developed by the Centers for Medicare and Medicaid Services to reduce SSI rates by 25%. However, SCIP was retired in 2015. Given the considerable financial burden of SSIs and because SSIs may be prevented using evidence-based measures, it was worth revisiting and re-evaluating the quality improvement efforts brought about by the success of the evidence-based SCIP initiative. This project aimed to examine the relationship between SCIP infection-prevention process-of-care measures and SSI rates between the years of high SCIP compliance, and several years after it was retired. The nature of this doctoral project was a quality improvement evaluation via a retrospective review of medical records acquired from the first quarter of 2014 to the fourth quarter of 2018. The SCIP core measure guidelines were used to define standards for care and thresholds for adherence. SSI rates were extracted and aggregated to look at trends and the chi-square test was used to show the relationship between two categorical variables. Analysis showed a significant difference between the proportions of infections from those of high SCIP compliance compared to the years following SCIP retirement (SCIP ($X^2(2) = 11.12$, $p < .004$). The improvement of individual, community, and societal health is a significant contribution made by the nursing profession. The concept of SSI is essential in building the nursing science that will lead to identifying sound nursing interventions in the perioperative period.

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Dedication

I wholeheartedly dedicate this work to the Almighty God, whose grace and mercy has brought me to where I am in my life today. All the glory and honor back to You Dear Father in heaven.

Acknowledgments

Many individuals facilitated the preparation of this project. To my stepfather, Nicolas A. Umahon, without whose hard work and support, I would not have been able to complete a college education. To my sister, Isabel U. Legaspi, whose love and understanding have always inspired me to be the best version of myself. To my other sister, Theresa U. Antonio, whose support I keep as inspiration living away from home. To Ms. Kay Vogel, who saw potential in me and opened the door for me to the Quality side of nursing. To Ms. Phoebe Gloria, a great mentor, who taught me all about the SCIP core measure when I started my career in Quality. To my project chairman, Dr. Patricia Senk, whose patience and positivity held my hand through this academic endeavor. To all my professors whose expertise has helped shaped me to be the clinician that I am now. To Ms. Zenaida Pasion, a good friend, who helped me with my statistical analysis. To all my detractors, who did not believe in me. Thank you for making me strive harder to prove myself that I can. Moreover, to my late mother, Jessie L. Umahon, who woke me up every morning to go to school and always had breakfast ready on the table. She had always wanted me to succeed in life and would have been proud to see me achieve my terminal degree. I acknowledge each one of you.

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Section 1: Nature of the Project

## Introduction

Surgical site infections (SSIs) reflect a serious complication in modern healthcare (Purba et al., 2018) and are a substantial burden to healthcare systems and service payers worldwide in terms of patient morbidity, mortality, and additional costs. However, SSIs are among the most preventable health-care-associated infections (HAIs; Allegranzi et al., 2016). In the United States, SSIs were identified in approximately 1.9% of 849,659 surgical procedures in 43 states from 2006 to 2009 (Mu, Edwards, Horan, Berrios-Torres, & Fridkin, 2011; Purba et al., 2018). It has been reported that SSI can increase the postoperative length of stay (LOS) by 7 to 10 days and hospital costs by 300%. Furthermore, mortality rates can exceed 10% with certain infections (Tillman, Wehbe-Janek, Hodges, Smythe, & Papaconstantinou, 2013). The economic burden of SSIs should also be taken into account. The annual costs of SSIs amounted to approximately US$3 billion in 2012, increasing from an estimated US$1.6 billion in 2005 (Purba et al., 2018). Today, the human and financial costs of treating SSI continues to increase as the number of surgical procedures performed in the United States continues to rise (Berrios-Torres et al., 2017).

## Problem

Traditionally, surgical care complications were thought to be inevitable. Practice traditions can be loosely defined as interventions or actions for which the evidence no longer supports the action(s), yet the intervention continues to be present in practice (Makic & Rauen, 2016). However, evidence suggests that health care professionals do

not always follow basic steps that have proven to eliminate infections and other major complications (Clancy, 2008). The absence of effective standardization makes it difficult for healthcare professionals to consistently provide the highest levels of care (Clancy, 2008). To address these issues, national programs for surgical quality performance and perioperative outcomes have been introduced as strategies to improve patient care and reduce complications (Tillman et al., 2013).

In 2002, Centers for Medicare and Medicaid Services (CMS) created the National Surgical Infection Prevention Project intending to standardize and implement surgical process measures at a national level. It later transitioned to the Surgical Care Improvement Project (SCIP) in 2006, with additional recommendations for the reduction of surgical infection, venous thromboembolism (VTE), and cardiac events (Chang et al., 2017). Their goal was to reduce SSI rates by 25% (Chang et al., 2017; Griffin, 2007; Rosenberger, Politano, & Sawyer, 2011). The SCIP initiative represented the first national effort to focus on reducing postoperative infectious morbidity and mortality (Edminston et al. 2011). SCIP measures for postoperative infection prevention involved a multidisciplinary approach, and reportable metrics included the proper timing of antibiotic infusion, antibiotic selection, appropriate discontinuation of prophylactic antibiotics, appropriate hair removal method, and maintenance of perioperative normothermia and euglycemia (Stulberg et al., 2010). Compliance with the SCIP quality performance measures was publicly reported and was tied to hospital reimbursement. The program's goal was to reduce the rates of postoperative surgical infections by promoting the adoption of publicly reported individual SCIP measures selected by a technical expert

panel (Cataife, Weinberg, Wong, & Kahn, 2014). SCIP measures were required beginning with discharges in the first quarter of 2007 (Garcia, Fogel, Baker, Remine, & Jones, 2012; Jones, Brown, & Opelka, 2005). The CMS estimated that compliance with SCIP recommendations would help prevent up to 13,027 perioperative deaths and 271,055 surgical complications annually for Medicare patients alone (Clancy, 2008). For this project, the years 2007 to 2014 will be referred to as the "high SCIP compliant years."

