

2018

# Implementing a Surgical Pathway to Reduce Operating Room Cancellation Rates

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Implementing a Surgical Pathway to Reduce Operating Room Cancellation Rates

by

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Submitted in Partial Fulfillment of the Requirements

For the Degree of Doctor of Nursing Practice in

Nursing Practice

College of Nursing

University of South Carolina

2018

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## **Dedication**

This dissertation and all of my academic achievements are dedicated to my loving husband Dutch and my daughters, Mary Bradham and Delaney. With their continued support, this journey would not have been possible. Their continued love and support carried me through days when this journey seemed impossible.

## **Acknowledgements**

Dr. Stephanie Burgess, Committee Chair, who kept me focused to complete this project.

Dr. Sheryl Mitchell, 2<sup>nd</sup> Committee Member, for all the wonderful recommendations.

Dr. Abbas Tavakoli, Committee Member, for all the statistical help.

To all my work colleagues, thank you for your continued guidance and support.

To the surgical staff at the undisclosed VA Medical Center, I could not have done this without each of you.

To all my family and friends who made sure my family had meals when needed and my girls had rides to and from soccer practice.

## Abstract

Improving operating room efficiency is a high priority as health care cost become more challenging. In order to reduce surgical cancellation rates, a process improvement plan was implemented using a preoperative surgical pathway to optimize a patient's health prior to scheduling the surgical procedure. The surgical risk assessment tool risk stratifies the patient based on the urgency of the procedure, the type of procedure, and the patients overall medical disease state. The Surgical Risk Tool determines patients with surgical risk scores of 9 or greater require medical and/or cardiac clearance in addition to hemoglobin A1C of 8 or less and hypertension controlled with 160/90 or less in order to proceed with surgery. Following pre and post intervention, a total of 6,867 charts were reviewed for comparison. Data demonstrated that surgical cancellations were reduced from 22.9% to less than 15% after implementation of the surgical pathway at one-year post-implementation. The cost savings at one-year post-implementation was estimated to be \$1,156,000 and completion surgical rates increased from 80% to 90%. Implications for practice, policy, and research include a full system implementation of the Surgical Risk Tool, policies and procedures for process implementation, and continued data assessment to determine refinement of the intervention.

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## **Chapter I**

### **Introduction**

#### **1.1 Description of the clinical problem**

Hospitals are continually exploring methods to reduce operational cost while providing safe efficient delivery of healthcare in our changing healthcare system.

Implementation of the Affordable Health Care Act in 2010 for healthcare reform is one of the major driving forces to reduce cost on our financially burdened healthcare system as more Americans are seeking health care. Operating rooms are one of the most costly area of hospital operations, and with the growing concerns to lower health care costs, hospitals are faced with multiple mounting financial pressure. Surgical operating rooms are important resources for patient care and financial profitability and are often the largest contributors to a hospital's financial success. Surgical cancellations can negatively impact an organization's financial revenue; therefore, efficient utilization of operating room time is critical to reduce expenses.

An effort to improve operating room efficiency is a high priority as health care cost become more challenging. A slight delay in a case start time, lengthy turnover between surgical cases or time wasted searching for operating room equipment and supplies can severely hinder operating room efficiency resulting in a loss of revenue (Gamble, 2013). Despite surgery being the pillar for hospital profitably, there is limited

formal data on operating room cost because of the multiple variables associated to accurately calculate such information. According to Macario 2010, a 2005 study of 100 U.S. hospitals found that operating room costs range \$22-\$133 per minute with the average being \$62 per minute. The cost of unused operating room time in the VA has been estimated at \$600 per hour or \$10 per minute in 2009 dollars based on the total OR cost divided work hours minus material costs (Argo Vick, Graham, Itani, Bishop & Hawn, 2009). Operating room cost per minute can depend on multiple factors including reimbursement fee structures as determined by payer systems, complexity of the procedure, overhead expenses, and provider fees (Macario, 2010).

Veterans Health Administration (VHA) is a federal government health care system which provides health services to America's Veterans across the world. It is America's largest integrated healthcare system serving 8.76 million veterans each year at over 1,700 sites of care (US Department of Veterans Affairs, 2015). The undisclosed, large government medical facility is one the 1,700 VHA sites of care which opened in 1932 at its current location. This government medical center is a 216 authorized bed facility (206 operating as of July 2016), which includes acute medical, surgical, psychiatric, long-term care and provides primary, secondary, and tertiary care for veterans in the 8 surrounding areas (Dr. J.W. Randolph Bolton, personal communication, July 6, 2016). In Fiscal Year 2013 (FY13), this government medical facility gained 2.8 percent enrolled patients with a total of 75,813 unique patients including 6,381 female veterans and 15,829 Veterans from the Operation Iraq Freedom/Operation Enduring Freedom/Operation New Dawn periods of service. There were 936,424 outpatient visits and 5,005 inpatients treated at the undisclosed medical facility (VA, 2014). There were

3500 major surgery cases and 3000 minor surgical cases performed at this center during the fiscal year 2014 (Dr. Daniel Jorgenson, personal communication, February 15, 2015).

Regardless of VHA or private sector surgical care, a process to improve surgical care utilization is needed to improve operating room efficiency among all venues. Financial resources and utilization of services within the VHA system are carefully monitored to ensure efficiency and quality outcomes. In 2009, operating room time in the VHA system generated revenue estimated at \$600 per hour compared to \$1700-\$2025 per hour in the private sector therefore optimal use of operating room time is essential (Argo, Vick, Graham, Itani, Bishop & Hawn, 2009). During a 2013 visit to the government facility, the Office of the Inspector General recommended implementation of a surgical pathway for the preoperative and postoperative surgical process due to inefficiencies of operating room cancellations. Operating room cancellations have a negative financial burden for the institution, and may also generate dissatisfaction for the surgeon, anesthesiologist, operating room staff as well as the patient.

The national average operating room cancellation rates is 12.4% for the Veteran Affairs Southeast Network Medical Centers in this region which includes VA Centers in three states. Surgical cancellation rates at this government facility are higher than the national average: FY14 Q1-29.7%, FY14 Q2-31.5%, FY14 Q3-22.8% and FY14 Q4-22.2% (Dr. J.W. Randolph Bolton, personal communication, April 5, 2015). Based on this data and the Inspector General's recommendations, a surgical pathway is needed for quality improvement in surgical cancellation rates and surgical mortality by implementing a surgical pathway assessment tool for adult patients scheduled for elective

surgery who receive conscious sedation or general anesthesia. Currently, no surgical pathway tool is used at the government facility.

## **1.2 Scope of the problem and need for change**

In 2006, cancellations for elective surgical cases cost the VHA more than 32 million dollars in one year (Argo et al., 2009). Operating room cancellations rates for elective surgical cases at this local government facility have been higher than the national average for multiple reasons. During FY 2014, cancellation rates for 195 surgical cases were randomly reviewed for this medical center and results determined 51.2% of the cancellations were due to patient no shows, 25.1% due a change in treatment, 3.5% due to no anesthesia provider, and 18.9% due to clinical scheduling errors (Dr. Daniel Jorgenson, personal communication, February 28, 2015). Clinical scheduling errors include providers scheduling surgery beyond operating room staffing capacity, or scheduling patients for a wrong surgical date (Dr. J.W. Randolph Bolton, personal communication, July 7, 2015). According to research performed by Argo et al., 35% of operating room cancellations for elective surgical procedures were due to patients “not showing up” for their appointment, 28% were cancelled because of improper workup or health status change, and 20% of the elective cases were cancelled due to facility issues because of improper scheduling techniques (2009).

There were 1,231 cancelled operating room cases in FY14 for this local undisclosed governmental facility (personal communication, Dr. J.W. Randolph Bolton, September 28, 2015). Each cancellation results in an average of 1.4 hours (80 minutes) of lost OR time, resulting in an average of \$850 per case (Argo et al., 2009). Based on this data, the loss of revenue for OR cancellations is roughly \$1,046,350. Veterans are not

billed for services received within the VA; therefore, lost income revenue due to lost billing operating room suite time, lost provider billing time, inefficient use of staff scheduling, and finally lost revenue due to adverse patient outcomes such as delay in surgery or operative interventions can be difficult to accurately calculate (Dr. J.W. Randolph Bolton, personal communication, July 7, 2015). Comparing research from facility to facility can be difficult due to inconsistent classification categories for cancellations. Nationally, the VA captures operating room cancellations based on the following categories: (1) case moved to an earlier date, (2) clinical urgent or emergent case, (3) environmental issue, (4) patient health status, (5) patient related issue, (6) schedule issue for non-emergent cases, (7) staff issue, (8) unavailable bed, (9) unavailable equipment excluding reusable medical equipment, and (10) unavailable reusable medical equipment. To simplify data analysis, cancellations within the surgery department are captured based on four categories: patient action, change in health status, equipment issues, and other. Patient action includes the patient not showing for his/her appointment, having the surgery done at another facility, or change in patient's decision to have surgery. Change in health status includes cancellations based on change in health conditions. Equipment issues include all reusable and non-reusable equipment which could be a sterilization process issue with surgical instruments, fluoroscopy machine malfunctioning, prosthesis not available, laparoscopy equipment malfunctioning, or other equipment malfunctioning problems. Other category includes cancellations due to emergent or urgent add-on case which could cancel an elective case, inappropriate staffing issues, scheduling errors or other issues which could develop that are not in the aforementioned criteria. Based on this data and the Inspector General's recommendation,

a surgical pathway is needed to reduce operating room cancellations (Dr. Daniel Jorgenson, personal communication, February 28, 2015). The purpose of this quality improvement project is to implement a surgical pathway assessment which is a process to improve the preoperative workup phase to reduce operating room inefficiencies related to surgical cancellations and surgical mortality.

### **1.3 Practice innovation to address the problem**

The purpose of the surgical pathway is to reduce operating room cancellation rates and reduce surgical mortality by ensuring patient health optimization for surgery, timely scheduling, improve operating room efficiencies, while improving health and safety patient outcomes therefore reducing costs. Eleven surgical subspecialties will be targeted for implementing the surgical pathway: general surgery, orthopedics, plastics surgery, gynecology, podiatry, dental, otolaryngology, ophthalmology, thoracic surgery, vascular surgery, urology, and gastroenterology. The surgical pathway for the large governmental medical center will be executed utilizing a surgical risk assessment tool for all surgical subspecialties. Screening will be performed during the patient's initial consultation which will predict the mortality rate specific to the recommended surgical procedure and the individual's specific health conditions. In addition, the surgical risk assessment tool will determine if medical and/or cardiac clearances are necessary based on the total. In using the surgical risk tool, scores of 9 or greater warrant medical clearance and may also require cardiac clearance if the patient's medical history creates a concern.

The concept of a surgical pathway model is evolving and has been researched for the past forty years throughout North America, Europe and Australia and is often referred



to as a “Preoperative Surgical Home” in the United States (Kash, Cline, Menser, & Zhang, 2014). Review of the literature identifies evidence that the preoperative surgical home model or surgical pathway functions under the principle of a coordinated individualized surgical treatment and management plan from the time surgery is planned through the recovery post-operative period. Coordination is often lacking in the surgical care process. The preoperative surgical clinic will focus on the coordination of primary care, management of chronic diseases, and patient engagement in all aspects of the preoperative care process (Kash et al., 2014).

A strategic plan for implementing a surgical pathway at the government facility to deliver collaborative preoperative care to improve surgical care outcomes among all subspecialties has been established by directive from the Chief Medical Officer and the Chief Nursing Director. There are five fundamental goals of the preoperative surgical pathway: 1) to engage patients in the coordinated surgical care process, 2) to implement the surgical risk assessment scale to determine the need for additional preoperative medical or cardiology clearances to ensure optimal health, 3) to improve operating room efficiencies including reducing delays and increasing surgical facility throughput while optimizing equipment devices, 4) to improve coordination of postoperative care, and 5) to reduce surgical skin site infections with implementation of preoperative skin prep instructions. Preoperative assessment clinics are an important part of the preoperative process for reducing operating room cancellation rates and ensuring appropriate work-up is completed pre-operatively. In a 1996 study conducted by Pollard, Zboray and Mazze, benefits of using a preoperative clinic decreased outpatient surgery cancellation rates from 26% to 6% in only 6months (Argo et al., 2009). An aspect of the surgical pathway

implementation at the government facility includes developing a centralized pre-operative clinic which will be staffed by advanced nurse practitioners. The centralized preoperative clinic will provide standardized, coordinated care across many different subspecialties and ancillary departments using evidence based practice guidelines to direct care for surgical patients from the assessment phase through the day of surgery.

Patients requiring surgical care who meet the criteria for surgical intervention will be screened for comorbidities utilizing the Surgical Risk Scale (SRS) prior to referral to the preoperative clinic. The SRS assessment method is a concise, easy to use surgical tool to calculate a patient's surgical mortality risk prediction for the specific surgical procedure using a combined score from the Confidential Enquiry into Perioperative Death (CEPOD), American Society of Anesthesiology (ASA) and British United Provident Association (BUPA) calculations (Sutton, Bann, Brooks & Sarin, 2002).

Patients with a surgical risk score of 9 or greater correlate with a 2% or greater mortality rate based on the Veterans Affairs Surgical Quality Improvement Program (VASQIP) surgical risk indicator (Dr. Daniel Jorgenson, personal communication, January 2, 2015).

Patients with a 9 or greater are required to complete further surgical clearances from primary care, cardiology or other services as deemed medically necessary for both inpatient and outpatient preoperative assessments (Dr. Daniel Jorgenson, personal communication, January 2, 2015). A templated note utilizing the surgical scale is included in the patient's electronic medical record and prompts automatic medical and cardiac clearances if deemed appropriate based on the total surgical risk assessment score. Patients with a previous drug history also will have a urine drug screen (UDS) at the time surgical intervention is recommended. Also, a repeat urine drug screen is

performed the morning of surgery. If the UDS is positive for cocaine metabolites, the patient is referred to the Substance Abuse Treatment Program (SATP). An elective, non-emergent procedure will not be recommended until the patient has a negative UDS for cocaine due to the risk of death and increased morbidities with cocaine use and anesthesia.

#### **1.4 Statement of the purpose - Project PICOT question**

Understanding of the extraordinary cost associated with operating room cancellations has led healthcare administrators to explore opportunities to decrease elective surgical cancellation rates. The purpose of the study is to determine if pre-operative risk assessments and optimization of medical conditions for surgical patients will significantly reduce elective operating room surgical cancellations. Implementing a surgical pathway to include a preoperative assessment clinic would prepare patients for elective surgery positively impacting operating room efficiency. Therefore, will implementing a preoperative surgical pathway for adult surgery veteran patients undergoing elective surgical procedures reduce operating room cancellation rates 72 hours prior to the scheduled surgery over a 12-month period? The following table 1.1 poses the evidence-based practice question in PICOT format.

#### **1.5 Definition of terms**

Adult Patients-male and female patients over the age of 18years old

Veteran- is any person, who served honorably on active duty in the armed forces of the United States

Veteran Patient-veteran who is deemed eligible for healthcare benefits a under the Veterans Administration

Elective surgery- surgery that is scheduled in advance because it does not involve a medical emergency

Conscious Sedation- is a combination of medicines to help you relax (a sedative) and to block pain (an anesthetic) during a medical or dental procedure

General Anesthesia-anesthesia that affects the whole body and usually induces a loss of consciousness.

**Table 1.1: Evidence Based Practice Clinical Question in PICOT Format**

<b>Patient Population</b>	<b>Intervention</b>	<b>Comparison Intervention</b>	<b>Outcome</b>	<b>Timeframe</b>
Adult VA patients over 18 years of age who are scheduled for elective surgery utilizing conscious sedation or general anesthesia	Surgical pathway  Using a Surgical Risk Assessment Tool	No risk assessment	Reduce operating room cancellation rates by implementing a surgical risk assessment for surgical clearance using the following guidelines:  BP<160/90, HgbA1c <8, BMI <40 Surgical Risk <9, unless cleared	12 months

Surgical Risk Assessment Tool- a screening tool used to determine the amount or proportion of incidence of disease or death (or risk of disease or death) in individuals undergoing anesthesia related to their specific health risk factors

Mortality Rates- is a measure of the number of deaths (in general, or due to a specific cause) in a particular population, scaled to the size of that population, per unit of time.

Cancellation Rates- a decision to not proceed with a surgical intervention

Providers-includes physicians, nurse practitioners and physical assistants

Operating Room Efficiency- the ability to accomplish a surgical procedure during the period with the least amount of time loss and revenue loss

Operating Room Utilization- the amount of time to perform each surgical procedure including preparation of the patient in the operating room, anesthesia induction time, the surgical procedure and plus the total turnover time, divided by the available surgical time during a specific period

Preoperative Assessment Clinics- a designated clinic to provide early preoperative evaluations to optimize a patient's health with expectations to minimize surgical cancellations

Surgical Cancellation Rate-cancellation of surgery within 72 hours of scheduled surgery date

Preoperative Surgical Home- Implementation of practice guidelines and protocols to reduce surgical cost and ensure optimal health to include pre-operative risk assessments and optimization of medical conditions for surgical patients

Surgical Pathway- Phase 1-Implementation of a mortality predictor surgical risk scale screening tool. Phase 2-Implementation of a surgical preoperative clinic when funding available.

### **1.6 Assumptions**

1. All patients scheduled for a surgical procedure at the government facility requiring conscious sedation or general anesthesia will have a surgical risk assessment form completed in the medical record prior to surgery (patients requiring local anesthesia scheduled on the operating room are excluded).
2. Patients with a surgical risk assessment score of 9 or greater will receive the proper medical/cardiac/dental clearances as deemed medically necessary.
3. All surgical providers scheduling patients in the operating room for conscious sedation or general surgery procedures will use the surgical risk assessment tool with 95% or greater consistency.
4. All providers will adhere to the medical clearance recommendations for diabetes mellitus with hemoglobin A1C of less than 8 and blood pressure of 160/90 or less for elective surgical cases.
5. All new providers including surgeons, physician assistants, nurse practitioners and residents will receive training on use of the surgical risk assessment tool prior to gaining privileges to schedule patients in the operating room using the SharePoint scheduling package.
6. Surgical Risk Assessment Tool is a calculated score specific to the patients' individual health conditions and the type of surgical procedure to determine the patients' surgical mortality rates within 30 days post-operative period.

7. Surgical Risk Assessment Tool Score will be used by surgeons, nurse practitioners, and physician assistants for the surgery department at the government facility to reduce operating room cancellations rates scheduled surgery date by optimizing health conditions preoperatively. A score of 9 or greater requires surgical medical clearance and cardiac clearance if the patient has cardiac risk factors.
8. Patients with prior history of drug use will have an initial urine drug screen(UDS) if surgery is recommended and a repeat UDS the morning of surgery. If the UDS is positive for cocaine metabolites, surgery for non-emergent issues will be postponed and the patient will be referred to the Substance Abuse Treatment Program (SATP). Surgery for patients with cocaine metabolites present on a UDS increases the mortality risk and is not recommended for elective, non-emergent cases. Once the patient has completed the SATP program and has a negative UDS, then plans for surgery may proceed.