As a result of continued excellent performance, all SCIP chart-abstracted measures were retired in December 2015 (Pellegrini, 2017), and the Joint Commission (TJC) transitioned to the ORYX Performance Measures, an initiative that integrated quality performance improvement measurement data into the accreditation process (TJC, 2019). SCIP was no longer a publicly reported measure. The prophylactic antibiotic administration and VTE prophylaxis remained, but reporting was optional (Chang et al., 2017). If the metrics from the SCIP have been hardwired into perioperative protocols and workflow processes are still currently and rigorously being implemented and monitored within organizations, then the postoperative infection rates should still be at a minimum. The years after 2015 will be referred to in this project as the "after SCIP" years.

## Purpose Statement

This project aimed to re-evaluate the success of the now-retired evidence-based SCIP initiative implementation at one Pacific Northwest United States hospital. It aimed to examine the relationship between SCIP infection-prevention process-of-care measures and SSI rates between the years of high SCIP compliance, and several years after it was

retired as a core measure. Due to the findings of this study, I recommend that organizations revisit and reevaluate their current SSI prevention processes and reference the evidence-based SCIP core measure indicators to effectively maintain the reduction of their postoperative infection rates.

## Nature of the Doctoral Project

The nature of this doctoral project was a quality improvement evaluation. From the perspective of the present time, a retrospective review of the medical records, after approval by Walden University's Institutional Review Board (IRB), involved the use of an existing longitudinal data set previously acquired from the first quarter of 2007 through the fourth quarter of 2018. Retrospective data sources were available from the hospital's administrative data and medical records.

A quality improvement evaluation project was conducted using de-identified, aggregated SCIP data from one acute care hospital in the Pacific Northwest to determine the effectiveness of self-reported adherence to the six publicly reported SCIP infection-prevention measures in predicting postoperative infection. The project protocol and waiver of informed consent was provided to the Walden University IRB.

## Significance

The importance of this quality improvement evaluation topic to nursing practice is imperative. SSIs can lead to increased postoperative stays, higher readmission rates and healthcare costs, and poorer health outcomes (Greene, 2015). Organizations that strive for high reliability in their processes should see improvement in the associated outcomes and a reduction in harm to patients (Griffin, 2007). There is strong evidence that the

implementation of protocols that standardize practices reduce the risk of surgical infection (Rosenberger et al., 2011). The SCIP initiative targeted complications that account for a significant portion of preventable morbidity. One of its goals was a 25% reduction in the incidence of SSIs and related costs (Griffin, 2007; Rosenberger, Politano, & Sawyer, 2011; Chang et al., 2017). However, since its retirement as a reportable measure, I argue that process measures have since become lenient and lose, resulting in low SCIP compliance. Hence, inconsistent compliance with infection prevention measures had again increased postoperative infection rates. As nurses practice more evidence-based medicine, it falls on nurse practitioners and scientists to be active, not only in the continued implementation and execution of these measures but in the investigation of the current processes and protocols. Nurses are responsible for ensuring that these practices are continuously carried out and that current practices are still appropriate, achievable, and effective in keeping postoperative infection rates to a minimum (Rosenberger et al., 2011).

Delivering evidence-based practice (EBP) has multiple benefits, including a higher quality of care, improved reliability, enhanced patient outcomes, and reduced healthcare costs (Melnyk, 2013). Implementing evidence-based guidelines requires a coordinated multidisciplinary approach. Nurses are at the forefront and continue to play a pivotal role in promoting and implementing SSI prevention strategies while bringing the best available evidence to the bedside (Greene, 2015). However, a gap exists between the best evidence and practice regarding postoperative infection prevention. Awareness of the evidence is the first step in knowledge translation (Qasem & Hweidi, 2017).

The improvement of individual, community, and societal environmental health is a significant contribution made by the nursing profession. Focusing on the concept of infection is an essential first step in building the nursing science that will lead to identifying sound nursing interventions in the perioperative period (Green & Polk, 2009). This aligns well with the mission of Walden University to promote positive social change. Positive social change results in the improvement of human and social conditions.

## Summary

The number of surgeries performed across the United States has risen. A consequent outcome was a rise in the human and financial costs of treating SSIs (Berrios-Torres et al., 2017). The significance of SSI prevention cannot be overemphasized enough. It has been estimated that approximately half of SSIs are preventable by the mere application of evidence-based strategies (Umscheid et al., 2011). Organizational mandates on quality improvement measures and other processes and the public reporting of outcomes had been required and linked to reimbursements. This has been proven effective and resulted in compliance. Given the considerable financial burden of SSIs and because 60% of SSIs have been estimated to be preventable with the use of evidence-based measures (Ban et al., 2017), it was worth revisiting and re-evaluating the quality improvement efforts brought about by the success of the evidence-based SCIP initiative implementation. Due to the findings of this study, I recommend that organizations revisit and reevaluate their current SSI prevention processes and reference the evidence-based

SCIP core measure indicators to effectively maintain the reduction of their postoperative infection rates.