## **CHAPTER II**

### **LITERATURE REVIEW**

#### **2.1 Introduction**

Hospitals are continually exploring methods to reduce operational cost while providing safe efficient delivery of healthcare. Implementation of the Affordable Health Care Act in 2010 for healthcare reform is one of the major driving forces to reduce cost on the financially burdened healthcare system as more Americans are seeking healthcare. Operating rooms are one of the most costly areas of hospital operations, and with the growing concerns to lower healthcare costs, hospitals are faced with multiple mounting financial pressures. Surgical operating rooms are important resources for patient care and financial profitability, and often are the largest contributor to a hospital's financial success. Surgical cancellations are highly inefficient and can negatively impact an organization's financial revenue; therefore, efficient operating room time utilization is critical to reduce avoidable expenses.

In 2006, cancellations for elective surgery cases was estimated to cost the VA system a loss of more than \$32 million in revenue (Argo et al., 2009). Cancellations can be related to a variety of factors. Some can be influenced by the medical provider while other factors cannot. A medical provider cannot control if a patient is a "no-show" or if they have inadequate transportation. However, a medical provider can provide detailed preoperative instructions so the patient has a good understanding of expectations prior to surgery and also verifying the patients' health is optimal prior to scheduling the patient



for surgery. According to Argo et al., (2009), 35% of all cancellations were due to patients not having adequate transportation or failed to show “no-show” for a scheduled surgery, 28% of all cancellations were associated with changes in medical condition or inappropriate preoperative work-up, and 20% of all cancellations were the result of facility factors. The literature provided the evidenced-based research to support implementation of a quality improvement project to reduce avoidable cancellations to improve OR efficiency and decrease the loss revenue from surgery cancellations (Argo et al., 2009).

According to a study conducted by Tulane University Medical Center in 2009, 327 of the 4876 total cases were analyzed by characteristics and cost associated with surgery cancellations and determined 32.4 % of cancellations were due to patient “no-show” with an estimated loss of \$4,550 per case based on Medicare payment rates (Bent, Mora, Russo, Pierre, Rosinia & Campbell, 2012). Of the 327 cancelled cases, 13.8% had the following recorded reasons for cancellation: 44% accounted for patient illness the day of surgery, 24% due to failure to comply with preoperative instructions, and 31% due to institutional issues such as unavailable beds or equipment (Bent et al., 2012).

Redesigning the surgical work process, improving management and performing early evaluations of patients have been suggested to reduce operating room cancellation rates which will improve operating room efficiency and reduce lost revenue (Bent et al., 2012; Hovlid, Burke, Haug, Aslaksen & von Plessen, 2012).

Surgical cancellation rates for elective cases at a government medical facility were greater than the national average by 10-15% during fiscal year 2013; therefore, the Office of Inspector General recommended implementing a quality improvement process

to improve operating room efficiency. Utilizing a pre-operative assessment tool for adult patients who receive conscious sedation or general anesthesia can ensure optimal health and reduce surgical cancellations rates due to change in health status, which often is, considered an avoidable cancellation in many instances. Currently, no surgical pathway tool is used at the government medical facility.

The purpose of the study is to determine if pre-operative risk assessments and optimization of medical conditions for surgical patients will significantly reduce elective operating room surgical cancellations. Implementing a surgical pathway to include a preoperative assessment clinic would prepare patients for elective surgery positively impacting operating room efficiency and reducing lost revenue from cancellations.

The purpose of this chapter is to analyze the literature to guide the quality improvement process related to reducing surgical cancellation rates, improving operating room efficiency and reducing lost revenue associated with cancelled surgical procedures. Despite surgery being the pillar for hospital profitability, there is limited specific data for operating room cost because of the multiple variables to accurately calculate such information for both the private sector and the VA system (Dr. Dan Jorgenson, personal communication, January 2, 2015). While an exact calculation of lost revenue from surgical cancellations is difficult to calculate, the literature supports implementation of a surgical pathway to improve efficiency of the operating room. Improving coordination of care and management of surgical patients have been shown to increase quality care, reduce complications, increase the efficient and cost-effectiveness of preoperative care while also improving patients' perception of their surgical experience (Schweitzer, Fahy, Leib, Rosenquist, & Merrick, 2013). Optimizing a patient's medical conditions during the

preoperative period can also reduce mortality and morbidity rates for elective surgical procedures. Based on the literature review, it is proposed that utilizing a preoperative surgical risk assessment tool to measure if a patient health status is optimal during the preoperative, consultation period will reduce operating room cancellations for “change in patients’ medical condition” within 72 hours of the surgery date at the government medical facility.

## **2.2 Literature Search**

Initial literature review searches returned 132,000 articles. Of these, 21 article abstracts were reviewed to identify articles pertinent to the PICOT question based on the following: study was specific the Veteran population; study measured financial benefits for reducing elective surgical cancellations; study outlined categories for avoidable surgical cancellations; or the study measured improved patient outcomes with implementation of the surgical preoperative clinic. CINAHL, PubMed, Google Scholar and Wiley Online Library databases were searched. Key terms included Department of Veterans Affairs, preoperative surgery clinics, surgical risk assessment tools, surgical home models, reducing operating room cancellations, operating room efficiency, preoperative evaluations, surgery cancellations, risk stratification for surgery, process redesign, and improving quality surgical care. Data related to operating room cancellations rates is limited especially as it relates to the VA population. To date, there have been no published research studies providing benchmarks for operating room cancellation rates in the VA system (Argo et al., 2009). Due to the limited number of studies available, criteria for inclusion were articles publication between 1996-2015, published in English, and studies which were conducted on surgical cancellations and

operating room efficiency. There are limited studies specific to the VA operating room expenses within the past 5 years.

### **2.3 Analysis of the Literature for Utilizing a Preoperative Pathway to Reduce Operating Room Cancellations**

Reducing operating room cancellation rates began with the development of a clinical question using a PICOT format as defined by Melnyk & Finerout-Overholt (2011). An analysis of the literature was performed using the John Hopkins Nursing Evidence-Based Practice Model where 21 articles were reviewed (Dearholt & Dang, 2012).

Several systematic literature reviews focused on improving operating room efficiency, evaluating preoperative clinics for reducing surgical cancellations by achieving optimal preoperative medical health, reviewing average operating room costs to determine the need for a surgical preoperative screening assessment process, and researching surgical risk assessment tools to measure mortality and morbidity. Implementation of a surgical risk stratification tool during the preoperative period is a useful predictor to determine a patient's surgical risk undergoing specific surgical procedures which factors in the patient's overall health, type of procedure and the timing of the procedure. An effort to improve operating room efficiency is a high priority as health care cost become more challenging. Valuable information related to the PICOT question to reduce operating room cancellation rates is summarized in an evidence summary table format (see Appendix D). Articles are analyzed by levels and quality for improving operating room efficiency by reducing elective surgical cancellations utilizing a surgical pathway.

## 2.4 Level One

In a Level I experimental study utilizing a univariate logistic analysis method, the Surgical Risk Scale (SRS) was concluded to be a concise, easy to use tool to predict mortality and morbidity outcomes. The SRS does not over predict mortality for low-risk procedures ( $\beta=0.84$ ,  $P, 0.001$ ); therefore, this tool can be used as a surgical screening tool as a predictor to mortality (Sutton, Bann, Brooks & Sarin, 2002). The SRS encompasses 3 different scoring systems: the Confidential Enquiry into Preoperative Deaths (CEPOD) which scores the procedure based on urgency, the American Society of Anesthesiologist (ASA) which scores the patient based in the degree of systemic disease, and the British United Provident Association (BUPA) which scores the surgical procedure based on complexity of the surgical case. The multivariate logistic regression analysis for CEPOD ( $\beta=0.57$ ,  $P<0.001$ ), BUPA ( $\beta=0.37$ ,  $P < 0.001$ ) and ASA ( $\beta=1.68$ ,  $P<0.001$ ) revealed that each are independently significant predictive of death. Scores for the SRS can range from 3-14 with the higher the score indicating a higher mortality and morbidity rate. In comparing mortality and mortality rates at the government medical facility, it was determined that a 9 or greater SRS score would capture high risk surgical patients thus will require medical and/or cardiac clearances prior to being placed on the surgery schedule (Dr. Daniel Jorgenson, personal communication, February 15, 2015).

In a Level I experimental study conducted by Haufler and Harrington (2011), preoperative nurses reduced the day of surgery cancellation rate by 53% after implementing a nurse-to-patient script telephone call three business days before the scheduled surgery during a 6-month period that began July 2009. During the 18 months before implementing the nurse-to-patient call project began, 395 of the 6,564 scheduled

patients were cancelled on the day of surgery (6.01%); however during the six months after the project was implemented, 94 of the 2,124 patients cancelled on the day of surgery (4.43%) (Haufler & Harrington, 2011). Of the 6,564 cancelled surgeries, it was determined that 155 (2.36%) were for “no-shows” (NS), patient not adhering to not eating after the designated period (NPO) and patients who were not accompanied by a responsible adult (RA) or family member; however after implementation of the nurse-to-patient call project, the cancellation for NS, NPO and RA was reduced to 1.32% which resulted in a statistic significance with  $P < 0.05$  ( $z = 2.91$ ,  $P = 0.004$ ) (Haufler & Harrington, 2011). This data concludes a positive correlation between nurse-to-patient calls prior to surgery can reduce surgical cancellation rates.

## **2.5 Level Two**

In a Level II retrospective analysis case study conducted by Argo et al (2009), surgical case cancellation rates at 123 Veterans Administration facilities were retrieved from the scheduling software database to include 329,784 cases of which 40,988, 12.4%, were cancelled. In comparison, the surgical cancellation rate for elective surgical cases in the VA system typically range from 6.6% to 19.7% in contrast to the private sector, which is reported to have a 4.6%-6.3% cancellation rate (Argo et al., 2009).

Case cancellations were collected from 2006 scheduling software system from 123 VA facilities with surveys being distributed to 40 facilities (10 highest and 10 lowest cancellations rate facilities and for 10 high and 10 low volume facilities). The cancellations within in the VA were placed in 6 different categories and the cancellation rate for each was calculated: patient (35%), work-up/medical condition change (28%), facility (20%), surgeon (8%), anesthesia (1%), and miscellaneous (8%). The reason for

cancellations varied by the type of surgical service and among the VA facilities; however patient factors which included nonappearance or “no-show” was the most common reason for elective surgical cancellations in 2006 comprising 35% of all reasons for cancellation (Argo et al., 2009). In addition, patients receiving treatment at a VA facility may not have reliable transportation, a permanent home address where mail can be received, or have a functioning phone number making communication between providers and patients challenging (Argo et al., 2009). The second most common reason for surgical cancellations is related to inadequate medical workup for medical co-morbidities or an acute change in a medical condition, which accounts for 28% of the cancellations (Argo et al., 2009). VA patients typically have more medical problems and are likely to have poor health status compared to the general population (Argo et al., 2009).

Recommendations of this study included implementing interventions to decrease surgical cancellations caused by patient factors, inadequate preoperative work-up and controllable facility factors. Limitations of the study included inconsistent data collection methods, which may adversely affect data. In the past, there were 10,000 different reasons for surgical cancellations; however, this has subsequently been revised and data is now classified into one of six categories for improved data reliability (Argo et al., 2009).

In a Level II quasi-experimental study by Pollard and Olson (1999) from January 1, 1997 to March 31, 1997, patients were referred to a preoperative evaluation clinic directly from the outpatient surgery clinic after being evaluated by the surgeon and scheduled for a surgical procedure. The patients then underwent a nursing assessment prior to an evaluation by an anesthesia care team member. Lab data and medical records were reviewed prior to consultation with other specialists for medical clearance. With

institutional review board approval, patients were placed in a database depending on the timing of the preoperative evaluation prior to surgery. Of the 529 patients, 166 of the 529 (31%) received their preoperative evaluation within 24 hours of surgery (standard group) and 363 out of 529 (69%) received a preoperative evaluation within 2-30 days prior to surgery (early group). This study reflects strong evidence to support quality care improvement benefits for patients, clinicians, health administrators associated with reducing operating room cancellation rates by implementing a perioperative surgical risk pathway. There were 70 cancellations on the day of surgery, which were due to administrative problems. Cancellations rates were comparable between the standard (13.3%) and early (13.2%) groups. Limitations of this study included unequal sample size when comparing the early group versus the standard group although the groups were similar in terms of gender, age, physical status and percentage of patients undergoing major procedures. The American Society of Anesthesiology (ASA) physical status is a system for assessing the fitness of patients before surgery and were similar in both the standard and early group (Pollard and Olson, 1999). Another weakness of this study includes restricted surgery classifications to two types of surgeries: major or minor. Major surgery cases included surgeries for upper abdominal, intrathoracic or those requiring a blood crossmatch, whereas the other cases not considered major then were placed in minor surgery classification. In conclusion, outpatient preoperative evaluations can decrease operating room cancellations (Pollard & Olsen, 1999).

Comparably, a Level II retrospective study data supports an increase in the number of elective surgical cases performed after implementation of preoperative surgical risk assessment clinics (Knox, Myers, Wilson & Hurley, 2009). In this study,



the total number of surgeries performed in the study and control group were comparable, 1421 vs 1405 and excluded surgeries classified in the minor category. There was no statistical significance in the emergent surgeries between the two groups, 518 vs 569 respectively; therefore, these were excluded from the study as were the pediatric cases. According to Knox et al (2009), prior to the establishment of a pre-operative assessment clinic the case cancellations between the study group and control group was 114 vs 256 ( $p < 0.001$ ); however, after implementation of the pre-operative assessment clinic the number of elective adult cases increased by 12.7% from 723 to 815 cases completed. Pre-operative assessment clinics have proven to improve patient safety and satisfaction (Knox et. al, 2009).

In a Level II quasi-experimental study by Agha, Lofgren, VanRuiswyk & Layde (2000), a comparative analysis of health status and medical resource use was analyzed comparing VA versus non-VA patients to determine if VA patients are sicker than non-VA patients in general. Records of 128,099 patients from the National Health Survey from 1993 to 1994 were reviewed and compared to determine if the VA population had more medical problems than the non-VA population based on the self-report health status, number of medical conditions, number of outpatient visits, number of hospital admissions, and the number of hospital days per year (Agha et al., 2000). Prior to October 1998, eligibility to receive VA medical care was based on service-related medical conditions which is no longer the case. Veterans can be seen for nonservice-related conditions therefore many veterans seek care at the VA when they have no other medical resources. Of the 128,099 sample size, 18,338 (14%) were identified as veterans and of those, 666 (4%) use a VA medical clinic or hospital as their usual source of

medical care (Agha et al., 2000). The other 17,672 (96.3%) identified a non-VA facility as their usual source of medical care while 3,081 (2%) were unsure about their veteran status (Agha et al., 2000). In conclusion, the VA patient population had poorer health status (CI 95%), more medical conditions (CI 95%) and higher medical resource use for more physician visits and hospital admission/days spent in the hospital per year compared to the general population (Agha et al., 2000). However, after removing health and sociodemographic differences, the VA and non-VA patients had similar resource use (Agha et al., 2000). The data was collected by NHIS which limited the ability to differentiate veterans who received care at both the VA and non-VA facilities and the questionnaire did not include this information. Eligibility rules at the time of the survey may have influenced the data thus veterans who used the VA for only service-related conditions at the time this survey was completed may explain the low number of veterans (4%) utilizing the VA as a sole resource. Limitations of the NHIS sampling design underrepresented the elderly population and underestimated the hospitalizations (Agha et al., 2000).

## **2.6 Level Three**

In a Level III descriptive, non-experimental study conducted by Bassom and Butler (2006), operating room activity over a 1-year period from July 1 2004 to June 30, 2005 was analyzed using a survey that was emailed to surgery chiefs at 23 VA hospital systems. The results concluded that 87,180 cases were performed, 24 publications generated, and 560 trainee years of educations delivered in 168 operating rooms over 166,377 hours by 1,384 full-time equivalents surgical providers and 523 non-providers during this period (Bassom & Butler, 2006). Many VA hospitals contain equipped OR's

that were not currently staffed because of financial constraints or absence of perceived need; however, standardization of the surgical package across VA facilities vary from location. There were widespread differences in definitions and terms used in coding operating room delay and cancellations. Using a data-envelopment analysis rather than conventional single-ratio analysis could prove to facilitate improvements in operating room efficiency (Bassom & Butler, 2006).

In a Level III retrospective, qualitative study over an undefined 5-year period, 45,663 surgeries required anesthesia and of those, 67 (0.15%) were postponed or cancelled in the operating room. Further analysis determined that 70.2% of those were cancelled due to changes in medical conditions (Lau, Chen, Liou, Chou, & Hung, 2008). Approximately half of those cancelled (49.3%) were performed 8 days later without mortality or morbidity, 31.3% cancelled were not performed, and 13.4 % of the patients died during their hospitalization after surgery was performed (Lau et al., 2008). In review of the data, it is concluded that some cancellations may be defined differently as some institutions and data collection method may vary. Also, the 5 year period is not defined in this study.

In a Level III non-experimental, observational study conducted by McKendrick, Cumming & Lee (2014), 42,082 operating room cases were scheduled in the 194 bed United Kingdom District General Hospital over a 5-year period during April 1, 2006 to March 31, 2011 of which 28,928 surgical cases met the inclusion criteria. Procedures that did not require anesthesia were excluded. The cancellations were divided into two groups: those considered to be affected by the preoperative preparation and those that were not. Reasons for cancellations were compared between the two groups. The study

concluded that patients seen in the preoperative clinic reduced cancellations from 462 to 177 (78% to 42% respectively) ( $P < 0.001$ ) (McKendrick et al., 2014). Operating room cancellations were reduced by 50% when utilizing preoperative clinics by reducing the no-shows rate and the day of surgery cancellations rate. There was a decrease in cancellations due to patient no-shows ( $P < 0.001$ ) and medical reasons ( $P < 0.001$ ) but there was an increase in cancellations due to patients cancelling surgery ( $P = 0.002$ ). During the study period, the cancellation rate increased due to lack of bed availability and other administrative factors ( $P < 0.001$ ). In the study by McKendrick et al., surgical cancellations were 2.5 times higher in the last year of the 5-year period due to a variety of organizational issues and were not related to patient compliance or medical conditions (Souzdanitki & Narouze, 2014). Problems contributing to the rise in cancellations due to organizational issues related to equipment failure and no bed availability as the hospital was at full capacity (Souzdanitki & Narouze, 2014). Limitations of the study conducted by Souzdanitki and Narouze (2014) includes not investigating the cost effectiveness of the preoperative clinic, and collecting data over a lengthy five-year period. Authors suggested that incorporating telemedicine technology into routine preoperative care may help decrease cancellations rates (Souzdanitki & Narouze, 2014).

A Level III non-experimental study conducted by Seim, Fagerhaug, Ryen, Curran, Saether, Myhre and Sansberg (2009) involving two major university hospitals demonstrated similar cancellation rates. St. Olavs Hospital (Norwegian Hospital) cancellations rates were 14.58% in 2003 and 16.07% in 2004 compared to Massachusetts General Hospital (American Hospital) with a 16.52% cancellation rate during May 1, 2003 and April 30, 2004 (Seim et al., 2009). A high percentage of cancellations at the

American Hospital had no meaningful explanation for cancellations. Large cancellation rates were due to capacity constraints and administrative data only roughly captures the causes of cancellations. This study is limited to 2 hospitals in 2 different health care systems which are not comparable. There is a limited sample size for prospective data which makes the analysis vulnerable. A limitation of this study include a concern for interobserver reliability.

In a Level III retrospective qualitative chart review analysis, 6,524 surgical cases during July 1 through December 31, 2003 at the University of Chicago Hospital were analyzed (Ferschi, Tung, Sweitzer, Huo & Glick, 2005). Case cancellations and rates of first case-delay were cross-referenced with a database of patients in an anesthesia preoperative medicine clinics (APMC) for both general operating rooms and the same-day surgery suite. The data concluded that patients who were evaluated in the APMC had earlier first start times than patients not evaluated in the APMC in the operating room. In the same day surgery suite, 98 of the 1,164 (8.4%) APMC evaluated patients were cancelled in comparison to 366 of the 2,252 (16.2%) in the non-APMC group of patients ( $P<0.001$ ) (Ferschi, et al., 2005). In the general operating rooms, 87 of the 1,631 (5.3%) APMC-evaluated patients were cancelled as compared with 192 of 1,477 (13.0%) patients without an evaluation ( $P<0.001$ ) (Ferschi et al., 2005). The data strongly suggest preoperative clinics play a significant role in reducing case delays and cancellation rates. There are limited studies to reflect to outcome of APMC on decreasing cancellation rates and improving case delays.

Preoperative clinics have been shown to decrease operating room delays and cancellations by appropriately identifying and optimizing medical issues prior to surgery

to prevent delays or cancellations due to a change in medical conditions (Ferschi et al., 2005). In a Level III qualitative study, 5,083 patients seen in a preoperative clinic during a 3-month period between November 1, 2003 through January 31, 2004 at the Brigham and Women's Hospital in Boston, Massachusetts were reviewed and a total of 647 patients had a total of 680 medical issues requiring further information, 565 were from chronic medical issues and 115 were from new medical issues (Correll, Bader, Hull, Hsu, Tsen, and Heper, 2006). Many of the chronic medical issues could be addressed with retrieval of information while the new medical issues required additional testing or consultation with other specialties. The study determined that new medical conditions were responsible for 10.7% of delays and 6.8% of cancellations compared to chronic medical conditions which contributed to 0.6% of delays and 1.8% of cancellations (Correll et al., 2006). Optimization of the patient's medical condition before surgery has been found to decrease cancellations and delays which consequently decreases lost revenue due to operating room inefficiency. With utilizing the preoperative clinic, information was obtained in 93% of the patients with chronic conditions and 96% in those patients with new medical problems (Agha et al., 2000). Majority of the issues identified among the cancellations were cardiac in nature or needed to address anticoagulation the setting for surgical intervention thus cardiac or hematology consultations were most commonly generated as a result of the preoperative clinic. The most common change in management included the institution of beta-blockers to reduce perioperative cardiac risk factors. Cancellations typically results in a loss of revenue of \$1500 per case on average but could be more depending on the type of surgery. The cost for the preoperative clinic was calculated to cost the organization \$136.61 per patient

(Agha et al., 2000). If revenue can be collected from the surgical history and physical during the preoperative visit, then the preoperative clinic would provide a cost saving to the organization (Agha et al., 2000). The study included an adequate sample size but was conducted over a short 3-month period. The results support preoperative evaluations to reduce cancellations and delays which improves operating room efficiency and reduces lost revenue.

Cancelled elective operations were reviewed from a district general hospital between January 2003 to January 2004 in a Level III qualitative observational study by Sanjay, Dodds, Miller, Arumugam and Woodward (2007). In total, 13,455 operations were completed during the 12-month period, and 1,916 (14%) of cancellations were recorded of which 615 were day cases and 1,301 were inpatients (Sanjay et al., 2007). Forty-five percent of the cancellations occurred within 24 hours of the scheduled surgery date, and 51% were due to medical related reasons with 34% due to non-clinical reasons, and 15% were due to clinical reasons (Sanjay et al., 2007). Cancellation for inconvenient appointment times accounted for 18.5%, list running over (16%), patients thought they were not fit for surgery in 12.2% of the cancellations, and 9.4% were due to emergencies or traumas (Sanjay et al., 2007). Previous studies suggest a significant reduction in cancellations with the use of pre-admission clinics to reduce patient-related reasons such as finding a convenient time for the patient to have surgery. Also, contacting the patient by telephone a few days before surgery has proven to reduce cancellations in other studies. Elective surgeries cancellations due to emergencies and trauma, and cases running longer than expected are considered a non-clinical hospital issues which impacts overall operating room efficiency. Separation of emergency cases and trauma from

elective surgery list would be beneficial when determining cancellations rates.

Cancellation rates could be significantly improved by targeting resources to reduce patient-related cancellations and hospital non-clinical issues (Sanjay et al., 2007)

According to a Level III qualitative study, the goal for implementing a surgical risk assessment pathway is to increase the number of surgeries performed and reduce surgery cancellations through the redesigned perioperative pathway for elective surgeries. In a study conducted by Hovlid, Bukve, Haug, Aslaksen & von Plessen (2012), data was collected during April 2010 to February 2012 from a Norwegian District Hospital with 7 operating suites and 34 surgical beds for planned or performed operation which were cancelled. The entire process from referral to discharge was redesigned for elective surgical procedures. A surgical pathway was implemented to include the following 1) an electronic reception for referrals, 2) consultation with anesthesia team member preoperatively, 3) creation of a day-surgery center, 4) contacting patients by phone 2 days prior to surgery, and 5) implementation of the electronic medical record which improved communication between anesthesia and the surgical team (Hovlid et al., 2012). Cancellation rates were compared before and after implementation of the surgical pathway. The mean cancellation rate decreased from 8.5% to 4.9% ( $P < 0.001$ ) (Hovlid et al., 2012). The mean number of operations performed per month increased by 17% from 323 to 378 ( $p = 0.04$ ) likewise the number of consultations in the outpatient clinic increased per month from 2722 to 3021 ( $p = 0.006$ ) after implementation of the pathway (Hovlid et al., 2012). The mean number of scheduled operations per month increased from 373 to 400 ( $p = 0.04$ ) (Hovlid et al., 2012). The study concluded a sustained reduction of cancellations and an increase in the number of operations performed over a 2



year period. Observational and retrospective study designs have limitations of bias and confounding information and cannot always prove causality between interventions and observed outcomes.

In a Level III non-experimental study conducted by Neary, Prytherch, Foy, Heather & Earnshaw (2007), three preoperative assessment tools were used to predict the mortality rate for 141 patients when using the Portsmouth Physiological and Operative Severity Score. A comparison was conducted to compare the three tools used, the Enumeration of Mortality and Morbidity (P-POSSUM), Surgical Risk Scale (SRS), and Biochemistry and Haematology Outcome Model (BHOM). It was concluded that all three were equally predictive of postoperative outcomes; however, SRS has the advantage over P-POSSUM and BHOM due to its ease of calculation (Neary et al., 2007). A cohort consecutive study was conducted of 2,349 patients undergoing elective, non-cardiac surgery during a 12 month beginning July 1, 2001 at the United Kingdom Hospital. Within the 30 day postoperative period, data was recorded using four risk scoring systems; Goldman Revised Cardiac Risk Index (GRCRI), the Portsmouth modification of Physiological and Operative Severity Score for the Enumeration of Mortality and Morbidity (P-POSSUM), Surgical Risk Score (SRS) and the Biochemistry and Hematology Outcome Models (BHOM). Of the 141 patients reviewed, 6% died within the first days postoperative which increased to 10.8% during the 12-month period postoperative period and it was concluded that P-POSSUM, SRS and BHOM were all predictive of outcomes but the SRS was the easiest to calculate (Neary et al, 2007). ). The SRS developed in 2001 by Sutton, Bann, Brooks and Sarin aimed to simplify the risk stratification process and reduce the perceived overprediction of mortality by POSSUM

(Neary et al., 2007). The 2,349 patients in this study were trauma patients with a mean age of 47 and an ASA of I or II which does not compare to VA geriatric patient population over the age of 65 with a ASA of III or IV. Implementation of a surgical risk stratification tool during the preoperative period is a useful predictor to determine a patient's surgical risk undergoing specific surgical procedures which factors in the patient's overall health, type of procedure and the timing of the procedure. Limitations of this study were that most of the patients studied were trauma patients with a mean age of 47 years of age with an ASA score of I or II, however most of the VA Geriatric patients are an ASA of III or IV due to their medical complexity.

In a Level III qualitative study by Hovlid and Bukve (2014), the impact of contextual factors to reduce operating room cancellations were analyzed. Contextual factors can influence the improvement process which go beyond the interventions themselves for which change can occur. Twenty clinicians were interviewed at a Forde Hospital in Norway. Three common elements were identified to influence contextual factors in the change process: 1) identifying the need for change 2) facilitating a system-wide improvement 3) involving leadership for support (Hovlid & Bukve, 2014). Cancellations are caused by a sub-optimal functioning clinical system and requires change and improvement over the entire process (Hovlid & Bukve, 2014). Before change can occur, it is critical for the organization to identify a need for the change. Not only is developing a preoperative clinic important for reducing surgery cancellations, but also it is extremely important for clinicians to build an interdisciplinary collaborative approach when caring for preoperative surgical patients (Hovlid & Bukve, 2014). Improved communication, appropriate guidance, and expedient information technology are

essential as well. Using the MUSIQ (Model for Understanding Success in Quality) framework can guide change within an organization to implement a quality improvement process. Hovlid and Bukve (2014) found that contextual factors can reduce operating room cancellations when a clinical system is functioning sub-optimal. Findings are based on a single case study and should be interpreted with caution particularly since observational and retrospective studies are often subjective.

## **2.7 Level Four**

Over 400,000 patients were reviewed in a Level IV systematic review study analyzing data from 1994 to 2000, and determined a paradigm shift to perioperative medicine to reduce operating room cancellations, and decrease length of stay postoperative as a cost saving tool (Lee, Kerridge, Chui, Chui & Gin, 2011). Twenty-two of twenty-four studies published from 1994 to 2000 in North America (14), Europe (3), Australia (4) and Middle East (1) were reviewed and included a variety of surgical procedures thus the new perioperative system model was created as the “standard of care model” for surgical care to reduce cost and reduce length of stay (Lee et al., 2011). When utilizing the perioperative medicine model compared to the traditional system, outcomes from 22 primary studies indicated an increase in surgical volume and flow (20-35%), shorter preoperative length of stay ( -0.2 to -1.3 day), fewer cancelled surgery cases (absolute reduction 1-8% and relative reduction 22-55%), cost reduction (40-59% or preoperative investigations) and a reduction in wound infections (relative risk 0.30, 95% CI 0.12-0.78) (Lee et al., 2011). The study found a mean reduction in overall cost by 8-18% per patient using the perioperative pathway. Results of the perioperative pathway supports implementation of a preoperative assessment to achieve optimal health for the

patient, reduce lost revenue, and improve operating room efficiency due to avoidable surgery cancellation (Lee et al., 2011). Limitations of the study includes lack of specific reasons for cancellation categories without a specific beginning and ending date for data collection.

## **2.8 Level Five**

In one Level V utilization review study by Pollard, Zboray and Mazze (1996), cancellation rates for inpatient and outpatient surgical cases were reviewed during a 6-month period prior to implementing a perioperative clinic during December 1993 to May 1994. Cancellation rates were collected after implementing the preoperative clinic during December 1994 to May 1995. Data was compared pre- and post-implementation of the preoperative assessment clinic which indicated an increase from 104 to 524 total cases performed (420 case increase), thus determining a decrease in the outpatient cancellation rate from 26% to 6.6% during the first six months of opening a preoperative assessment clinic (Pollard, Zboray & Mazze, 1996). One third of the cancellations during the period before and after implementation of the preoperative assessment clinics were cancelled due to medical reasons and two-thirds were due to emergency surgery superseding elective cases, patients not adhering to NPO status, patients not having adequate transportation or a care giver, and failing to appear on the day of surgery. Limitations of this study include insufficient data to support the economic benefits directly related to the pre-operative clinic. Also, the data is from 1993 making the economic value obsolete compared to today's medical expenditures. Data reflected an increase in the number of surgical cases performed during December 1994 and May 1995 from 104 to 524 and felt to be directly related to the implementation of the perioperative surgical unit. The data

indicated a significant decreased in outpatient surgical cancellations rates from 26% to 6.6% ( $P < 0.001$ ) during the first six months after the perioperative unit was established (Pollard et al., 1996). There are a few limitations in this study. It is assumed the preoperative unit is directly related to the decreased cancellation surgical rate and increased surgical cases however, it does not include other factors that may influence this data such as increase in surgical suites, surgical staff or other administrative factors. Also, the data reports a decrease in length of stay as a result of the perioperative procedures however this could have been directly related to the reimbursement fees for surgeries paid per diem verses per procedure (Pollard et al., 1996).

Of the 21 articles used for the literature review, each article met inclusion criteria. Two of the studies were Level I evidence based articles, five Level II, twelve Level III, one Level IV and one Level V studies reviewed of which six non-experimental studies, three retrospective studies, three quasi-experimental studies, one systematic review, one utilization review, two experimental studies, and five qualitative studies reviewed.

## **2.9 Synthesis**

Fostering collaboration among providers and team staff to reduce supply costs, schedule operating room times by day instead of hourly, monitor for equipment problems, reduce start time tardiness, control lengthy room turnover times and reduce surgical cancellations can greatly reduce operating room insufficiencies (Beckers, 2015; Haufler & Harrington, 2011; Hovlid & Bukve, 2014; Lee et al., 2011; Schweitzer et al., 2013). Operating room cancellations contributes to decreased productivity, therefore negatively impacting revenue. Multiple variables are associated with cancellations rendering it difficult to accurately calculate operating room expenses. There is limited

formal data for precise operating room cost per surgical case for both the private sector and the VA system. According to Macario 2010, a 2005 study of 100 U.S. hospitals found that operating room costs range between \$22-\$133 per minute with the average being \$62 per minute. The cost of unused operating room time in the VA system has been estimated at \$850 per hour or \$10 per minute in 2009 dollars (Argo et al., 2009). Comparably, operating room delays have a significant financial consequence in the private sector with loss revenue ranging from \$1,430 to \$1,700 per hour (Ferschi et al., 2005). In 2006, elective surgical cases cancellations were estimated to cost the VA system a total of \$32 million in lost revenue (Argo et al., 2009). Based on 2009 Medicare rates from Tulane University Medical Center, outpatient surgical cancellations resulted in \$4,550 lost revenue per cancelled case or \$1,487,850 total lost income (Bent et al., 2012). Understanding the extent of lost revenue from OR cancellations can justify resources to prevent and improve the process which contribute to cancellations.

Of the 21 articles reported for this evidence-based practice project, none of the studies found a decrease in quality care of patient outcomes when using a surgical pathway. In fact, evidence supports instituting a surgical pathway to increase operating room efficiency, decrease avoidable surgical cancellations, and optimize a patient's health conditions prior to surgical intervention (Argo et al., 2009; Agha et al., 2000; Hovlid et al., 2012; Knox et al., 2009; Pollard & Olson, 1999; Pollard et al, 1996; Souzdanitki & Narouze, 2014; Sutton et al., 2002).

## **2.10 Recommendations for Practice Innovation -Recommendation One**

Following a site visit by the Office of Inspector General February 2014, a report indicated a slight delay in start time, lengthy room turnover, or inefficiencies related to

missing operating room equipment hindered operating room efficiency. Time is the most valuable resource for operating room efficiency. Best practices to assist in operating room efficiency include building support among the physicians to reduce supply costs, schedule operating room times by day instead of hourly, monitor for equipment problems, reduce start time tardiness and controlling lengthy room turnover times (Beckers, 2015). Implementing a surgical pathway will lead to improved, efficient operating room practices.

Reasons for surgical cancellations are often multifaceted and involve patients, organizational issues and clinical staff; however, the main reason for cancellations are due to patient no-shows, patient's medical conditions, overbooking of cases and facility inadequacies (Hovlid et al., 2012). Based on the evidence for best practice, more than 50% of cancellations can be avoided. Performing early clinical evaluations of surgical patients has been suggested to reduce cancellations, thus implementing a surgical risk stratification tool (SRS) can ensure a patient's health is optimal prior to scheduling the patient for an elective surgical procedure. The proposed plan includes implementing a surgical assessment tool during Phase I of the surgical pathway. Future development of a centralized surgical clinic will increase operating room efficiency and improve patient care and will be implemented during Phase II of the surgical pathway (Pollard et al., 1996). During phase I of the surgical pathway however, utilization of a SRS tool during the surgical consultation process will be implemented.

The Surgical Risk Score (SRS) is easy to use and has a low over-prediction mortality rate for low-risk procedures and it has proven to provide accurate mortality rates across the entire risk spectrum (Sutton et al., 2002). During the surgical consultation

period, the surgical team will complete a SRS scale in the electronic medical record if surgery is indicated. The SRS is a cumulative score of 3 variables: 1) CEPOD-which classifies the procedure as elective/scheduled/urgent or emergent; 2) BUPA-which categorizes the procedure as minor/intermediate/major/major-plus/complex-major; 3) A score of 9 or greater on the SRS will prompt the provider to order pre-operative medical and cardiac clearances. Some surgical procedures that involve a prosthetic device such as a total knee arthroplasty or total hip arthroplasty also requires a dental consult for surgical clearance. Recommendations for diabetes and hypertension management for the elective surgical patient must include an hgbA1C of less than 8 and blood pressure must be less than 160/90 on the past two blood pressure readings during the past six months (Dr. Dan Jorgenson, personal communication, January 2, 2015). Patients with a SRS of less than 9 can be scheduled in SharePoint, the surgical electronic scheduling system, without additional clearances unless the surgeon advises. The standard operating procedure for preoperative surgical clearance recommendations can be found in Appendix C. Patients with a positive UDS for cocaine metabolites will be referred to the SATP program and surgery for an elective procedure will be post-posed until the patient has a negative UDS for cocaine metabolites due to the increased mortality rate associated with cocaine and anesthetic medications (Dr. Dan Jorgenson, personal communication, January 2, 2015).

### **2.11 Recommendations for Practice Innovation -Recommendation Two**

A secondary recommendation for practice includes implementation of the centralized preoperative surgical clinic to increase quality surgical care, reduce complications, increase the operating room efficiency, and increase the cost efficiency while improving the patients' perception of the surgical experience (Hovlid et al., 2012).