Section 2: Background and Context

## Introduction

The goal of the SCIP quality measures program was to reduce the rates of postoperative surgical infections by promoting the adoption of publicly reported individual SCIP measures selected by a technical expert panel (Cataife et al., 2014). The CMS estimated that compliance with SCIP recommendations would help prevent up to 13,027 perioperative deaths and 271,055 surgical complications annually for Medicare patients alone (Clancy, 2008). However, all of the SCIP chart-abstracted measures were retired in December 2015 (Pellegrini, 2017); compliance to SCIP measures was no longer publicly reported, and TJC transitioned and implemented the ORYX Performance Measures. If the metrics from the SCIP have been hardwired into perioperative protocols and workflow processes, then the postoperative infection rates should still be at a minimum.

In one Pacific Northwest United States hospital, is there a statistically significant difference in the reduction of SSI rates during the implementation of the SCIP Core Measure in 2007 compared to the SSI rates in 2018? This project aimed to examine the relationship between SCIP infection-prevention process-of-care measures and SSI rates between the years of high SCIP compliance, and several years after it was retired as a core measure.

## Concepts, Models, and Theories

The selected theoretical framework for this project is the germ theory by Louis Pasteur. In 1858, he theorized that a specific organism (germ) was capable of causing an

infectious disease (Kalisch & Kalisch, as cited in McEwen, 2019). It may seem like a simple theory, but its impact has been phenomenal and has outstandingly helped to radically reduce mortality rates from infection (McEwen, 2019). Theories of infection are often applied to infection prevention, such as handwashing, using topical antibiotics on a scrape, or prophylactically treating a surgery patient with antibiotics (McEwen, 2019).

The Iowa Model of EBP is a model that is likewise appropriate for this project. Promoting EBP using the Iowa model to identify triggers for change, implementing patient care based on the best research evidence available, and monitoring changes in practice to ensure quality care is imperative (Grove, 2017). EBP should be the standard of care in all perioperative facilities (White & Spruce, 2015). Since the SCIP Core Measure was evidence-based, as an advanced practice nurse, I can benefit from the Iowa model's direction to expand my evidence-based practice. In healthcare, triggers initiate the need for change, and the focus should always be to make changes based on the best research available (Grove, 2017). Since SCIP was retired at the end of 2015, the quality metrics may not have been implemented as strictly as it had been when it was a reportable measure. Based on the results of this project, a trigger to restart process improvement initiatives and elicit practice change within my current organization is recommended.

## Relevance to Nursing Practice

The major source of nursing research problems is clinical nursing practice (Sutherland, 2017). An action to consider when conducting research or locating a suitable topic is to make sure that it is relevant. With the concept of infection in mind, a project to address a related practice problem that was considered is postoperative infection rates

during and after the evidence-based core measure SCIP was implemented. The relevance of this topic to nursing practice is essential. SSI or postoperative sepsis can lead to increased postoperative stays, higher readmission rates and health care costs, and poorer health outcomes (Greene, 2015). Implementing evidence-based guidelines requires a coordinated multidisciplinary approach. Nurses are at the forefront and continue to play a pivotal role in promoting and implementing SSI prevention strategies while bringing the best available evidence to the bedside (Greene, 2015).

## Local Background and Context

Hospitals perform various types of surgeries, and SSI is a risk for any surgery. The Washington Department of Health (DOH) SSI reports of hospitals' infection rates uses inpatient surgical procedure categories to compare across hospitals (DOH, n.d.). SSI reporting focuses on certain types of surgeries because they are performed frequently or may pose a higher risk of infection (DOH, n.d.). To date, hospital SSI rates in the state of Washington (WA) are compared by the type of surgical procedure. Hospitals classify procedures by categories defined by the Centers for Disease Control and Prevention's National Healthcare Safety Network (NHSN) for WA state SSI reporting (DOH, n.d.). The NHSN has provided simple risk adjustment of SSI rates to participating hospitals to facilitate quality improvement activities (Mu et al., 2011).

The intended setting for this project was one inpatient acute care hospital in the Pacific Northwest, where patients underwent selected surgeries during their encounter. It was feasible to accomplish this project in the identified setting because patients are

admitted to the hospital for their specific inpatient perioperative care. Retrospective data sources were available from the hospital's administrative data and medical records.

## Role of the DNP Student

The role of the Doctor of Nursing Practice (DNP) student in this endeavor was that of a leader and change agent. As an Advanced Practice Clinician currently working as a Board-Certified Acute Care Nurse Practitioner Hospitalist and as a future DNP-prepared Nurse Practitioner, my role in this project dealt explicitly with systems improvement that is based on scientific evidence. As such, I was the organizational and systems leader for quality improvement and systems thinking (Zaccagnini & White, 2017). As a current clinician in the organization, with the additional education at the doctoral level, I am now better prepared to lead and am well-positioned to provide organizational leadership in project development and implementation or quality improvement evaluation with the application of evidence-based health care through the use of existing research (Zaccagnini & White, 2017). The ultimate goal was to translate evidence into practice resulting in improved patient outcomes.