All patients will be screened in the clinic area utilizing the SRS tool and then referred to the preoperative surgical clinic for coordinated team management regardless of the SRS score. According to the U.S. Census Bureau, between 2010 and 2050, the percentage of men and women aged 65 years and older will more than double, and this age group will increase by 20% of the total population by 2030. It was estimated in 2006, that men and women aged 65 and older will account for 35.3% of all inpatient surgical procedures and 32.1% of all outpatient procedures (Barclay, 2012).

## **2.12 Potential facilitators and barriers to innovation implementation**

The implementation of the surgical pathway is driven by several deficiencies and weakness in the patient delivery of surgical care at the government medical facility. With any innovation, change is often not accepted in the workplace and is considered a barrier. In order to make a change, commitment from the staff and organization must be obtained from the beginning of the process. Some barriers with implementing the surgical pathway at the military medical center includes inconsistent pre-operative testing among different providers, complex elderly population with multiple co-morbidities with less than desirable optimal health status for the recommended surgical procedure, and lack of transportation for the patients to show for their scheduled surgeries just to name a few.

The Chief of Surgery supports the use of evidence based practice to support a standardized, consistent preoperative workup for all patients. The Anesthesia personnel are supportive of the surgical pathway because it will provide coordinated care managed from the preoperative period through the post-discharge period. According to Schweitzer, Fahy, Leib, and Rosenquist (2013), improved coordination and management of the surgical patient not only has proven to decrease surgical complications, improve

quality surgical care, increase operating room efficiency and cost effectiveness, but also improves the patients perception of his or her surgical experience.

Second facilitators for this project are the Administrative Directors at the government medical facility and the Director for the VA Southeast Network who remain engaged and supportive of the medical center's action plan to improve the operating rooms inefficiencies by implementing the surgical pathway. As part of the surgical pathway to ensure medical clearances are adequate, a weekly meeting is held to discuss the patients with a SRS of 9 or greater. The high-risk committee members include the Chief of Surgery, Chief of Anesthesia, four to five physicians representing several subspecialties, nurse practitioners, and physician assistants, registered nurses, case managers and the VASQIP nursing data coordinator. Data is gathered for the mortality and morbidity (M&M) monthly reports as mandated by the Office of Inspector General.

### **2.13 Conclusion**

In conclusion, the results of the literature search yielded valuable and useful information. The literature review provided an evidence-based approach to address the PICOT question. There were numerous findings that indicate implementation of a surgical preoperative pathway will improve operating room efficiency and reduce lost revenue as a result of surgery cancellations while also improving quality patient care and reducing surgical comorbidities (Know et al., 2009; Neary et al., 2007; Pollard & Olson, 1999; Schweitzer et al., 2013; Sutton et al., 2002). The literature indicated the importance of reducing unanticipated cancellations for scheduled elective operations to decrease operating room inefficiency which leads to increased loss of revenue and increases patient dissatisfaction. Cancellations for elective surgery due to patient factors such as

“no-show” or inadequate transportation contributed to 35% of cancellations, 28% were due to changes in medical condition or inappropriate preoperative work-up, and 20% were due to facility factors (Argo et al., 2009; Bent et al., 2012; Correll et al., 2006; Knox et al., 2009; Lau et al., 2010; McKendrick et al., 2014; Sanjay et al., 2007; Schweitzer et al., 2013; Weinbroum et al., 2003). The literature provided the evidence-based research to support implementation of a quality improvement project to reduce avoidable cancellations to improve operating room efficiency and decrease the loss revenue from surgery cancellations. Implementing evidence-based practice can be a challenge, but ultimately leads to improved patient outcomes and standardization of care. Evidence supports use of clinical pathways to reduce unnecessary variation among clinical team members to improve health care quality outcomes for surgical patients. While many tools estimate a patient’s preoperative risk for a specific procedure, it is important to establish standardized clinical guidelines for optimal medical management of chronic disease processes to reduce postoperative surgical complications and reduce mortality and morbidity rates for the surgical patient. Use of a surgical preoperative screening tool such as the surgical risk scale (SRS) and implementing clinical guidelines will ensure optimal health of the patient is maximized prior to scheduling the patient of an elective surgical procedure.

## Chapter III

### Methodology

Chapter Three describes the details of the quality improvement process (QIP) design and implementation project for evaluating processes to reduce cancellation rates for elective surgical cases. Cancellation rates refers to those cancellations that involve frequency of the occurrence event  $r=m/n$  where  $m$  is the frequency with which an event occurred during a period of time and  $n$  is the number of persons exposed to the risk of the event during the same period of time. The purposes of the evidence-based project are to 1) develop an intervention to improve operating room efficiency, 2) reduce wasted OR time which negatively impacts financial revenue, 3) reduce surgical cancellations rates for elective cases for controllable factors such as inadequate preoperative work-up, changes in medical conditions, patient “no-shows” or non-compliance with preoperative instructions, 4) reduce mortality and morbidity surgical risks by implementing a process to optimize a patient’s health prior to an elective surgical procedure, and 5) monitor compliance of the surgical risk assessment tool. Positively influencing these factors may improve operating room efficiency by reducing lost revenue given that resources are becoming limited and more challenging for the future of healthcare. As the literature suggested, use of preoperative surgical clinics to ensure proper preoperative workup may lower cancellation rates compared to those who do not attend a preoperative assessment clinic (Ferschl et al., 2003).

### **3.1 Evidence-Based Project Design**

A quality improvement project design is implemented to reduce cancellation rates for elective surgical procedures. Statistical data for surgical cancellations 12 months prior to implementation of the SRS project will be compared to the statistical data for surgical cancellations following implementation of the SRS project during the period of January 2015 to January 2016. Evidence-based practice assisted in the design of the QI implementation process of the surgical pathway.

### **3.2 Unit of Analysis**

Operating room cancellations for the SRS QI project are categorized into 9 categories for data collection pre-implementation: 1) change in treatment or patient's health, 2) no available postoperative inpatient bed, 3) no consent, 4) no surgical equipment, 5) no available licensed independent surgical provider, 6) no pre-operative nursing assessment, 7) no reusable medical equipment, 8) patient action such as lack of transportation, positive drug screens or declined the procedure, and 9) other which includes administration issues, staff training, weather, or maintenance of the operating rooms.

Data will be collected to determine the overall cancellation rate for the nine categories pre-implementation of the surgical risk assessment scale. Operating room cancellation rates post-implementation of the SRS QI project include: 1) rescheduled case for an earlier date, 2) clinical urgent/emergent case overriding an elective case 3) environmental issue such as inclement weather or closure of operating room for repair, 4) change in patient's health status, 5) patient related issue including lack of transportation, positive drug screen or declined surgery, 6) schedule issues for a non-emergent case, 7)

staff issue, 8) unavailable bed, 9) unavailable equipment excluding reusable medical equipment, and 10) unavailable reusable medical equipment. The overall goal is to reduce cancellations due to change in health status by achieving optimal health prior to scheduling a surgical procedure. Surgical cancellations rates will be recorded on a monthly, quarterly and annual basis during the post-implementation period of January 2015 to January 2016 and compared to monthly cancellations rates during the pre-implementation period of January 2014 to January 2015. No demographics will be collected and no patient identifiers will be used that can be traced to the patient.

### **3.3 Sample**

The sample will include any adult patient over 18 scheduled to receive elective surgery but requiring conscious sedation, general anesthesia or monitored anesthesia care in the operating room and therefore, must have a surgical risk scale in the electronic medical record at the time the surgical procedure is scheduled. Patients receiving a local anesthetic such a lidocaine or marcaine in the operating room are excluded from the surgical risk scale requirement because local anesthetics have lower risk of complications compared to general anesthesia, conscious sedations and monitored anesthesia care (Dr. Dan Jorgenson, personal communication, February 10, 2015). The average number of surgical cases performed monthly at the facility range from 209-346 (Dr. Randy Bolton, personal communication, April 7, 2015).

Group sample sizes of 943 in pre-intervention and 943 in post-intervention achieve 80 % power to detect a difference between the group proportions of 0.05. The proportion in pre-intervention is assumed 0.20 under the null hypothesis and 0.15 under the alternative hypothesis. The test statistic used is the two-sample proportion Z-test for

cancellations. The significance level of the test is 0.0500. Data will be entered into SAS9.4. The frequency distribution will include for categorical variables. Central tendency (mean and median) and measures of spread (standard deviation and range) will report for continuous variables. P-values less than or equal to .05 will be considered significant.

### **3.4 Setting**

The setting for the DNP project is in the surgery department at a large government 16 inpatient bed acute care facility located in the Southeast. The facility performs 3,445 surgical cases annually (Dr. Randy Bolton, personal communication, April 10, 2015). Eleven surgical subspecialties were involved in this improvement project: general surgery, orthopedics, plastics surgery, gynecology, podiatry, dental, otolaryngology, ophthalmology, thoracic surgery, vascular surgery, urology, dental and gastroenterology.

### **3.5 Outcomes to be measured**

Operating room cancellations are monitored on a monthly, quarterly, and annually basis. Once a patient is scheduled for surgery in the electronic surgery scheduling system known as SharePoint, cancellation at any time is recorded as a cancellation and is counted against the facility in the National Surgical Database. Cases cancelled at 6 weeks or 6 months in advance counts the same as a day of surgery cancellation. Surgical cancellations are monitored and recorded by surgery operating room scheduler and are reported in a local facility report. Both the local and national data statistics are compared on a monthly basis to verify data accuracy. The reports are submitted to the Operating Room Clinical Manager and the Chief of Surgery which is reported monthly to a Surgical Work Group, and the Medical Executive Board Committee. The PENTAD Leadership

team which includes the Medical Center Director, Associate Medical Director, Associate Director of Patient Care Services, Chief of Medical Staff, and the Assistant Director are informed of the cancellation rates and reasons for cancellations on a daily basis during morning report.

The surgical risk assessment developed by Sutton et al. (2002) is completed by the medical provider and entered in the patient's chart at the time surgery is scheduled, Table 3.1. Patients with a total surgical risk score of 9 or greater is required to undergo medical and/or cardiac clearance prior to scheduling the patient for surgery. Monthly audits of 30 random patients are performed to measure accuracy of provider use of the surgical risk assessment tool for patients who are scheduled in Sharepoint. The Chief of Surgery is provided a list of the providers who fail to complete the surgical risk assessment tool at the monthly Surgical Work Group Committee. The cancellation data form, Appendix A, is completed for each cancellation and data is collected on a daily basis.

### **3.6 Model of Research Utilization**

The Plan-Do-Study-Act (PDSA) Quality Improvement Model is a four-stage problem solving model used for improving a process or carrying out change. This PDSA model is an ongoing process that improves healthcare in a continuous cycle and aims to include patient safety, effective services based in scientific knowledge, patient centered care, reduced patient time delays, efficient use of energy, ideas, and supplies and equitable care provided to all patients ("What is Quality", 2013). Factors related to patient safety, quality, and evidenced-based practice are driving changes in healthcare.



The PDSA model (Appendix B) is the framework used to guide implementation of the surgical pathway and surgical risk scale for predicting mortality for surgical patients. The PDSA Model aims to answers three key questions: 1) What are we trying to accomplish? 2) How do we know if the change is an improvement? 3) What changes can we make that will result in improvement?

**Table 3.1: Surgical Risk Assessment Scale developed by Sutton, Bann, Brooks & Sarin, 2002**

<b>CEPOD</b>		
1	Elective	Routine booked non-urgent case
2	Scheduled	Booked Admission
3	Urgent	Cases requiring treatment within 24-48 hours of admission
4	Emergency	Cases requiring immediate treatment
<b>BUPA</b>		
1	Minor	Removal of cyst or skin lesion
2	Intermediate	Unilateral Hernia, Colonoscopy
3	Major	Appendectomy
4	Major Plus	Gastrectomy or colectomy
5	Complex	Vascular surgery, extensive abdominal surgery, limb salvage
<b>ASA</b>		
1	I	No systemic disease
2	II	Mild systemic disease
3	III	Systemic disease affecting activity
4	IV	Serious disease but not morbid
5	V	Moribund, not expected to survive
Total score of CEOPD, BUPA, ASA		

### 3.7 Plan-Do-Study-Act Model Application

The PDSA cycle configures a quality improvement guide, which offers a framework for planning a process, developing, testing, and implementing changes leading to improvement. During the Plan stage, the organization understands the nature of

the current problem and has ideas as to how to alleviate the problem. An organization identifies persons affected by the change and keeps those informed to ensure buy-in which results in effective change. Testing the change is the Do stage. An organization tests the change and determines the measured change during the Study stage. An analysis of the data occurs during this stage and provides answers from the Study stage for the Act stage. If there were no improvements during the Act stage, then the organization could move to the Plan stage to reconsider new options for implementation (ASQ, 2004).

Recommendations to improve operating room efficiency and reduce surgery cancellations rates were established based on research evaluated for reducing operating room cancellation rates to improve operating room efficiency is the main objective. Changes to the preoperative screening process will be implemented and closely measured monthly to determine effectiveness. The process can be modified at any time during its development to become more effective.

### **3.8 Description of the intervention**

A Standard Operating Procedure was developed by the project implementer and approved by the Chief of Surgery (Appendix C). Surgical providers and nursing staff for this facility were informed of the surgical scheduling changes at a monthly staff meeting 2 months before implementation of the new process. Providers were informed of the new process and formal training sessions were scheduled for each subspecialty department. Attendance of providers were recorded. After contacting the Chief of the specific service line, providers were emailed a powerpoint tutorial for scheduling patients in the electronic scheduling program, Sharepoint. Each provider scheduled a one-on-one training session with project investigator. During this training session, each provider

demonstrated appropriate use of the tool along with proper documentation in the electronic medical record. Written instructions for utilization of the surgical risk assessment tool were provided. After completion of the training, the surgery scheduler approves access to SharePoint for the trained provider.

The surgical risk assessment tool measures three important areas to determine if the patient is in optimal health prior to surgery. These three areas evaluate the patient's current health status, the type of procedure and the urgency of procedure. The first measure of the surgical risk scale is the Confidential Enquiry into Perioperative Deaths (CEOPD) which measures whether the surgery is considered elective, scheduled, urgent or emergent. Elective is booked as a non-urgent case which equals 1 point. Scheduled is considered a booked admission to undergo the surgery procedure and equals 2 points. Urgent is considered a booked admission needed to undergo surgery within 24-48 hours of an admission and equals 3 points. Emergent requires surgery emergently and is equal 4 points (Sutton et al., 2002). The second measure of the surgical risk assessment scale is the British United Provident Association (BUPA) which measures the type of surgical procedure required and will be classified as minor, intermediate, major, major plus, or complex major. A minor surgical case for example is the excision of a cyst and equals a score of 1 point. An intermediate case for example is a hernia repair or colonoscopy and equals a score of 2 points. A major surgery for example is an appendectomy or cholecystectomy and equals a score of 3 points. A major plus for example is a total knee replacement or gastrectomy and equals a score of 4 points. A complex major for examples is a carotid endarterectomy, abdominal aortic aneurysm repair or limb salvage and equals a score of 5 points (Sutton et al., 2002). The more complex the surgery, the

higher the BUPA score. Providers are provided a BUPA scale during training for their particular subspecialty for accurate scoring of procedures. The third measure is the American Society of Anesthesiologist (ASA) guideline that measures the patient's baseline health status into categorical points. An ASA I equals 1 point and is defined as the patient has no systemic disease. An ASA of II equals 2 points and is defined as mild systemic disease. An ASA of III equals 3 points and is defined as systemic disease affecting activity. An ASA of IV equals 4 points and is defined a serious disease but not moribund. An ASA of V equals 5 points and is defined moribund disease state and not expected to survive (Sutton et al., 2002). During the one-on-one training session, providers are given an ASA guide to accurately measure the patient's current health state. Providers and nursing staff complete the initial training and have continued access to the implementation coordinator for questions or concerns.

### **3.9 Feasibility**

There are several promoters to feasibility of the quality improvement project, such as:

1. Readiness for change. The facility has transitioned to providing surgical care to reduce surgical cancellations rates.
2. Availability of subjects. Patients requiring surgical intervention are prepared for surgery to reduce cancellations related to medical factors.
3. Accessibility to the setting and time to conduct the project. The researcher is a full-time employee at the government hospital and will have time to devote to data collection and implementation of the project.
4. Supportive stakeholders (the medical center director, associate medical director, associate director of patient care services, chief of medical staff, assistant director,

- nurse practitioners, physician assistants, physicians, nurse case managers and operating room staff). The stakeholders are supportive of the project.
5. The researcher has a supportive and knowledgeable DNP project committee to guide her as she plans and implements the quality improvement project.
  6. There are no financial burdens involved in the implementation of the project.
  7. Availability of electronic template for providers to document the surgical risk assessment score. Scores with a 9 or greater are reported on a weekly basis and discussed in a formal surgical risk group meeting weekly. The researcher has full access to the EMR that banks the Surgical Risk Assessment Scale.

There are potential barriers to the feasibility of the quality improvement project, such as:

1. Providers may score the SRS incorrectly since the information is complex.
2. Providers may fail to use the SRS prior to scheduling the patient for surgery.
3. Staff may receive incorrect information and training from non-proficient employees.
4. SRS scale is useful for elective surgical cases when time is permitted to optimize medical conditions and may not apply to emergent cases.
5. Inconsistent pre-operative testing among different providers.
6. Complex elderly population with multiple co-morbidities with less than desirable optimal health status for the recommended surgical procedure.
7. Lack of transportation for the patients to show for their scheduled surgeries.
8. Lack of patient involvement in his or her care.
9. Infrastructure issues with operating room staffing that can potentially close operating rooms.

10. Reusable Medical Equipment (RME) not available.

### 3.10 Instruments

For all patients receiving general anesthesia or conscious sedation in the operating room, completion of surgical risk scale (SRS) assessment is required prior to scheduling the patient for surgery. The SRS attempts to capture patients with a higher mortality and morbidity rate needing surgical clearance prior to scheduling for surgery. The SRS tool was developed by Sutton, Bann, Brooks and Sarin (2002) by combining three preoperative risk tools; the Confidential Enquiry into Perioperative Deaths (CEPOD), American Society of Anesthesiology (ASA) and British United Provider Association (BUPA) which is included for review in Table 3.1. The CEPOD outlines parameters based on the urgency of the procedure: 1=elective, 2=scheduled, 3=urgent, and 4=emergent. The BUPA outlines the risk associated with the type of procedure performed: 1=minor, 2=intermediate, 3=major, 4=major plus, and 5=complex major. The ASA outlines the patient's overall health risk: 1=no systemic disease, 2= mild systemic disease, 3=systemic disease affecting activity, 4= serious disease but not moribund, and 5=moribund, not expecting to survive (Sutton et al., 2002). If the SRS total score is 9 or greater, the patient must postpone elective surgery and complete medical and cardiac clearances. If the patient scores 8 or less on the SRS, he or she can be placed on the electronic surgery schedule known as SharePoint. Locally, data is captured for patients cancelled within 72hours, 24hours and the day of surgery. The SRS scores can range from 3-14 with the higher the score indicating a higher mortality and morbidity rate. The goal of the SRS is to avoid scheduling patients for surgery who have a greater than 2%

mortality rate (SRS of 9 or greater) prior to completing medical and cardiac clearances for elective surgical procedures.