## Summary

The germ theory by Louis Pasteur has been phenomenal and has outstandingly helped to radically reduce mortality rates from infection (McEwen, 2019). SSI is a risk for any surgery. The relevance of this topic to nursing practice is imperative. SSIs can lead to increased postoperative stays, higher readmission rates and health care costs, and poorer health outcomes (Greene, 2015). The DNP student endeavored to provide organizational leadership in project development and implementation with evidence-

based health care application through the use of existing research by leading a quality improvement evaluation based on the evidence-based SCIP guidelines.

Section 3: Collection and Analysis of Evidence

## Introduction

SSIs are among the most preventable HAIs (Allegranzi et al., 2016). The absence of effective standardization makes it difficult for healthcare professionals to consistently provide the highest levels of care (Clancy, 2008). To address these issues, national programs for surgical quality performance and perioperative outcomes have been introduced as strategies to improve patient care and reduce complications (Tillman et al., 2013). The goal of the SCIP quality measures program was to reduce the rates of postoperative surgical infections by promoting the adoption of publicly reported individual SCIP measures selected by a technical expert panel (Cataife et al., 2014). Given the considerable financial burden of SSIs and because 60% of SSIs have been estimated to be preventable with the use of evidence-based measures (Ban et al., 2017), it is worth revisiting and re-evaluating the quality improvement efforts brought about by the success of the evidence-based SCIP initiative implementation.

This scholarly project involved the retrospective review on already available data. I collected data that was de-identified and aggregated for the evaluation purposes of the project. Although the organization had permitted to provide data, data collection ensued only after IRB approval by Walden University. In addition to Walden University, the Evidence-based Practice and Research Council at the project site granted permission to conduct this quality improvement evaluation project. The samples and discharge information from the organization's database were anonymous. The organization's database was compliant with the current Health Insurance Portability and Accountability

Act (HIPAA) standards and regulations. Collected data was stored in a secure, password-protected flash drive. Because quality improvement also needs to uphold ethical standards, it is important to note how the data was collected. This can then allow the reader to understand the significance of the project and the lack of bias (Theofanidis & Fountouki, 2018).

## Practice Focused Question

The practice-focused questions that guided this scholarly project was:

In one Pacific Northwest United States hospital, was there a statistically significant difference in the reduction of SSI rates during the implementation of the SCIP Core Measure in 2007 as compared to the SSI rates in 2018?

## Sources of Evidence

In 2002, CMS created the National Surgical Infection Prevention Project to standardize and implement surgical process measures at a national level. It later transitioned to the SCIP in 2006 in partnership with national organizations, including the American Hospital Association, CDC, TJC, and the Institute for Healthcare Improvement (Cataife et al., 2014). Of the 20 SCIP measures covering various discrete elements of patient care (Bratzler & Hunt, 2006; Clancy, 2008), preventive measures related to HAIs included nine publicly reported SCIP metrics, six of which focused on postoperative infection prevention (Stulberg et al., 2010). In addition to the three measures of antimicrobial prophylaxis – antibiotic timing, selection, and discontinuation (Salkind & Rao, 2011; Stulberg et al., 2010), additional process measures focused on the control of blood glucose postoperatively in cardiac surgery patients (Carr et al., 2005), proper hair

removal, and maintenance of normothermia in patients undergoing colorectal surgery (Bratzler & Hunt, 2006). The frequently cited *Compendium of Strategies to Prevent HAIs in Acute Care Hospitals* (Yokoe et al., 2014) cited grade A-1 evidence to support a recommendation to administer antimicrobial prophylaxis in accordance with the evidence-based standards and guidelines in association with surgical procedures for all three of these measures (Bratzler & Houck, 2005a; Bratzler & Hunt, 2006). In 2009, these measures were endorsed for use by the National Quality Forum (NQF).

Two studies by Bratzler et al. (2005b) and Steinberg et al. (2009) provided evidence for the effectiveness of prophylactic antibiotic use. However, it was unclear whether the findings from these studies can be true in routine clinical care for a national sample. A study by Pastor and colleagues (2010) of 491 patients undergoing colorectal surgery showed that an increase in SCIP compliance aimed to prevent SSIs does not translate into a significant reduction of SSIs in patients undergoing colorectal resections. But in another study by Berenguer and colleagues (2010) of a tertiary hospital with a high outlier in superficial SSI in colorectal patients showed that compliance with SCIP improved their rates. Reduction in superficial SSI decreased cost to the patient and decreased LOS. In one retrospective cohort study by Stulberg et al. (2010) of over four million patients from 398 hospitals, SCIP adherence measured through a global all-or-none composite infection-prevention score was associated with a lower probability of developing a postoperative infection. A systematic review of the literature by Edmisnton et al. (2011) concluded that the overall success of SCIP has been decidedly mixed, with results varying across SSI rates and research methodology.

Adoption of these measures was supported by research attesting to their efficacy, and the development and implementation of these process-of-care measures have been endorsed by the NQF and other organizations that promote improvements in the quality of medical care (Bratzler & Houck, 2005a; Bratzler & Hunt, 2006; Clancy, 2008). SSIs account for 14% to 16% of all HAIs and are common complications of the surgery, occurring in 2-5% of patients after clean extra-abdominal operations and in up to 20% of patients undergoing intra-abdominal operations (Bratzler & Hunt, 2006). The SCIP core measure guidelines were used to define standards for care and thresholds for adherence.

**Published Outcomes and Research**

Review of scholarly evidence included utilizing the Walden University Library and other appropriate databases such as CINAHL, Cochrane Database of Systematic Reviews, MEDLINE, Google Scholar, and others, to locate scholarly articles that pertain to this evidence-based practice project. Only peer-reviewed literature from 2005-2018 were included in the review. Search terms, keywords, and phrases used were *SCIP, core measures, infection, postoperative infection, surgical site infection, intraoperative infection, infection prevention, evidence-based practice, meta-analysis,* and *systematic reviews.* Boolean operators used were AND, OR, and NOT. Evidence was appraised utilizing the hierarchy of evidence. The evidence-based pyramid systematic reviews being at the top of the pyramid as they are the gold standard and bring all the others types together to review as a whole.

## Analysis and Synthesis

The hospital's database, which is assumed to be compliant with the HIPAA, was used because it contained 100% of their discharge data. The SCIP performance data have undergone all of the same quality assurance and data validation checks as the data reported on the Hospital Compare Web site. The data are the same discharge-level data submitted to the CMS for public reporting of their hospital-level performance. Discharges meeting inclusion criteria for SCIP quality measures from the first quarter of 2014 through the fourth quarter of 2018 was included.

Infection rates were extracted from the inclusive dates identified and aggregated to look at trends. The chi-square test was used to show the relationship between two categorical variables. The Statistical Package for the Social Sciences (SPSS) was used to analyze the data.

## Summary

This project involved the retrospective review of data conducted on already available material. Adoption of the SCIP measures was supported by research attesting to their efficacy, and the development and implementation of these process-of-care measures have been endorsed by the NQF and other organizations that promote improvements in the quality of medical care (Bratzler & Houck, 2005a; Bratzler & Hunt, 2006; Clancy, 2008). SSIs account for 14% to 16% of all HAIs and are common complications of surgery, occurring in two to five percent of patients after clean extra-abdominal operations and in up to 20% of patients undergoing intra-abdominal operations (Bratzler & Hunt, 2006). Was there a statistically significant difference in the

reduction of SSI rates during the implementation of the SCIP Core Measure in 2007 as compared to the infection rates in 2018? As United States healthcare reimbursement structures were tied to the quality of care and clinical outcomes, incorporation of evidence-based nursing practice actively supported scientific, safe, economical, and efficient care delivery (Friesen, Brady, Milligan, & Christensen, 2017). The SCIP core measure guidelines were used to define standards for care and thresholds for adherence.

This project involved the retrospective review of data conducted on already available material. Infection rates were extracted from the inclusive dates identified and aggregated to look at trends. The chi-square test was used to show the relationship between two categorical variables. The SPSS was used to analyze the data.

Section 4: Findings and Recommendations

## Introduction

Hospitals perform various types of surgeries, and SSI is a risk for any surgery. SSI reporting focuses on certain types of surgeries because they are performed frequently or may pose a higher risk of infection (DOH, n.d.). SSI reports of hospitals' infection rates by the WA DOH uses inpatient surgical procedure categories to compare across hospitals (DOH, n.d.). However, a gap exists between the best evidence and practice with regards to SSI prevention. The purpose of this project was to re-evaluate the success of the now-retired evidence-based SCIP initiative implementation at one Pacific Northwest United States hospital. It aimed to examine the relationship between SCIP infection-prevention process-of-care measures and SSI rates between the years of high SCIP compliance, and several years after it was retired as a core measure. This scholarly project addressed the following clinical question: In one Pacific Northwest United States hospital, was there a statistically significant difference in the reduction of SSI rates during the implementation of the SCIP Core Measure in 2007 as compared to the SSI rates in 2018? This project involved the retrospective review of already available data.

Adoption of the SCIP measures was supported by research attesting to their efficacy, and the development and implementation of these process-of-care measures have been endorsed by the NQF and other organizations that promote improvements in the quality of medical care (Bratzler & Hunt, 2006; Bratzler & Houck, 2005a; Clancy, 2008). The *Compendium of Strategies to Prevent HAIs in Acute Care Hospitals* (Yokoe et al., 2014) cited grade A-1 evidence to support a recommendation to administer

antimicrobial prophylaxis following the evidence-based standards and guidelines in association with antibiotic timing, selection, and discontinuation (Bratzler & Houck, 2005a; Bratzler & Hunt, 2006). These measures were endorsed for use by the NQF.

## Findings and Implications

The hospital's database was used as it contained 100% of their discharge data. They are the same discharge-level data submitted to the CMS for public reporting of their hospital-level performance. The organization utilizes fiscal year (FY) method, from June to July to designate the inclusive months for the designated year. The original intended data inclusion for this study was from 2007 when compliance to SCIP was initially mandated. However, during the data collection process, it was discovered that the SSI data was only available from 2014 onwards in an electronic format. As Electronic Medical Records (EMR) were not mandated until 2015, the readily available SSI data was limited. Discharges meeting inclusion criteria for SCIP quality measures collected were then adjusted from the FY 2014 through FY 2018. A total of 56,141 postoperative patients from 2014-2018 were included in the sample. The total number of surgeries during the high SCIP compliant years (2014 and 2015) were 30,475. The total number of surgeries after SCIP years (2016 to 2018) were 25, 666 (see Table 1).