### **3.11 Procedure**

The SRS surgical assessment tool with CEPOD, BUPA and ASA sections were adapted to an electronic medical record note. The orthopedic department was the first surgical subspecialty to implement the process followed by the other services after educational training was provided to the medical and nursing staff for each department. Each department was trained on proper scheduling of patients in the electronic scheduling system Sharepoint. The scheduling coordinator for the operating room maintained records of cancellations and reasons for cancellations. These files were submitted to the researcher on a monthly basis and an audit of a minimum 30 random patients were reviewed monthly to determine consistent use of the SRS tool among surgical providers. The chief of surgery reviews all cancellations and collects data locally. Cancellation rates are shared with administrative personnel on a quarterly basis. Cancellation rates are also entered into the Veterans Administration Surgery Quarterly Improvement Program (VASQIP) national database by the VASQIP researcher. Cancellation rates are compared quarterly at all VA Medical Centers using the VASQIP data. Local data is collected at the medical center and compared to the national data for accuracy on a quarterly basis. VASQIP also measures 30-day postoperative mortality rates based on reportable criteria.

**Table 3.2. Procedural Steps for DNP Project Timeline**

Steps	Procedure	Timeline
1	Original proposal for surgical pathway written and presented to Leadership at the government medical facility	8/1/2014
2	Providers informed and educated about the QI project	9/1/2014
3	Policies and Procedures for the surgical pathway developed and approved	9/1/2014
4	Implementing and monitoring the Standard Operating Procedure for the Surgical Pathway	9/1/2014 continuous
5	Surgical Pathway phase I-Implementation of the SRS tool as Pilot with Orthopedics	10/1/2014
6	Surgical Pathway phase I-Implementation of the SRS tool with all subspecialties	1/1/2015
7	Monitoring of cancellation data weekly	10/1/2014
8	3-month preliminary SRS evaluation period	3/30/2015
9	Monthly surgical workgroup meeting to review data and provider use of tool	1/1/2015
10	Evaluation of the Surgical Pathway Jan 2015-Jan 2016	1/1/2016
11	Monthly surgical workgroup meeting to review data and provider use of tool	1/1/2015
12	Evaluation of the Surgical Pathway Jan 2015-Jan 2016	1/1/2016
13	University of South Carolina Institutional Board Review (IRB) Approval	7/1/2017
14	Data Retrieval	7/1/2017
15	Data Analysis	7/1/2017

### 3.12 Data Analysis

The test statistic used is the two-sided Z-Test with unpooled variance. The significance level of the test is 0.0500. Inferential statistics include a two sample proportion test for cancellation using Z-testing variables pre-intervention and post-intervention by chart review. Local data is collected for surgical cancellation reasons and are placed in one of nine categories for data collection pre-implementation and post-implementation: 1) change in treatment or patient's health, 2) no available OR bed, 3) no consent, 4) no OR equipment, 5) no licensed independent surgical provider, 6) no pre-



operative nursing assessment, 7) no reusable OR equipment, 8) patient action such as lack of transportation, positive drug screens or declined the procedure,, and 9) other which includes administration issues, staff training, weather or maintenance of the operating rooms. Data will be collected to determine if the overall cancellation rate decreased after implementation of the surgical risk assessment scale. Pre-intervention and post-intervention data will be analyzed using a two proportion Z-test.

### **3.13 Human Subjects Protection**

After approval from the University of South Carolina Institutional Board Review (Appendix E) and the government medical facility (Appendix F) is obtained as an exempt study for a quality improvement project, data is collected from charts of patients who are scheduled for elective surgery that require general anesthesia. Data is collected before and after implementation of the Surgical Risk Scale (SRS) assessment tool. No personal or identifying information is collected that can be traced back to the patient's healthcare record. Data will be maintained in a secure, password protected flash drive that is encrypted for protection. Any hard copies of the de-identified data will be kept in a locked filing cabinet in a locked office of the investigator. Only members of the DNP project team will have access to the data.

### **3.14 Summary**

The evidenced based quality improvement project questions will be answered using a descriptive study analyzing outcomes for cancellation rates using the SRS tool. IRB approval from both the government medical center and the University of South Carolina was obtained (Appendix E and Appendix F). Data analysis will be performed to examine the outcome variables. Chapter 4 will discuss the results of the data collection.

## Chapter IV

### Results

#### 4.1 Introduction

The purpose of this chapter is to present the findings, conclusions and implications for nursing practice and future evidence-based projects and dissemination activities for this quality improvement project. The purpose of this DNP project was to compare operating room cancellation rates pre- and post-implementation of the surgical risk assessment to determine if cancellation rates would be reduced using a preoperative screening tool to optimize a patient's health status prior to scheduling for a surgical procedure. This quality improvement project assessed whether implementation of the Surgical Risk Assessment Scale developed by Sutton et al and implementation of surgical guidelines would meet the organizational goal to reduce surgical cancellation rates (2012). The findings will be presented in relation to the primary questions discussed in chapter three. Will implementing a surgical risk assessment scale for surgical clearance using the following guidelines: BP<160/90, HgbA1c of less than 8, BMI of less than 40, and surgical risk score of less than 9, reduce surgical cancellation rates for adult VA patients less than 18 years of age, receiving general anesthesia or conscious sedation?

The data was collected by medical chart review and operating room schedules from 12-months prior and post-implementation of this quality improvement process. Monthly cancellation rates during January-December 2014, FY14Q3 through FY15Q1, prior to implementation of the quality improvement process was compared to

cancellations rates post-implementation during January-December 2015, FY15Q2 through FY16Q1. The total number of cases scheduled and total number of cases cancelled beginning January 2014 for a 12month period (pre-implementation) were compared to the total number of surgical cases scheduled and cancelled beginning January 2015 for a 12month period (post-implementation).

#### **4.2 Sample**

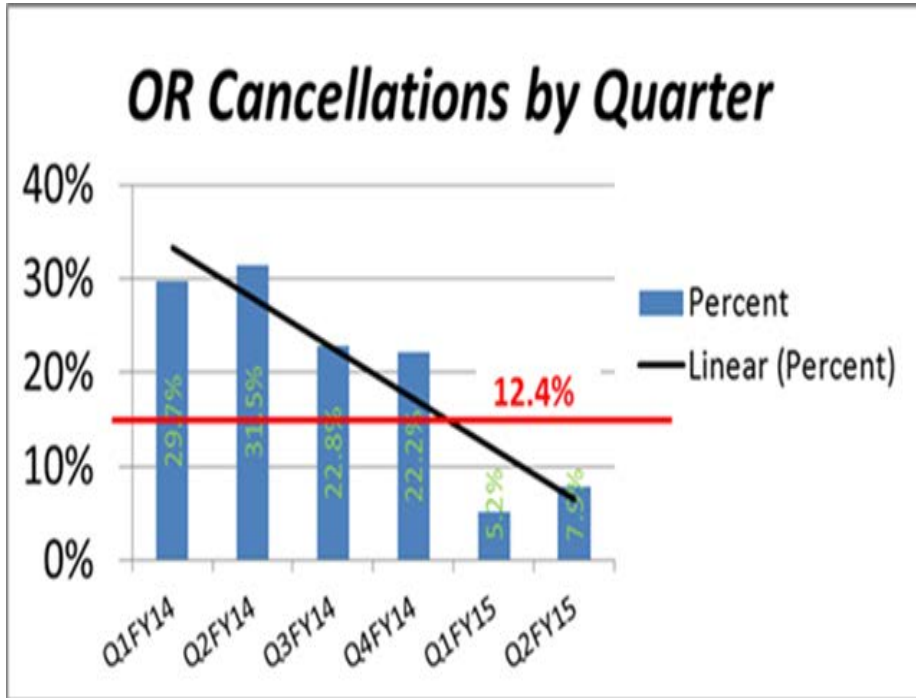
Scheduled and cancelled surgical cases for 2014 and 2015 are located in Table 4.5. The total number of surgical cases performed for 2014 was 2980 and the total cancelled cases was 582, which means that roughly 19.5% of all scheduled cases for 2014 were cancelled. The implementation of the surgical risk assessment and recommended surgical guidelines were implemented in January of 2015. The total number of scheduled and cancelled cases for 2015 can be found in Table 4.5. The total number of cases scheduled for 2015 was 3887 and 354 of those were cancelled, which equals a 9.1% overall cancellation average for 2015.

#### **4.3 Findings**

Data was collected retrospectively during a 12-month time period to identify the number of surgical cancellations. The pre-implementation cancellation rate was 29.7% during FY14Q1, October 2013 to December 2013. Post-implementation data began for FY14Q2, January 2014-March 2014, which revealed a 31.5 % cancellation rate and was slightly increased due to operating room closure for equipment repair. During April through June 2014, FY14Q3, the cancellation rate decreased to 22.8% and during July through September 2014, FY14Q4, the cancellation rate was 22.2%. The quality improvement project began for FY15Q1, October 2014-December 2014. There was a

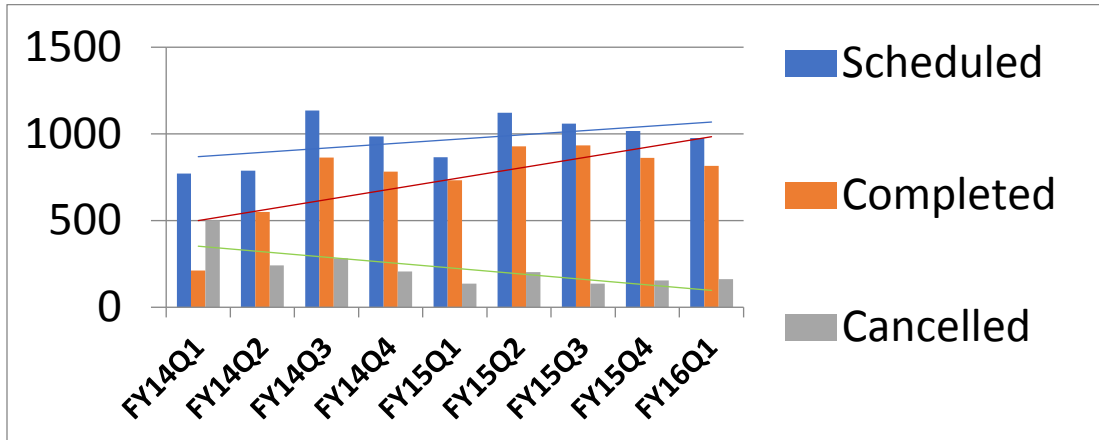
significant reduction in cancellations to 5.2% during FY15Q1 and FY15Q2 after implementing the quality improvement project. See Table 4.1

**Table 4.1 Operating Room Cancellations by Quarter**

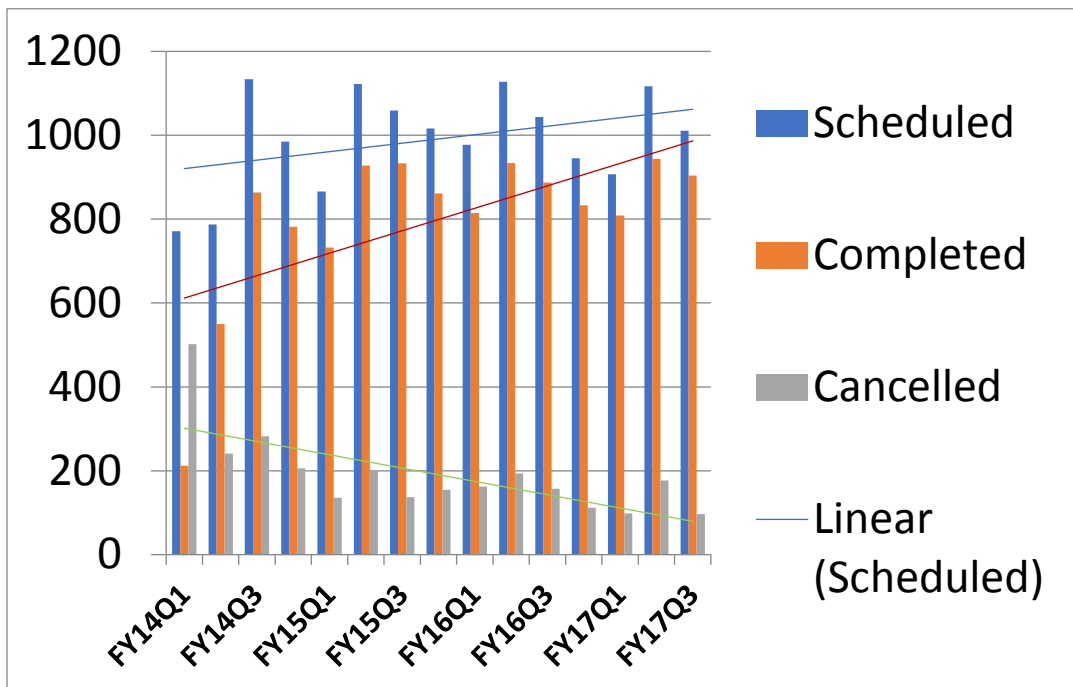


At one-year and two-year post implementation, the number of cancellations have remained below the national average of 12.4% while the number of completed surgical cases have continued to increase from the initial implementation data. See table 4.2 and 4.3. The factors identified as common, potentially preventable reasons form cancellations included: medical instability (i.e. uncontrolled hypertension); body mass index (BMI) >40 kg/m<sup>2</sup>; hemoglobin A1c >8; abnormal labs and/or studies; necessity for referral to specialist; dental clearances; patient-initiated cancellations; active infections (e.g. wounds, urinary tract infections, upper respiratory infection, sinus infections, tooth infection, fever) or a surgical risk assessment score of 9 or greater.

**Table 4.2 Quarterly Caseload for 1-year post implementation**



**Table 4.3 Quarterly Caseloads for 2-year post Implementation**



Implementation of the quality improvement process began January 2015, FY14Q3. Data was collected for a 12month period post implementation of the quality improvement process and compared to the 12month period pre-implementation. There were a total number of 2980 cases scheduled from February-December 2014, the period prior to implementation of the QI project. The operating room was closed for repairs

during January 2015 which is noted with a slight increase in the cancellation rate during FY14Q3. There were 582 surgical cases cancelled during January 2014-December 2014, with the average cancellation rate for the 12month period of 19.53% (Table 4.4). The surgical risk assessment quality improvement process was implemented beginning January 2015 for all surgical specialties at this government facility. During the 12month period after implementation of this project, there were a total number of 3,887 cases scheduled with 354 cases getting cancelled during this time, with the average cancellation rate for 2015 of 9.1%. The p-value for data comparisons for 2014 and 2015 is 0.000 which indicates the implementation of this quality improvement process is statically significant for reducing operating room cancellations Table 4.4. Despite a spike in cancellations during the month of October 2015 due to environmental flooding, the cancellation rate remained sustainably less than the prior months before implementation of the surgical pathway quality improvement project.

Table 4.4 indicates proportion of canceled survey for each month for 2104 and 2015. The results of the proportion Z test revealed there was statistically significant cancelation survey between 2014 and 2015 except month of October and November.

#### **4.4 Provider Use of Tool**

Random sampling of 10% or greater of all cases scheduled for general anesthesia or conscious sedation cases for the 12-month period post-implementation of the QI project was reviewed. Providers were educated and informed of the quality assurance process to determine if providers were compliant with use of the surgical risk assessment tool during the pre-operative period. Charts reviews were performed and determined that 48.48% of providers began using the tool during the first month of implementation.

Several of the charts reviewed indicated that patients scheduled during January were placed on the schedule prior to the QI project start date, therefore providers were required to complete the surgical assessment tool only on patients placed on the scheduled after January 1, 2015. The data indicates increased compliance with use of the surgical risk assessment tool as evident in Table 4.5. By April 2015, 3-months after implementation, provider compliance for use of the tool was 86.36% with a steady increase over the next 8 months.

**Table 4.4 Proportions of Cancellation Operating Room and Z-test monthly for 2014-2015**

Month	Number Scheduled 2014	Number Canceled 2014	Proportion Canceled 2014	Number Scheduled 2015	Number Canceled 2015	Proportion Canceled 2015	Z Test Statistics	P Value
jan			.	311	21	0.06752		
feb	217	43	0.19816	304	26	0.08553	3.74	0.00018
mar	322	51	0.15839	359	32	0.08914	2.76	0.00582
apr	307	75	0.24430	318	20	0.06289	6.32	0.00000
may	309	59	0.19094	323	21	0.06502	4.76	0.00000
jun	286	53	0.18531	336	18	0.05357	5.15	0.00000
jul	292	80	0.27397	340	28	0.08235	6.38	0.00000
aug	295	58	0.19661	326	26	0.07975	4.25	0.00002
sep	212	56	0.26415	307	28	0.09121	5.26	0.00000
oct	256	49	0.19141	328	82	0.25000	-1.68	0.09212
nov	206	17	0.08252	326	27	0.08282	-0.01	0.99031
dec	278	41	0.14748	309	25	0.08091	2.55	0.01079
total	2980	582	0.19530	3887	354	0.09107	12.4	0.00000
							8	

**Table 4.5 Provider Use Summary of the Surgical Risk Scale**

Month	Number of cases scheduled	% of charts reviewed	Number of Charts Reviewed for SRS	No Charts with complete	Number SRS Not complete	% Provider use of SRS
15-Jan	311	10.60	33	16	17	48.48
15-Feb	304	10.20	31	23	8	74.19
15-Mar	359	11.14	40	30	10	83.56
15-Apr	318	13.80	44	38	6	86.36
15-May	323	11.40	37	35	2	94.59
15-Jun	336	68.40	230	226	4	98.20
15-Jul	340	22.90	78	75	3	96.15
15-Aug	326	10.70	35	35	0	100
15-Sep	307	10.74	33	30	3	90.9
15-Oct	328	10.06	33	31	2	93.90
15-Nov	326	11.90	39	38	1	97.43
15-Dec	309	14.56	45	40	5	88.89
total for 2015	3887	17.44	678	617	70	91.0

#### 4.5 Financial Benefit for Reduced Surgical Cancellations

As discussed in Chapter I, operating room cancellations have a negative financial burden for facilities and may also generate dissatisfaction for the surgeon, staff, as well as the patient. The cost of unused operating room time in the VA system has been estimated at \$600 per hour or \$10 per minute in 2009 dollars based on the total OR cost divided work hours minus material costs (Argo et al., 2009). Another resource values operating room time in the VHA system generates an estimated at \$600 per hour revenue compared to \$1700-\$2025 per hour in the private sector (Argo et al., 2009). Each surgical case is estimated to results in an average of 1.4 hours (80 minutes) of lost OR time, resulting in an average of \$850 per case (Argo et al., 2009). Table 4.6 outlines the total number of cases scheduled, the number cancelled with the total number of revenue lost in 2014 from cancelled case based on \$850 per case which was Cancellations in 2014 cost the \$494,700 at this local government facility. Cancellations in 2015 cost the government



facility an estimated \$300,900 based on 354 cases cancelled at \$850 per cases. The projected cost savings from 2014 to 2015 was \$193,000 at this undisclosed governmental medical facility. In addition, this government facility was able to complete 907 more surgical cases in 2015 than completed in 2014. Based on \$850 per case, it is estimated the facility was able to increase revenue by \$962, 200. Data projects a 10.4% increase in operating room completion rates from 2014 to 2015. See Table 4.6.

**Table 4.6 Cost Savings post-implementation of the QI Project at this Local Undisclosed Governmental Facility**

Year	Number Scheduled Cases	Number Cancelled Cases Day of Surgery	Number of cases completed	% Completion Rate- #completed/#Scheduled	Lost Revenue \$850 X no. of cancelled cases	Estimated Gross Revenue from Completed cases based on \$850 per case	Total Savings 2015
2014	2980	582	2398	80.40	\$494,700	\$2,038,300	NA
2015	3887	354	3530	90.80	\$300,900	\$3,000,500	NA
total savin gs	NA	NA	NA	NA	\$193,800	\$962,200	\$1,156, 000

#### 4.6 Overall Conclusions

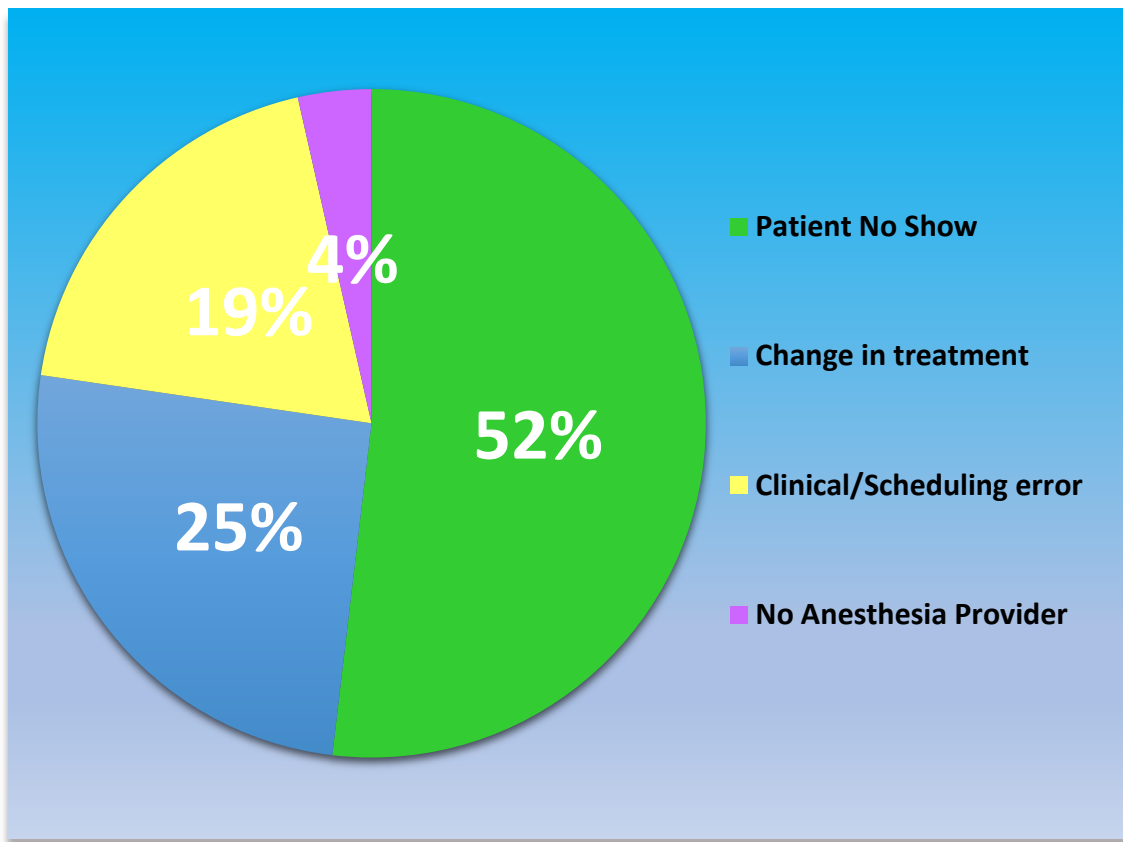
Based on the financial savings from the operating room cancellations in 2014 compared to 2015 for the undisclosed governmental facility outlined in table 4.5, implementing this QI project had a significant reduction in day of surgery cancellations, improved operation room efficiency by increasing the number of surgical cases completed, and subsequently reduced lost revenue cost for cancellations at this governmental facility. The calculations for cost savings is based on 2009 dollars in the VA system and likely would reflect a higher savings for 2017.

## 4.7 Chapter Summary

The surgical cancellation rate in 2014 was 10% greater than the national average of 12.4% at this government facility. The need to implement a quality improvement process to reduce operating room cancellations and reduce operating room cost was mandated by the Office of Inspector General. Surgical cancellations for 195 randomly selected cases were classified by cancellation types to better understand the reasons for cancellations. See Table 4.7. Evidence-based literature suggested implementing a surgical preoperative screening tool would be beneficial to optimize a patient's health prior to surgery and could impact cancellations due to change in health status. Based in the literature review, many cancellations are preventable and often need a change in the systems process. After reviewing the categories for cancellations during 2014, evidence suggested implementing a preoperative surgical clearance process. The Surgical Risk Assessment scale developed by Sutton et al., was the most efficient and precise tool found after extensive research for elective surgical cases. A score of 9 or greater for the surgical risk tool requires medical and/or cardiac clearance if the patient has cardiac disease. Understandably, emergency cases also have a higher score based on timing of the case and the urgency of the cases is taken into consideration. However for elective cases, optimal risk stratification is necessary to reduce mortality and morbidity postoperative. Patients also must have a BMI < 40, HgbA1c of < 8 and systolic blood pressure of less than 160/90 in addition to a surgical risk score of less than 9 to be placed on the surgical schedule without medical/cardiac clearances. Elective surgeries are not scheduled if the patient is obese (must have BMI < 40), has uncontrolled diabetes (must have HgbA1c less than 9) and uncontrolled hypertension (less than 160/90) since

these factors can greatly increase postoperative surgical complications. A surgical risk score of 9 or greater warrants medical and/or cardiac clearances which was determined after reviewing the mortality and morbidity cases from 2013. A score of 9 or greater would have captured patients whose health condition were not optimally controlled (Dr. Daniel Jorgenson, personal communication, February 15, 2015).

**Table 4.7 Surgical Cancellations for 195 Randomly Selected Cancellations during 2014 Classified by Category**



## **Chapter V**

### **Conclusion**

#### **5.1 Discussion**

The Plan-Do-Study-Act (PDSA) model in Appendix B is a quality improvement tool used to implement change in rapid small-step cycles. The PDSA framework includes developing a plan to test the change (Plan), carrying out the test by implementing the new process with data collection (Do), observing and learning from the consequences (Study), and determining what modifications should be made to the test (Act). The PDSA model is a simple yet powerful method for implementing a quality improvement process in the healthcare setting. As Chapter 4 described “Reducing operating room cancellations by implementing a surgical risk assessment pathway” reduced elective surgical cancellations, it was favorably accepted by the providers as a useful tool. The information collected for this project provides the evidence-base for the development of the new process for surgical clearances for standard operating procedure. The purpose of the DNP project was to compare operating room cancellation rates pre- and post-implementation of the surgical risk assessment to determine if cancellation rates would be reduced using a preoperative screening tool to optimize a patient’s health status prior to scheduling for an elective surgical procedure thus also reducing lost revenue from cancelled surgical cases. The purpose of this chapter is to outline the implications for evidence-base practice, research and education to improve operating room efficiency and surgical flow.

## **5.2 Implications for Practice**

Clinical experiences suggest that co-morbidity and the magnitude of the surgical procedure generally predicts mortality (Sutton et al., 2002). The preoperative surgical risk scale is a scoring system which incorporates the patient's medical status, the urgency of the procedure and the type of surgical procedure being performed. The surgical risk scale combined with implementation of the surgical preoperative clinic is designed to achieve the triple aim of optimizing the patient's health conditions, improving the quality of healthcare, and improving operating room efficiency for surgical patients. Reducing expenditures through shared decision-making and seamless continuity of care for the surgical patient from the moment potential surgery is planned through recovery, discharge, and the first 30 days afterward is one ultimate goal. Too often, perioperative care plans are variable and fragmented. Surgical patients may experience incomplete preoperative care, duplication of tests, and lost opportunities to prevent mortality and morbidity. Costs rise, complications occur, physicians and other healthcare team members are frustrated, and the patient and families endure a lower-quality experience of care.

## **5.3 Implications for Research**

Determining the impact of a surgical pathway to improve operating room efficiency by reducing surgery cancellations is the motivating force for implementing a preoperative screening process. Mortality and morbidity statistical data is collected by chart review and entered in the VASQIP data bank. Quarterly reports are reviewed at the local and nation level and compared to other VA data summaries to establish the nation average operating room efficiency standards. Separate from the VASQIP data, local data

is captured to determine if the surgical risk scale and other surgical pathway components will contribute to a reduction in operating room cancellation rates 72 hours of the scheduled surgery. New approaches are needed that provide better service, cost less, and focus on the personalized patient as the center of preoperative care. Benefits of the new process will lead to improved multidisciplinary communication, and will focus on quality, coordinated care for the surgical patient. The new surgical pathway will emphasize preemptive care of the surgical patient with cost-effective and comprehensive management of the surgical patient. The common goal for implementing this model is to provide quality, safe, efficient surgical care, reduce mortality and morbidity rates, and prevent surgical site infections. If this new system improves the operating room efficiency by reducing cancellation rates, patients will receive timely, safe surgical care while ensuring optimal health is obtained prior to an elective surgical procedure which will reduce postoperative surgical complications.

#### **5.4 Implications for Education**

Implementing the surgical pathway provides several educational opportunities that can improve the efficiency of the surgical preoperative process to engage the patient and family. Patient education and preoperative teaching is essential during the preoperative process. Implementation of the surgical check list and surgical preoperative teaching for patients will include preoperative skin preparation instructions prior to surgery to reduce the surgical skin site infection rate.

All clinicians including physicians, nurse practitioners, physician assistants, and nurses were instructed regarding the use of the SRS during the consultation process. Staff will also be informed during the implementation of the preoperative clinic with annual in-

services. Through repetitive education, clinicians will be less likely to forget the surgical pathway process. Surgical residents who rotate through the facility will be informed of the process during orientation and provided feedback monthly by the Chief of Surgery during the M&M reviews. Provider use of the SRS tool is audited on a monthly basis and reported to the Chief of Surgery and to the surgical staff during the monthly staff meetings. Providers are also informed of their use of the tool on a monthly basis. Data is collected monthly on provider use of the SRS tool.

### **5.5 Implications for Policy**

A standard operating procedure policy (SOP) endorsing the surgical pathway and its multiple components was submitted to Directors at the undisclosed government facility for approval. The SOP was reviewed by the VA Office of Inspector General and acknowledged as an action plan to improve the operating room efficiency to reduce surgery cancellation rates. Data is currently being collected and analyzed to determine the surgical pathway effectiveness. If this proves to be a successful improvement process, this could influence VA policy nationally as well.

### **5.6 Conclusions**

Surgical case cancellations were 29.7%, 31.5%, 22.8% and 22.2% for 4 consecutive quarters during the 12-month period prior to implementation of the surgical risk assessment quality improvement process which are higher than the national benchmark of 12.4%. During a 6-month period after implementing the new process for the undisclosed government facility, surgical cancellations rates fell to 5.2% and 7.9%, well below the 12.4% national benchmark as seen in table 4.1. Evidence supports use of the surgical risk assessment tool and clinical pathway to support guidelines for BMI<40,

HgbA1c <8 and Hypertension <160/90, and a surgical risk assessment of less than 9 as optimal for reducing cancellations to achieve optimal health prior to scheduling patients for elective surgical procedures. Patients with a prior history of drug abuse will complete a urine drug screen (UDS) at the time surgery is recommended. If the UDS is positive for cocaine metabolites, the patient is referred to the substance abuse treatment program (SATP) and surgery is postponed for non-emergent, elective cases until the patient has a negative UDS. This project revealed that medical providers to include physicians, nurse practitioners and physical assistants can adequately use the surgical risk assessment tool as evident from the 91% compliance over the 12month post-implementation period and surgical guidelines to ensure a patient's health is optimal prior to elective surgical intervention. This project also found that reducing cancellations can reduce lost revenue and increase operating room efficiency. In 2015, there was 1,132 more cases completed compared to 2014, and there was 228 less cases cancelled in 2015 compared to 2014; both initiatives produced a \$1,156,000 increase in revenue in 2015 compared to 2014 for this undisclosed government facility. Implementing a surgical risk clinical pathway is financially beneficial for all surgery subspecialties departments and can be utilized at other healthcare organizations.



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## Appendix A

### Cancellation Data Form

Patients Last Name \_\_\_\_\_ Last 4 SSN# \_\_\_\_\_

Date of Surgery \_\_\_\_\_

Surgical Procedure \_\_\_\_\_

Date Surgery Posted \_\_\_\_\_

Date of Cancellation \_\_\_\_\_

#### **Reason for cancellation**

Labs \_\_\_\_\_

Change in Medical condition \_\_\_\_\_

SPS \_\_\_\_\_

Surgeon \_\_\_\_\_

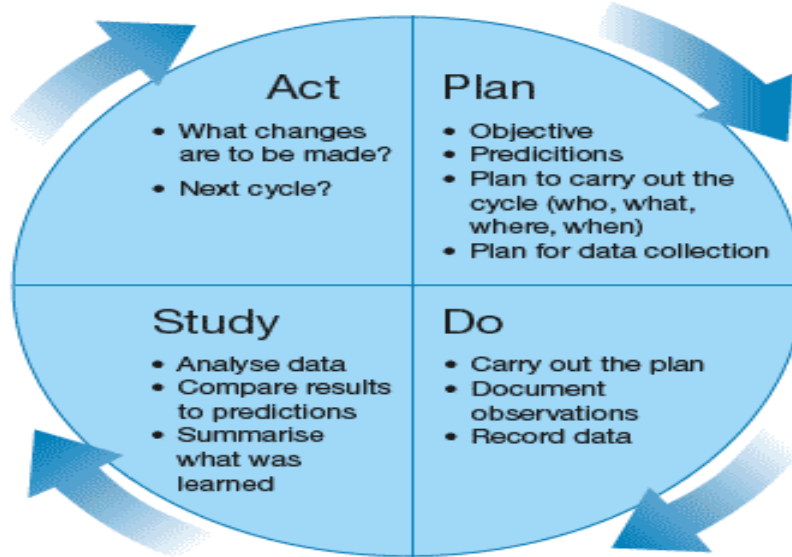
Other \_\_\_\_\_

Scheduling error \_\_\_\_\_

**Surgical Risk Scale Score** \_\_\_\_\_

## Appendix B

### Plan, Do, Study, Act (PDSA) Model (ASQ, 2004)





## Appendix C

### UNDISCLOSED GOVERNMENT MEDICAL FACILITY

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#### Surgical Care Service Line

Standard Operating Procedure No. 11 March 13, 2015

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#### SURGICAL PATHWAY FOR IMPROVED SURGICAL CARE

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1. **PURPOSE:** To establish guidelines for collaborative care to improve surgical care outcomes at the undisclosed military medical center among all subspecialty surgery services. The common goal for implementing the Surgical Pathway is to provide quality, safe, efficient surgical care, to reduce mortality and morbidity in addition to preventing surgical site infections.
2. **SCOPE:** Provisions of this memorandum apply to the undisclosed government medical facility
3. **POLICY:** Patients requiring surgical care who meet the criteria for surgical invention will be screened for comorbidities utilizing the Surgical Risk Assessment Tool. This Surgical Risk Assessment Tool is a concise, easy to use surgical tool to calculate a patient's surgical risk for each procedure using the Confidential Enquiry into Perioperative Death (CEPOD), American Society of Anesthesiology (ASA) and British United Provident Association (BUPA) classifications. Patients with a surgical risk score of 9 or greater are further evaluated by calculating a predicted mortality based on the Veterans Affairs Surgical Quality Improvement Program (VASQIP) surgical risk indicator. Overall, patients with a 9 or greater represent a higher operative risk of mortality and will be required to complete further surgical clearances from primary care, cardiology or other services as deemed medically necessary. The Surgical Risk Assessment Tool will be used for both inpatient and outpatient assessments.  
There are five phases of the surgical pathway leading to an operative procedure:
  - I. Assessment
  - II. Surgeon Pre-op
  - III. Pre-bed clearance
  - IV. Procedure/Hospitalization/Post-Operative Care
  - V. Discharge/Recovery Period

Pre-op blood work must be within 60 days of the scheduled procedure. History and physicals (H&P) are valid for 30 days and informed consent is valid for 60 days prior to the scheduled procedure.

#### **4. PROCEDURES:** **Phase I: ASSESSMENT**

During the initial consultation or during the period when the patient meets criteria for surgical intervention, the surgical service provider completes the Surgical Risk Scale Assessment Tool within CPRS. Necessary pre-op bloodwork will be ordered at the time of surgical risk assessment.

1. Patients with a 9 or greater on the Surgical Risk Assessment Scale are required to undergo medical, cardiology risk assessments, and additional evaluations specific to the individualized patient's health care needs. The patient will not be placed into a scheduled status in SharePoint until all clearances are completed. If surgery is emergent or urgent and the Surgical Risk Assessment score is 9 or greater, the Chief of Surgery is to be notified immediately by phone and CPRS notification for both inpatients and outpatients.
2. Patients with a score of 3-8 on the Surgical Risk Assessment Scale can be scheduled for the operating room using SharePoint provided their health is deemed optimal. Major medical conditions such as hypertension and diabetes will be under adequate control to minimize surgical morbidities, i.e., blood pressure must be consistently less than 160/90 mmHg and a hemoglobin A1C less than 8.0. Failure to demonstrate adequate systemic control of major medical conditions even if asymptomatic will delay scheduling or result in the patient being referred back to their primary care provider for additional evaluation in the setting of non-emergent and non-life threatening surgical conditions.
3. Case Managers for the sub-specialties will continue to provide oversight for surgical clearances and keep the surgical provider informed once all recommended surgical clearances have been completed. The surgery Pre-op Clearance Checklist (PCC) will be used as a separate note by the case manager to provide the patient with written instructions. The patient will be provided with instructions and a working copy of the pre-op checklist. The case managers will engage and encourage the patient to take personal responsibility to complete the process of surgical clearance.
4. Patients with a Surgical Risk Assessment of 9 or greater will be followed on a weekly report and a Surgical Risk Assessment Team will meet weekly to review surgical and non-surgical options for care. If the patient is felt to be a prohibitive risk for surgery

additional consultations will be obtained with other services to include palliative care and services providing interventional and non-surgical alternatives to surgical intervention. The surgical services and consultative services will meet in accordance with the procedures defined in the Palliative Surgery SOP. Urgent/Emergent cases will be discussed with the Chief of Surgery timely to the patient's need for surgery.