Table 1

*Number of Qualifying Surgeries*

| Qualifying Surgeries | FY14 | FY15 | FY16 | FY17 | FY18 |
|---|---|---|---|---|---|
| Cardiac | 626 | 721 | 762 | 1297 | 768 |
| Colon | 260 | 253 | 281 | 395 | 309 |
| Other Gastroenterology | 1197 | 1011 | 1430 | 906 | 1383 |
| Cesarean Section | 1036 | 1163 | 1171 | 205 | 1227 |
| Hysterectomy (Abdominal) | 592 | 553 | 601 | 349 | 750 |
| Hysterectomy (Vaginal) | 164 | 9 | NA | NA | NA |
| Joint – Hip | 390 | 314 | 282 | 437 | 366 |
| Joint – Knee | 515 | 469 | 386 | 812 | 413 |
| Other Orthopedic | 1506 | 1349 | 434 | 777 | 975 |
| Other Procedures | 13159 | 5188 | 3533 | 2881 | 2536 |
| Total Number of Surgeries | 19445 | 11030 | 8880 | 8059 | 8727 |

SSIs in this organization were monitored according to type of SSIs during and after SCIP. Superficial incisional SSIs involve only skin and subcutaneous tissue of the incision (NHSN, 2020). Superficial incisional primary (SIP) SSIs are identified in the primary incision in a patient who has had an operation with one or more incisions such as cesarean section incisions or chest incision for Coronary Artery Bypass Graft (CABG) (AHRQ, n.d.; NHSN, 2020). Superficial incisional secondary (SIS) SSIs are identified in

the secondary incision in a patient who has had an operation with more than one incision, such as the donor site incision on a leg for a CABG (AHRQ, n.d.).

Deep incisional SSIs involve deep soft tissues of the incision, such as fascial and muscle layers (NHSN, 2020). Deep incisional primary (DIP) SSIs are identified in the primary incision in a patient that has had an operation with one or more incisions, such as cesarean section incisions or chest incision for CABG (AHRQ, n.d.; NHSN, 2020). Deep incisional secondary (DIS) SSI is identified in the secondary incision in a patient that has had an operation with more than one incision, such as the donor site incision on a leg for a CABG (AHRQ, n.d.). Organ/space involves any part of the body deeper than the fascial/muscle layers that was opened or manipulated during the operative procedure NHSN, 2020). Organ/space, deep incisional, and superficial incisional SSI are defined in the CDC NHSN manual (2020) as those that involve any part of the body deeper than the fascial/muscle layers that are opened or manipulated during the operative procedure (NHSN, 2020). Table 2 provides data on the number of infections by the type of infection per FY.

Table 2

*Number of SSIs by Type*

| Infection Type | FY14 | FY15 | FY16 | FY17 | FY18 |
|---|---|---|---|---|---|
| Superficial Incisional Primary (SIP) | 21 | 23 | 17 | 60 | 33 |
| Superficial Incisional secondary (SIS) | 1 | 7 | 11 | 4 | 1 |
| Deep Incisional Primary (DIP) | 28 | 22 | 22 | 15 | 14 |
| Deep Incisional Secondary (DIS) | 1 | 1 | 2 | 2 | 0 |
| Organ Space | 17 | 30 | 24 | 32 | 15 |
| Total Number of SSIs | 68 | 83 | 76 | 113 | 63 |

The goal of this scholarly project was to determine whether the two categorical variables – SCIP and SSI rates, were associated with each other. The chi-square test was used to analyze the difference between the groups. A total of 56,141 postoperative patients from 2014-2018 were included in the sample. The total number of patients during the SCIP years were 30,475, and there were 25,666 patients from the post-SCIP era sample. The total number of SSIs from 2014-2018 were 403. SSI cases during the high SCIP compliant years were 151, and 252 during the post-SCIP years. A visual representation of the SSI data collected in relation to the number of surgeries in the sample is shown in the Appendix. Chi-square analysis was performed using the infection rates to determine if there was a significant difference between SCIP and SSI. There is a significant difference between the proportions of infections from those during the SCIP compliant years compared to the years following SCIP retirement (SCIP ($X^2(2) = 11.12$, $p < .004$). This purports that there is a significant difference in the reduction of SSI rates

during the implementation of the SCIP Core Measure in 2014 and 2015 as compared to the infection rates after SCIP in 2016 through 2018 (see Figure 2).

The improvement of individual, community, and societal environmental health is a significant contribution made by the nursing profession. Results from this project can lead to identifying process and performance improvement initiatives to help improve SSI prevention. This aligns well with the mission of Walden University to promote positive social change.

## Recommendations

The primary purpose of this scholarly project was to address the gap between the best evidence and practice concerning SSI prevention. Hence, to contribute to the growing body of knowledge on the prevention of SSIs, awareness of the evidence is the first step in knowledge translation (Qasem & Hweidi, 2017). In Decmber 2015, as a result of continued excellent performance, nationally, all SCIP chart-abstracted measures were retired (Pellegrini, 2017). This scholarly project concluded that there was a statistically significant difference in the reduction of SSI rates during the implementation of the SCIP Core Measure in 2014 and 2015 as compared to the infection rates in 2016 through 2018 (after SCIP). This was realized after reevaluating the success of the now-retired evidence-based SCIP initiative implementation at one Pacific Northwest United States hospital. It is therefore, strongly recommended that organizations revisit and reevaluate their current SSI prevention processes and reference the evidence-based SCIP core measure indicators and metrics to maintain the reduction of their SSI rates effectively. Likewise, the imperative to ensure that the current organizational processes

are at par with the current evidence-based guideline recommendations available from various society and government regulatory agencies cannot be overemphasized. There is strong evidence that the implementation of protocols that standardize practices reduce the risk of surgical infection (Rosenberger et al., 2011). However, effective standardization makes it difficult for healthcare professionals to consistently provide the highest levels of care. And because health care professionals do not always follow basic steps that have proven to eliminate infections and other major complications (Clancy, 2008), surveillance in compliance is additionally recommended to be adopted by organizations in order to ensure that focus is consistently maintained. Although SCIP performance is not linked to reimbursement anymore, we owe it to our patients and the communities we serve, that we guarantee high reliability in our processes to achieve safe and quality outcomes.