5. All patients scheduled in the operating room must be scheduled in SharePoint regardless of local, IV or general anesthesia. Except for local only cases all patients will have a Surgical Risk Assessment on the chart prior to scheduling the patient for surgery.
6. All patients scheduled in the operating room who require IV, regional, or general anesthesia must be seen in pre-bed clinic/anesthesia.

## **Phase II: SURGEON PRE-OP**

1. Surgery staff provider identifies a patient who meets criteria for surgery and insures that the Surgical Risk Assessment has been completed, all lab data reviewed and/or all medical/surgical clearances completed. Patients deemed acceptable risk for surgery are then scheduled in SharePoint.
2. Case Managers for the specific surgical specialty will provide patients with service and/or procedure specific Surgical Procedure Instructions (SPI). The instructions will identify the planned procedure, preparations necessary for the patient prior to the surgery date to include pre-procedure skin or GI preps, discontinuing any medications, cessation of smoking, additional appointments with other services, laboratory or radiology studies required prior to the day of surgery. The SPI will be presented as a face to face education encounter between the case manager and the patient. For patients, who on initial consultation are scheduled for surgery within 30 days, the Case Manager will provide the patient with both the PCC and the SPI. For these patients, time is of the essence, appointments for any consultations or necessary visits should be made prior to the patient departing the Surgical Clinic.
3. The case manager for the subspecialty surgical service will provide periodic check-in to track the patients' progress.
4. Surgeon must review pre-op lab data to insure that all are within acceptable range.

5. SharePoint posting will alert pre-bed staff to schedule patient for a pre-bed/anesthesia appointment unless a walk-in appointment is necessary
6. Surgeon to complete informed consent during pre-op period if procedure is to be scheduled within 60 days
7. Surgeon to complete pre-op H&P if procedure within 30 days or will need to specifically note in the consultation when the patient should be scheduled for a pre-op H&P visit if the consultation is completed prior to the 30 days before the surgical procedure.
8. Surgeon is responsible for discontinuing anti-coagulation prior to surgery and must include this information on the SharePoint posting. If necessary, the surgeon will consult Pharmacy prior to scheduling the patient for surgery. It is also helpful to include the anti-coagulation instructions within the H&P.
9. If necessary, the patient can be scheduled for a pre-op history and physical appointment to include written pre-op skin preparation techniques prior to the procedure
10. Hibicleanse skin prep and instructions will be provided to all patients except for ophthalmology surgery patients. For patients who do not require skin prep wash, guidance will be provided as necessary for the posted surgery.
11. Hibicleanse will be provided to the patient in the clinic or pre-bed anesthesia clinic with appropriate education. A video presentation is adequate.
12. For high risk patients who have a limited life expectancy of, the high risk surgical committee may consider a Palliative Surgery Conference to review non-operative treatment options with the patient and family

### **Phase III: PRE-BED CLEARANCE/ANESTHESIA/PATIENT NOTIFICATION**

1. Pre-bed appointments are generated by the SharePoint request and the patient is scheduled in pre-bed clinic to meet with nursing and anesthesia personnel unless patient requires same day/walk-in appointment

2. Pre-bed nursing staff will perform a nursing assessment, check vital signs, height, weight and review posting for surgery. Using the patient's SPI the nursing staff will verify the date of surgery, review anti-coagulation plan with the patient, and address NPO status prior to surgery. Pre-bed staff will also instruct patients to call the pre-bed clinic on the business day prior to their scheduled surgery between the hours of 10 AM and 12 PM for surgery report time.
3. Anesthesia staff will assess the patient, review anesthesia risks, and review medications and outline which medications the patient should and should not take the morning of the procedure. The surgeon is responsible for the addressing the anti-coagulation and must include this information on the SharePoint posting.
4. Patients over the age of 50 requiring general anesthesia need a CXR and EKG within the past 6 months
5. Preoperative type and screen should be considered, if indicated.
6. Current MRSA screening is required for all patients receiving joint replacements or surgery with any artificial prosthetic device. MRSA screening is also required for all patients with prior MRSA infection. MRSA screening is highly recommended for all patients.
7. An operative schedule review conference will be held weekly attended by the Chief of Surgery, Surgical Nurse Scheduler, Chief of Anesthesia, OR Nurse manager, Pre-Bed nurse manager, and the surgical specialty case managers. The conference will review the surgery schedule extending two weeks going forward. As a minimum, the case managers will be prepared to verify that patients on the schedule have completed the PCC and have been instructed in the SPI. The verification should include contacting the patient between 1-2 weeks prior to surgery to confirm with the patient that they have no questions and are planning to proceed with surgery. If the patients are not able to be contacted, efforts must be made to contact them after hours in the evening to verify their intent to undergo surgery.

#### **Phase IV: PROCEDURE/HOSPITALIZATION/POST-OPERATIVE CARE**

1. Patient reports to surgery waiting room the morning of surgery.
2. NPO status will be verified in the holding area and medications reviewed with patient by the holding area staff.

3. Surgeon validates no change in H&P/health status since prior documentation in the holding area.
4. Same day labs ordered and reviewed (drug screen and pregnancy test if applicable) by the surgeon and/or surgical team provider in the holding area. Patients requiring pre-op laboratory screening should not be scheduled as first cases if possible.
5. Verify “correct procedure, correct site, correct patient” and surgical pre-operative check lists are completed by the holding area staff. Pre-operative briefing conducted.
6. Holding area staff verifies consent has been completed.
7. Holding area staff verifies same day surgery patients have a driver present before the procedure begins.

#### **Phase V: DISCHARGE/RECOVERY PERIOD**

1. Post-op instructions and post-op follow-up appointments are provided if the patient is discharged the same day as the surgical procedure.
2. If patients are admitted to the medical center following surgery, nursing staff and medical providers will provide post-operative discharge instructions and request follow-up appointments from the perspective service lines.
3. The Case Managers will receive a CPRS alert when a patient in their surgical specialty is discharged.
4. Patients are monitored for 30 days post-op for complications by VASQUIP staff.

#### **5. RESPONSIBILITY:**

The Chief, Surgical Service, will be responsible for the compliance to this directive by all providers. This memorandum is due for review annually or before the anniversary date. Mortality and morbidity outcomes will be reviewed to validate the use of the Surgical Pathway and to identify outcomes for additional opportunities for improvement.

#### **6. REFERENCES:**

Sutton, R., Bann, S., Brooks, M., and Sarin, S. The Surgical Risk Scale as an improved tool for risk-adjusted analysis in comparative surgical audit. British Journal of Surgery: 2002, 89, 763-768.

#### **7. RESCISSION: NONE**

**Director, Surgical Care Service Line**

## Appendix D

### EVIDENCE SUMMARY TABLE

EBP Question: Will implementing a preoperative surgical pathway for veteran patients undergoing elective surgical procedures reduce operating room cancellation rates prior to the scheduled surgery over a 12-month period?

Article, Title & Date	Author	Evidence Type	Sample and Sample Size	Results	Recommendations	Limitations	Rating Strength and Quality
#1							
∞ The Surgical Risk Scale as an improved tool for risk-adjusted analysis in comparative surgical audit. <i>British Journal of Surgery</i> 2002.	Sutton, R., Bann, S., Brooks, M., & Sarin, S.	Experimental	A prospective audit of 4308 patients admitted under the care of three surgeons during May 1997-October 1999. Total of 3144 procedures performed with 134 deaths.	Surgical Risk Scale (SRS) is significantly predictive of death and did not over predict mortality for low-risk procedures	The SRS is concise and easy to use with score ranging from 3-14.	1) Some concern the BUPA score may not be accurate with regard to some procedures 2) SRS does not include specific operative details.	Level I/Good

#2							
Using Nurse-to-Patient Telephone Calls to Reduce Day-of-Surgery Cancellations. <i>AORN Journal July 2011.</i>	Haufler, K. & Harrington, M.	Experimental	Total OR Procedures before project 6,564/total day of surgery cancellations 395, total day of surgery 155 cancellations due to NS/NPO/RA. After the project 2,124 total OR procedures were scheduled/94 total day of surgery cancellations/28 procedures cancelled due to NS/NPO/RA.	Day-of-surgery cancellations were related to patient education issues rather than medical conditions.	Day-of-surgery cancellations were related to patient education issues rather than medical conditions.	Script wording was changed after 5months to suit the personal callers preference and may not be the exact script given to all patients.	Level I/Good



#3							
Are Patients at Veterans Affairs Medical Centers Sicker? <i>Archives of Internal Medicine.</i> 2000	Agha, Z., Lofgren, R.P., VanRuiswyk, J.V. & Layde, P.M.	Quasi-Experimental	128,099 records from the National Health Interview Survey from 1993 and 1994 were analyzed. The VA and general population were compared for self-report health status, number of medical conditions, number of outpatient physician visits, number of hospital admissions, and number of hospital days each year.	VA patient population had poorer health status, more medical conditions, and higher medical resource use and more hospitalizations days per year compared to the general population	After controlling for health and sociodemographic differences, the VA population had similar resource use compared to the general population.	1) Survey did not ask for secondary sources of medical care or for veterans who are dual users of VA and Non-VA care. 2) The health status was self-reported current and chronic medical conditions which could affect results. 3) Survey also conducted during a time prior to veterans seeking VA care unless service related.	Level II/Good

#4							
Elective surgical case cancellation in the Veterans Health Administration System: identifying areas for improvement. <i>The American Journal of Surgery</i> 2009.	Argo, J.L., Vick, C.C., Graham, L.A., Itani, K.M.F., Bishop, M. J., & Hawn, M.T.	Non-experimental study (Retrospective Analysis)	Case cancellations (CC) data for 2006 were collected from the scheduling software for 123 VA facilities. Surveys were distributed to 40 facilities (10 highest and 10 lowest CC rates for high- and low-volume facilities). CC reasons were standardized and piloted at 5 facilities.	Of the 329,784 cases scheduled by 9 different surgical subspecialties, 40,988 (12.4%) were cancelled. CC reasons 9,528 were placed into 6 broad categories: patient (35%), work-up/change in medical condition (28%), facility (20%), surgeon (8%), anesthesia (1%), and miscellaneous (8%)	Interventions to decrease cancellations caused by patient factors, inadequate work-up and facility factors are needed to improve overall elective surgical case cancellations.	1) this is a retrospective study of administrative data 2) Variation in use of the surgical package among VA facilities may affect the validity of data adversely 3) nearly 10,000 different reasons for elective surgical case cancellations were placed into 1 of 6 categories which could improperly categorized the data.	Level II/Good

#5							
The Impact of Pre-Operative Assessment Clinics in Elective Surgical Case Cancellations. <i>The Royal Colleges of Surgeons of Edinburgh and Ireland: Surgeon 2009.</i>	Knox, M., Myers, E., Wilson, I., & Hurley, M.	Retrospective Analysis	All surgical cases over a one year period prior to and subsequent to establishment of the pre-operative assessment clinic	1063 scheduled surgery cases revealed a lack of medical clearance and 'no shows' accounted for the majority of cancellations. 1421 vs 1405 cases were analyzed. There was a 12.7% increase in elective surgical cases after implementation of the pre-operative assessment clinics.	The data suggest that establishment of a pre-operative assessment clinic reduces elective case cancellations. Significant reductions in cancellations for medical reasons were found.	1) Complete data not available for 94 of the 721 study groups, and 54 of the 669 in the control group for the POAC 2) There was an increase in non-ICU bed availability not attributable to the POAC assuming the increase is due to the pre-discharge unit however there is no data to support this.	Level II/Good

#6							
Early Outpatient Preoperative Anesthesia Assessment: Does It Help to Reduce Operating Room Cancellations? <i>Economics and Health Systems Research 1999.</i>	Pollard, J. B. & Olson, L.	Quasi-Experimental	537 patients were examined in the preoperative clinic between January 1 1997-March 31, 1997, only 529 patients qualified for the study.	Of the 529 pts who qualified for the study, 166/529 patients (31%) received their preop evaluation within 24hr of surgery (standard group) and 363/529 (69%) were evaluated 2-30 days before their surgery (early group). Groups were compared in terms of ASA, gender, age and classification of surgery. In conclusion, pre-op workup 24hr before surgery or 2-30 days before surgery was not statistically significant therefore outpatients maybe seen at a	There is evidence of quality benefits for patients, clinicians and health administrators associated with new Perioperative Systems	1) Sample size is not equal for the standard group (166) vs early group (363) 2)surgery was classified as major or minor. Major cases as upper abdominal, intrathoracic and any other for which a blood type and cross match was done. All others were classified as minor. 3) Cancellations contributed to the surgeon including urgent or emergent surgery preempting elective surgery	Level II/Good

				convenient time without adversely affecting OR cancellations.		and illness of a member of the surgical team. 4) A patient on the OR schedule without having surgery could be a facility error however this article does not classify it as a facility error.	
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#7							
Efficiency of the operating room suite. <i>The American Journal of Surgery</i> . 2003.	Weinbroum, A.A., Ekstein, P. & Ezri, T.	Quasi-Experimental	814 operations for general and orthopedic surgery were performed during a 30 day period, patients aged 63+ 4years. 102 met inclusion criteria for surgeries not performed	79hours over the 30day period was "time-wasted"-12% of those were due to inappropriately prepared patients, 7% due to surgeon not available, 59% due to insufficient nursing staff/anesthesiologist/ or OR reassignment due to emergencies, 2% due to delay in transport to OR, and 10% due to PACU congestion, and 33% due to surgery cases running longer than expected "spill-over" cases. Within 3 months, new guidelines implemented and reduced time wasted by 35%	Continuous surveillance of the OR suite could	<ol style="list-style-type: none"> <li>1. Expertise of the surgeon or anesthesiologist was not considered</li> <li>2. PACU has limited staffing resources and can influence OR efficiency</li> <li>3. There were 5 non-working OR days during the 30 day period which could influence the results</li> <li>4. No standards criteria for cleaning rooms, transporting patients</li> </ol>	Level II/Good

#8							
Evaluation of operating room suite efficiency in the Veterans Health Administration system by using data-envelopment analysis. <i>The American Journal of Surgery</i> 2006.	Basson, M.D. & Butler, T.	Descriptive, Non-Experimental	OR activity in 23 VA hospital systems over 1 year encompasses 168 equipped ORs and 87,180 cases performed by 1,384 full-time equivalents of surgical and anesthesia providers, including both full and part-time surgeons and anesthesia providers with the assistance of 523 non-provider staff over 166,377 hours.	24 research publications were reported to have been generated and 560 trainee-years of education delivered. Data-Envelopment Analysis (DEA) reviews inefficiencies but takes into consideration such factors as resident training.	It was determined broader DEA applications may better characterize OR efficiency more informatively than conventional single-ratio rank ordering.	1) VA Surgical Package calculates OR utilization for each room in an OR suite, including rooms not in use which may inaccurately affect the results 2) difficult to compare VA OR inefficiencies to private sector OR inefficiencies.	Level III/Good

#9							
The Financial Burden of Cancelled Surgeries: Implications for Performance Improvement. American Society of Anesthesiology: <i>Practice Management 2012.</i>	Bent, S. Mora, A. Russo, S., Pierre, N. Rosinia, F., & Campbell, C.	Qualitative Study	327 of 4876 scheduled outpatient surgery cases were reviewed in 2009 from Tulane University Medical Center. Financial data was also reviewed. Cancellations were defined after the patient arrived or either the patient “no-showed” the day of surgery.	32.4% of cancellations contributed to “no-show”. 13.8 % were cancelled due to patient being ill the day of surgery (44%), patient failed to comply with preoperative instructions (24%), and institutional issues such as equipment or unavailable beds (31%). Cancellation rates were higher among patients who did not have a preoperative clinic visit 10.64% compared to 3.92% for those that did. Revenue lost from cancelled surgeries was estimated at \$4,550 per cancelled case = \$1, 487, 850 for n=327.	Cost of cancellations in certain subspecialties are more significant than others however preoperative visits have the potential to prevent cancellations, increase productivity and improve financial productivity.	Financial data from 2009 and cases reviewed were from one single medical center	Level III, Good



#10							
Value of Preoperative Clinic Visits in Identifying Issues with Potential Impact on Operating Room Efficiency. <i>Anesthesiology</i> 2006.	Correll, D.J., Bader, A.M., Hull, M.W., Hsu, C., Tsen, L.C. & Hepner, D.L.	Qualitative	All patients seen in the preoperative clinic during a 3 month period, November 1, 2005 through January 21, 2004 at the Brigham and Women's Hospital Boston Massachusetts. Total of 5083 patients were seen during the timeframe and a total of 647 patients had 680 medical issues requiring further workup. Of these, 565 were known medical problems and 115 were new medical problems.	New problems had a far greater probability of delay (10.7%) or cancellation (6.8%) compared to old problems responsible for 0.6% delay and 1.8% cancellations	Optimization of patients medical condition before surgery has also been shown to reduce delays and cancellations which have a significant negative financial impact. The preoperative clinician identify and resolve medical issues that can impact efficient operating room resource use. Most delays or cancellations required cardiac (to address	Period was only for 3 months which is relative short period and include less than 10% of the patients cancelled	Level III/Good

					coronary artery disease) or hematology consultations (to address anti-coagulation concerns)		
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#11							
<p>Perioperative Clinic Visits Reduce Operating Room Cancellations and Delays. <i>Anesthesiology</i> 2005.</p>	<p>Ferschi, M., Tung, A., Sweitzer, B., Huo, D., &amp; Glick, D.</p>	<p>Retrospective, Qualitative Analysis</p>	<p>A retrospective chart review of all surgical cases during 6-month period at the University of Chisago Hospitals and the impact of the anesthesia directed preoperative medicine clinics (APMC) were analyzed-6,524 cases were included from July 1 through December 31, 2003.</p>	<p>98 of the 1,164 (8.4%) same day surgeries of the APMC evaluated patients were cancelled compared to the 366 of the 2,252 (16.2%) on the non-APMC patients.</p>	<p>Evaluation in the APMC can significantly impact case cancellations and delays on the day of surgery.</p>	<p>1)cardiac surgery cases were excluded so these numbers are not inclusive 2)the referring surgeon decides who is seen in the APMC clinic which may lead to inconsistent results</p>	<p>Level III/Good</p>