## Strengths and Limitations of the Project

### Strengths

This project revisited and re-evaluated the quality improvement efforts brought about by the success of the evidence-based SCIP initiative implementation, standardizing and implementing surgical process measures at a national level. The facility where this project was conducted is supportive of quality and performance improvement initiatives which is the core of my DNP Project. This organization has provided me with the venue I needed for the success of the project. Organizations such as this, that strive for high reliability in their processes and want to see improvement in the associated outcomes and a reduction in harm to patients, may want to reassess their current infection prevention processes. There is an opportunity for improvement in every process and on every

occasion (Hughes, 2008). When organizations monitor compliance with procedures and report data, it has a positive impact on patient outcomes. Many in-hospital quality assurance programs generally focus on issues identified by regulatory or accreditation organizations, such as checking documentation, creating oversight committees, and studying trends (Hughes, 2008). This is because delivering EBP has multiple benefits, including a higher quality of care, improved reliability, enhanced patient outcomes, and reduced healthcare costs (Melnyk, 2013). A project such as this may lead to a performance or quality improvement change recommendation depending on their outcomes. Another strength of this project is its robust sample size. The facility is a 366-bed Acute Care Hospital that provided me with robust data needed to complete this DNP project. Larger sample sizes have the distinct advantage of providing more data for researchers to work with.

**Limitations**

The main limitation of this project was the availability of the pre-EMR data. The planned inclusive years for data collected was from 2007 when SCIP compliance was initially mandated. However, during the data collection process, it was discovered that the only SSI data available electronically was from 2014 onwards. Because EMRs were not required until 2015, the readily available SSI data was limited. Hard copies of data before 2014 are stored in remote storage areas. The current COVID-19 restrictions at the project site have limited this student's access to them. Due to this, data on SCIP compliant years available for analysis were only 2014 and 2015. There could have been a more robust sample size for the SCIP compliant years.

A second limitation is that the SCIP core measure was limited to the following surgeries: CABG, other Cardiac, Hip and Knee Arthroplasties, Colon, Hysterectomy, and Vascular (TJC, 2010). This project was focused on SSIs specific to these types of surgeries only; therefore, the results are not generalizable. The third limitation is that no data on vaginal hysterectomy cases were available for surgical cases count beginning in 2016. In addition, the other procedures count saw a decrease in number of cases, as the organization's minor gastroenterology and orthopedic cases were outsourced and moved to a different cost center (outside of the perioperative department) towards the end of the 2014 FY. I am not certain whether the missing data and the considerable decrease in the volume of surgery cases significantly affected the SSI rates. The last limitation is, this project did not look explicitly at the specific trigger(s) or fall out(s) in the preventive process that may have caused the particular SSI. Cases that had a postoperative infection were not revisited and abstracted as to the probable cause. Hence no specific recommendation may be offered.

It is likewise unclear whether hospital characteristics such as the hospital type, size, and location contributed to a considerable reduction of SSIs by stringent enforcement of SCIP compliance. More data is needed to evaluate if SCIP and SSI rates are associated with each other. It is recommended that future projects utilize as much SSI data (those from 2007-2015) as possible to establish a more robust baseline SSI rate trend during the SCIP compliant years to compare with the post SCIP year trends. On this note, thoughtful planning is reinforced as a critical element to any project development. Identifying and anticipating potential concerns or barriers from the beginning is essential

to developing effective strategies. It is also recommended that future studies undertake and look into specific quality process measure indicators that triggered a particular SSI to establish causality. This way, specific indicators may be looked into, and a more specific process or performance improvement initiative may be initiated.

## Summary

This scholarly project revisited and re-evaluated the quality improvement efforts brought about by the success of the evidence-based SCIP initiative implementation, standardizing and implementing surgical process measures at a national level. The Chi-square analysis was performed using the infection rates to determine if there was a significant difference between SCIP and SSI variables. It was concluded that there was a statistically significant difference in the reduction of SSI rates during the implementation of the SCIP Core Measure in 2014 and 2015 as compared to the infection rates in 2016 through 2018 (after SCIP). It is strongly recommended that organizations revisit and reevaluate their current SSI prevention processes and reference the evidence-based SCIP core measure to maintain the reduction of their postoperative infection rates effectively. It is essential that the current organizational processes are at par with the current evidence-based guideline recommendations available from various society and government regulatory agencies because there is strong evidence that the implementation of protocols that standardize practices reduce the risk of surgical infection (Rosenberger et al., 2011).

There will always be an opportunity for improvement in every process and on every occasion (Hughes, 2008). When organizations monitor compliance with procedures such as checking documentation, creating oversight committees, studying

trends, and report data, it has a positive impact on patient outcomes. (Hughes, 2008). Delivering EBP has multiple benefits, including a higher quality of care, improved reliability, enhanced patient outcomes, and reduced healthcare costs (Melnyk, 2013).