#12							
A qualitative study of contextual factors' impact on measures to reduce surgery cancellations. <i>BMC Health Service Research May 2014.</i>	Hovlid, E. & Bukve, O.	Qualitative, Exploratory	21 employees were interviewed- 1 dropped out. Of the 20 employees interviewed- 9 physicians, 7 nurses, 2 secretaries, 2 administrators. Content analysis was performed to determine how contextual factors affected measures to reduce OR cancellations for elective surgeries	25 Contextual factors were identified with 6 of the most important being external environment, organization, quality improvement support and capacity, microsystem, quality improvement team and miscellaneous. MUSIQ framework was useful for exploring how the contextual factors influence the improvement process.	The MUSIQ framework is useful for exploring how contextual factors influence the improvement process and how they influence quality improvement outcomes. Patient input is important for determining the quality problem.	This is one, single case study and should be interpreted with caution. There are limitations of information bias. A causality relationship between the contextual factors and outcomes cannot be concluded.	Level III/Low

#13							
A new pathway for elective surgery to reduce cancellation rates. <i>BMC Health Services Research</i> 2012.	Hovlid, E., Buke, O., Haug, K., Aslaksen, A. B., & von Plessen, C.	Qualitative	A Norwegian district general hospital was studied; included 7 OR suites, 34 surgical beds and serves 107,000 populations for the community – cancellation rates were collected between April 2010 and February 2012.	Cancellation rates were reduced from 8.5% to 4.9%. Results were sustained over 26 months after implementation of the new surgical pathway. Surgery cases performed per month was increased by 17%.	The redesign pathway for elective contributed to a sustained reduction in cancellations and increased number of performed operations. Engagement of middle managers and the electronic scheduling systems were important factors for success	1) Long observation period 2 years is rare 2) cannot prove causality between intervention and observed outcomes 3) unclear of data collection period	Level III/Good

#14							
Retrospective Analysis of surgery postponed or cancelled in the operating room. <i>Journal of Clinical Anesthesia 2010.</i>	Lau, H., Chen, T., Liou, C., Chou, M., & Hung, W	Retrospective, Qualitative Analysis	45,663 surgeries over a 5 year period were reviewed. Surgery was postponed or cancelled in the OR for 67 patients due to airway problems, change in medical condition, or change in surgical condition were recorded.	33 cases (49.3%) were postponed from one day to 6months- median was 8 days but one case was 165days.Scheduled surgeries for 21 patients (31.3%) were never performed and 9 patients(13.4%) died during their hospitalization. 70.2% cases cancelled or postponed as due to change in medical condition-either medical risk outweighed surgical benefit or alternate treatments was used.	Record, report, review, retrain, and reduce are 5 steps to improve health care quality at the hospital.	OR cancellations may be defined differently at some institutions and the data collection method can vary.	Level III/Good

#15							
<p>A 5-year observational study of cancellations in the operating room: Does the introduction of preoperative preparation have an impact? <i>Saudi Journal of Anaesthesia 2014.</i></p>	<p>McKendrick, D.R.A., Cumming, G.P. &amp; Lee, A.L.</p>	<p>Non-experimental</p>	<p>42,082 operating room cases scheduled during the District General Hospital in the United Kingdom during April 1, 2006 to March 31, 2011 were reviewed. Cases which did not require anesthesia input were excluded.</p>	<p>28,928 cases met inclusion criteria. There was a decrease cancellations due to patient who did not arrive and medical reasons but an increase in cancellations by patients themselves. Cancellations due to lack of beds and other increased.</p>	<p>Study suggests the introduction of preoperative prep clinics for patients reduces cancellations on the day of surgery.</p>	<p>Limitations of this study includes not examining the cost effectiveness of the preoperative clinic, and the study was projected over long five year period. Authors suggested that incorporating telemedicine technology into routine preoperative care may help decrease cancellations rates</p>	<p>Level III/Good</p>

#16							
<p>Comparison of different methods of risk stratification in urgent and emergent surgery. <i>British Journal of Surgery Society 2007.</i></p>	<p>Neary, W.D., Prytherch, D., Foy, C., Heather, B.P. &amp; Earnshaw, J.J.</p>	<p>Non-Experimental</p>	<p>Consecutive cohort study of 2,349 patients who needed non-elective, non-cardiac surgery in the 12month period beginning July 1, 2001 at the district hospital in the UK. Death within 30days and within 1 year of surgery was recorded using four risk scoring systems: Goldman Revised Cardiac Risk Index (GRCRI), Portsmouth modification of the Physiological</p>	<p>141 (6%) of patients died within 30days of surgery, which increased to 10.8% died within one year. P-POSSUM, SRS, BHOM scoring systems were all able to predict outcomes after urgent and emergent surgeries however SRS has the advantage for ease of calculation.</p>	<p>Preoperative physiological disturbances continue to be highly predictive of survival beyond 30 day postoperative.</p>	<p>Majority of patients in this study were trauma patients with a mean age of 47years old and ASA I or II which does not compare to the VA geriatric population over the age of 65 with ASA of III or IV.</p>	<p>Level III/Good</p>



			and Operative Severity Score for the Enumeration of Mortality and Morbidity (P-POSSUM), Surgical Risk Score (SRS) and Biochemistry and Hematology Outcome Models (BHOM).				
<b>#17</b>							
Cancelled elective operations: an observational study from a district general hospital. <i>Journal of Health</i>	Sanjay, P., Miller, D.E., & Woodward, A.A.	Qualitative	In total, 13,455 operations were completed during the 12 month period, and 1,916 (14%) of cancellations were recorded of which 615	Forty-five percent of the cancellations occurred within 24hours of the scheduled surgery date, and 51% were due to medical related reasons with 34% due to non-clinical reasons, and 15% were due to	Cancellation rates could be significantly improved by targeting resources to reduce patient-related cancellations and hospital	Grouping was based on the Wales Assembly government codes for cancellations. Data was collected based on a dedicated	Level III/Good

<i>Organization and Management 2007.</i>			were day cases and 1,301 were inpatients	clinical reasons. Cancellation for inconvenient appointment times accounted for 18.5%, list running over (16%), patients thought they were not fit for surgery in 12.2% of the cancellations, and 9.4% were due to emergencies or traumas	non-clinical issues	NP, surgical secretaries' records, surgery list, ward admission and discharge data. Cancelled operations for ENT and General Surgery were cancelled twice as often as trauma and orthopedics. Reasons for this data is unclear.	
<b>#18</b>							
Causes of Cancellation on the Day of Surgery at Two Major University Hospitals.	Seim, A., Fagerhaug, T., Ryen, S., Curran, P., Saether, O., Myhre, H., & Sansberg, W.	Non-Experimental	Two major university hospitals were studied- American Hospital (Massachusetts	Norwegian Hospital cancelled 14.58% of cases in 2003 and 16.07% in 2004. The American Hospital cancelled 16.52% of all cases. A high	Large cancellation rates were due to capacity constraints and administrative	This study is limited to 2 hospitals in 2 different health care systems which are not	Level III/Low

<i>Surgical Innovation</i> <i>August 2009</i>			General Hospital) and Norwegian University Hospital (St. Olavs Hospital) to determine if the data was comparable. Data was reviewed and interviews were conducted at both facilities between May 1 2003 and April 30 2004.	percentage of cancellations at the American Hospital had no meaningful explanation for cancellations.	data only roughly captures the causes of cancellations.	comparable. There is a limited sample size for prospective data which makes the analysis vulnerable. There is also a question of interobserver reliability.	
<b>#19</b>							
Evidence-based approaches toward reducing cancellations on the day of surgery. <i>Saudi</i>	Souzdalnitki, D., & Narouze S.	Non-experimental	194 bed District General Hospital in the United Kingdom from April 1, 2006 to March 31, 2011. 42,082	Over 5 year period OR cancellation on the same day of surgery was reduced by 50%. The number of cancellations was related to a variety of organizational and other problems not	Preoperative clinics seem to be effective in helping to reduce the number of no-shows and cancellations on the day of	This study does not examine the cost effectiveness of the preoperative clinic	Level III/Good

<i>Journal of Anaesthesia November 2014.</i>			operating room cases were scheduled for operation during this period, A total of 28,928 cases met the inclusion criteria	related to patient compliance or medical conditions. This study revealed 250% more opportunities for healthcare organizations improvements.	surgery that are related to medical management and incorporation of telemedicine technology into routine perioperative care may help decrease cancellation rates. Telemedicine clinics may affect the outcomes		
<b>#20</b>							
Perioperative Systems as a quality model of perioperative medicine and surgical care.	Lee, A., Kerridge, R.K., Chui, P.T. Chiu, C.H., 12& Gin, T.	Systematic Review	22 of 24 studies published from 1994 through March 2010 in over 400,000 patients included in the	The new Perioperative System comprises a number or organizational pre-procedural preparations and represents a substantial change in	Further observation, research and analysis of the paradigm shift to a preoperative medicine are	1) One of the difficulties in interpreting the rate of surgery cancellation on the day of surgery is the	Level IV/Good

<p><i>Health Policy 2011.</i></p>			<p>review. Two studies did not meet the inclusion criteria. Studies were conducted in North America (14), Australia (4), Europe (3), and Middle East (1). Studies involve a variety of surgical procedures.</p>	<p>clinical practice and behaviors and are becoming the new “standard of care model” for surgical care</p>	<p>needed. The study suggests greatest cost savings comes from shorter length of stay rather than fewer preop investigations.</p>	<p>range of reasons for cancellation, such as patient-related factors, inadequate work-up, no hospital beds, or operating room time or lack of staff. 2) study did not report specific start date, only year</p>	
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<b>#21</b>							
Economic Benefits Attributed to Opening a Preoperative Evaluation Clinic for Outpatients. <i>International Anesthesia Research Society 1996.</i>	Pollard, J.B., Zboray, A.L., & Mazze, R.I.	Utilization review	Utilization review of inpatient and outpatient surgical volumes and cancellation rates from December 1993 to May 1994 were compared to similar data from 6 month period after opening the perioperative unit, December 1994 to May 1995. Outpatient surgery cases increased from 104 to 524 during December	During the 6months immediately after opening the perioperative unit, the number of outpatient operations increased by 420 from 104 to 524. Outpatient cancellations decreased significantly from 26% prior to opening the perioperative unit to 6.6% during the first 6months after it was established.	One third of cancellations in both periods were for medical reason with the remainder due to other factors such as emergency surgery superseding an elective surgery, patients not adhering to NPO status, patients not having a companion for transportation home after outpatient surgery, and patients failing to	1) It is assumed the pre-op clinic is directly related to economic benefits however there is insufficient data to support this 2) 1993 utilization review determines the length of stay is directly related to the pre-op clinic however this could have been the result of surgeries paid per	Level V/Low

			1994 to May 1995.		appear on the day of surgery.	diem vs per procedure 3) study assumes the decrease in length of stay is related to the pre-op clinic however data is insufficient to assume this correlation 4) data is from 1993.	
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**Appendix E**  
**Institutional Review Board Approval**



OFFICE OF RESEARCH COMPLIANCE

**INSTITUTIONAL REVIEW BOARD FOR HUMAN RESEARCH  
DECLARATION of NOT RESEARCH**

Demerise Minor  
College of Nursing  
1601 Greene Street  
Columbia, SC 29209

Re: **Pro00070822**

This is to certify that research study entitled, "**Implementing a Surgical Pathway to Reduce Operating Room Cancellation Rates**," was reviewed on 8/29/2017, by the Office of Research Compliance, which is an administrative office that supports the University of South Carolina Institutional Review Board (USC IRB). The Office of Research Compliance, on behalf of the Institutional Review Board, has determined that the referenced research study is not subject to the Protection of Human Subject Regulations in accordance with the Code of Federal Regulations 45 CFR 46 et. seq.

No further oversight by the USC IRB is required. However, the investigator should inform the Office of Research Compliance prior to making any substantive changes in the research methods, as this may alter the status of the project and require another review.

If you have questions, contact Arlene McWhorter at [arlenem@sc.edu](mailto:arlenem@sc.edu) or (803) 777-7095.

Sincerely,



Lisa M. Johnson  
ORC Assistant Director  
and IRB Manager



## Appendix F

### VA Medical Center IRB Approval

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#### WJB Dorn VA Medical Center Differentiating Research from Other Projects

**Research** is defined as "a systematic investigation, including research development, testing and evaluation, designed to develop or contribute to generalizable knowledge and to produce information to expand the knowledge base of a scientific discipline or other scholarly field of study."

**Operations Activities** are certain administrative, financial, legal, quality assurance, quality improvement, and public health endeavors that are necessary to support VHA's missions of delivery health care to the Nation's Veterans, conducting research and development, performing medical education, and contributing to national emergency response. Operations activities may or may not constitute research. These may include program evaluations.

**Quality Improvement** is defined as a data-driven, systematic approach to improving care locally and focuses on tracking quality of care.

**Evidence Based Practice (formerly Research Utilization)** is defined as a clinical decision-making approach that integrates best available research evidence into practice with the practice change in one area or unit prior to institutional implementation.

**Responsible Individual:** Demerise Minor

**Department/Service:** Surgery

**Phone:** 4037      **E-mail:** Demerise.Minor@va.gov

**Project Title:** Implementing a Surgical Pathway to Reduce Operating Room Cancellation Rates


Please submit this completed checklist and a brief (1 page) description of the proposed project, clearly stating the purpose of the activity, how the work will be conducted, and what will be done with the resulting information, to the Research Office (Bldg. 9) or email to [lucas.david@va.gov](mailto:lucas.david@va.gov).

CONDITIONS FOR DETERMINATION OF STATUS	Yes	No
1. Is this project or activity designed to be implemented and used solely for internal VA purposes? (ie, findings are intended to be used by and within VA or by entities responsible for overseeing VA, such as Congress or the Office of Management and Budget).	<input checked="" type="checkbox"/>	<input type="checkbox"/>
2. Does the project aim to produce information that expands the knowledge of a scientific discipline or scholarly field?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
3. Does the project consist of "operations activities"? (see footnote for examples)	<input checked="" type="checkbox"/>	<input type="checkbox"/>
4. Do you have any plans in the future with this project to do either of the following:		
a. Supplement/modify your project or analyze the data collected in a different way to produce information generalizable outside the VA?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
b. Supplement/modify your project or analyze the data collected in a different way to produce information that expands the knowledge base of a scientific discipline?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
5. Will the proposed project meet requirements set forth by a university level degree program that requires "research" be conducted?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
6. Does the project involve prospective assignment of patients to receive different or additional procedures or therapies?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
7. Does the project involve a "control group" (patients or employees) for whom an intervention is intentionally withheld or process not done to allow an assessment of its efficacy?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
8. Will individuals be exposed to additional physical, psychological, social or economic risks or burdens?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
9. Will the project collect and record identifiers and/or personal health information (PHI) for purposes other than treatment, payment or operations?	<input type="checkbox"/>	<input checked="" type="checkbox"/>

<sup>†</sup> Examples of operations activities include activities designed for internal VA purposes, including routine data collection and analysis for operational monitoring, evaluation and program improvement purposes, VHA system redesign activities, patient satisfaction surveys, case management and care coordination, policy and guidance development, benchmarking activities, Joint Commission visits and related activities, medical use evaluations, business planning and development such as cost-management analyses, underwriting, and similar activities.

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OTHER RELEVANT INFORMATION		Yes	No
10. Who will participate? All patients undergoing surgical intervention requiring general anesthesia			
11. Is participation voluntary?			
		<input type="checkbox"/>	<input checked="" type="checkbox"/>
12. Please indicate below all of the following that will be measured with this project:			
<input type="checkbox"/>	Variation from standard of practice	<input type="checkbox"/>	Rate of adoption
<input checked="" type="checkbox"/>	Improved adherence with standard of practice	<input type="checkbox"/>	Ease of implementation
<input type="checkbox"/>	Satisfaction with standard of practice	<input type="checkbox"/>	Cost reduction
<input type="checkbox"/>	Feasibility	<input checked="" type="checkbox"/>	Other: reduction in operating room cancellations
13. Do you plan to publish or present the findings from this project?			
		<input checked="" type="checkbox"/>	<input type="checkbox"/>
14. Who or what VA organizational body (if any) authorized or sanctioned the project? NA			
15. Is this project funded? If yes, by whom?			
		<input type="checkbox"/>	<input checked="" type="checkbox"/>
16. Please include any comments, clarifications, and/or questions regarding the project:			

 \_\_\_\_\_ Date 8/31/17  
**Signature of Responsible Individual**

**\*Please note that it is the responsibility of this individual and/or each VA author and coauthor (in cases of publications) to retain a copy of this form signed by the ACOS/Research for a minimum of 5 years after publication and in accordance with any applicable records retention schedules. A copy will also be retained by the Research Service.**

Office Use only	
<input checked="" type="checkbox"/>	Determined NOT to be research - no research approvals required
<input type="checkbox"/>	Research - requires IRB approval
<b>Kathlyn S. Haddock</b> 123554	
<small>           Designated by Kathlyn S. Haddock, 123554            OR designates research or non-research            activities. 123554-123554-123554            or Kathlyn S. Haddock, 123554            Date: 08/31/17 08:52:34 AM         </small>	
ACOS/R&D – WJB Dorn VA Medical Center	Date <u>8/31/2017</u>
<input type="checkbox"/>	See attached comments.

Form is based on VHA Handbook 1058.05, VHA Operations Activities that May Constitute Research (October 28, 2011). Per paragraph 7.c. Other Peer-Reviewed Publications, the ACOS-R is designated by the Facility Director to acknowledge the non-research status of an activity, as specified on this form for facility operations activities. Any network operations activities must be reviewed by the Network Director or their designee.

<sup>1</sup>PHI (Protected Health Information) = Health information + identifiers. The 18 HIPAA identifiers include: 1) Names; 2) All geographical subdivisions smaller than a State, including street address, city, county, precinct, zip code, and their equivalent geocodes, except for the initial three digits of the zip code if according to the current publicly available data from the Bureau of the census; a) the geographic unit formed by combining all zip codes with the same three initial digits contains more than 20,000 people; and b) the initial three digits of a zip code for all such geographic units containing 20,000 or fewer people is changed to 000. 3) All elements of dates (except year) for dates directly related to an individual, including birth date, admission date, discharge date, date of death; and all ages over 89 and all elements of dates (including year) indicative of such age, except that such ages and elements may be aggregated into a single category of age 90 or older. 4) Telephone numbers; 5) Fax numbers; 6) Electronic mail addresses; 7) Social security numbers; 8) Medical record numbers; 9) Health plan beneficiary numbers; 10) Account numbers; 11) Certificate/license numbers; 12) Vehicle identifiers and serial numbers, including license plate numbers; 13) Device identifiers and serial numbers; 14) Web Universal Resource Locators (URLs); 15) Internet Protocol (IP) address numbers; 16) Biometric identifiers, including finger and voice prints; 17) Full face photographic images and any comparable images; 18) Any other unique identifying number, characteristic, or code.

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