## Section 5: Dissemination Plan

Dissemination is the communication of clinical research and its clinical findings to bring new knowledge to the bedside (Dudley-Brown, 2016). It is essential to disseminate and share the information gained from a translation-of-evidence project to enhance the body of knowledge within the profession, thus furthering nursing science. Hence, dissemination is a significant, essential component of translation of evidence. Otherwise, no change will occur, and innovation will not be adopted (Dudley-Brown, 2016). DNP-prepared nurses have an ethical and professional obligation to disseminate findings. By assessing and reflecting on the success of our program design, the challenges encountered, and the ethical considerations that may warrant additional attention, professional growth is facilitated.

At the conclusion of this scholarly project, results will be reported at the Evidence-based Practice and Research Council at the project site during one of their quarterly meetings. Results from the project created a trigger to restart process improvement initiatives and elicit practice change within the current organization. My project led to a performance or quality improvement change recommendation based on the project outcomes. Another venue I have in mind are the monthly staff meetings and quarterly process and outcomes improvement committee meetings. This would be another excellent setting to reach potential stakeholders and healthcare team members.

The site for this scholarly project was an inpatient hospital setting with concentration on the perioperative patient population; hence, the Association of Perioperative Registered Nurses (AORN) journal is one venue I can publish the results of

my work. It may also be published in other peer-reviewed journals such as the World Views on Evidence Based Nursing, Infection Control and Hospital Epidemiology, or the Online Journal of Issues in Nursing. It may also be featured in quality improvement websites such as the Agency for Healthcare Research and Quality. These are excellent sites to reach a diverse audience of clinicians, scholars, and researchers in the field because these venues focus on the study, practice, impact, and outcomes of quality patient care and safety.

## Analysis of Self

The DNP Project was an opportunity for me to translate my acquired knowledge into practice. Preparing for the project allowed me to lay the groundwork for future scholarship and to make a potentially meaningful contribution to improving nursing practice and patient outcomes (Zaccagnini, & White, 2017). The end product reflects my critical thinking skills and our ability to translate research into practice. By integrating best research with clinical expertise and patient values for optimum care and participate in learning and research activities to the extent feasible, I am employing EBP (Stevens, 2013).

Scholarship and research are the hallmarks of doctoral education (AACN, 2006). According to the American Association of Colleges of Nursing's third Essential of Doctoral Education for Advanced Nursing Practice, the translation of research into practice and the dissemination and integration of new knowledge are key activities of a DNP graduate. They are expected to engage in ANP and provide leadership for EBP. My professional knowledge and expertise were developed throughout this project, as I

engaged in multiple intensive learning experiences. One learning experience was the design and implementation processes and the evaluation of outcomes of practice, practice patterns, and systems of care within a practice setting. Another experience was through designing, directing, and evaluating quality improvement methodologies to promote safe, timely, effective, efficient, equitable, and patient-centered care. In addition, my competence in the dissemination of findings from EBP and research to improve healthcare outcomes was also enhanced (AACN, 2006). My experiences in this scholarly journey will enable me to move forward as a contributor and leader within my field of practice.

## Summary

SSIs reflect a serious complication in modern healthcare (Purba et al., 2018) and are a substantial burden to healthcare systems and service payers in terms of patient morbidity, mortality, and additional costs. The absence of effective standardization makes it difficult for health care professionals to consistently provide the highest levels of care (Clancy, 2008). In order to address these issues, national programs for surgical quality performance and perioperative outcomes have been introduced as strategies to improve patient care and reduce complications (Tillman et al., 2013). Delivering EBP has been proven to have multiple benefits, including higher quality of care, improved reliability, enhanced patient outcomes, and reduced healthcare costs (Melnyk, 2013). There is strong evidence that the implementation of protocols that standardize practices reduce the risk of surgical infection (Rosenberger et al., 2011). The absence of effective standardization makes it difficult for health care professionals to consistently provide the

highest levels of care (Clancy, 2008). The SCIP initiative targeted complications that account for a significant portion of preventable morbidity. Adoption of these measures was supported by research attesting to their efficacy, and the development and implementation of these process-of-care measures have been endorsed by the NQF and other organizations that promote improvements in the quality of medical care (Bratzler & Houck, 2005a; Bratzler & Hunt, 2006; Clancy, 2008).

This scholarly project involved the retrospective review of data conducted on already available material which aimed to examine the relationship between SCIP infection-prevention process-of-care measures and postoperative infection rates between the years of high SCIP compliance, and several years after it was retired as a core measure. The nature of this project was a quality improvement evaluation. It revealed that there was a statistically significant difference in the reduction of SSI rates during the implementation of the SCIP years 2014 and 2015, as compared to the infection rates after SCIP retirement from 2016 to 2018.

"The SCIP is a transformational effort that combines scientific information about the prevention of complications with the will to work together on the issues and create a concrete plan for success" (Clancy, 2008, p. 621). It is strongly recommended that organizations revisit and reevaluate their current SSI prevention processes and reference the evidence-based SCIP core measure indicators to effectively maintain the reduction of their postoperative infection rates. Surveillance in compliance is also recommended to be adopted by organizations in order to ensure that focus is maintained on the impacts of SSI on healthcare costs and hospital LOS.

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Appendix: Collected Data