Southern California CSU DNP Consortium

California State University, Fullerton
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IMPROVING ELECTIVE SURGERY CANCELLATIONS:
A QUALITY IMPROVEMENT PROJECT

A DOCTORAL PROJECT
Submitted in Partial Fulfillment of the Requirements
For the degree of
DOCTOR OF NURSING PRACTICE

By
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ABSTRACT

The purpose of the project was to identify factors associated with elective surgery cancellations (ESCs) on the day of surgery in a multispecialty orthopedic practice and develop recommendations to mitigate these factors. Elective Surgery (ES) Cancellations increase the cost of health care delivery and contribute to patient and family dissatisfaction. The rate of ESCs varies significantly from 1% to 26% across settings. Organizational (perioperative processes) and patient factors (knowledge deficits, communication issues, etc.) contribute to preventable surgical cancellations.

A quality improvement (QI) project was conducted in the orthopedic practice in a Southern California facility. A retrospective chart review of the orthopedic ESC cases was performed for the timeframe of January 1, 2015 to December 31, 2015. An analysis of 4,633 ES cases was reviewed and examined. Preventable and unpreventable ESC cases were analyzed using frequency counts and percentages based upon patient and organizational factors. A report of recommendations to address ESCs was created for stakeholders.

The QI project found that there were no organizational factors that contributed to ESCs on the day of surgery. It was determined that 1.2% of the ESCs were attributed to patient related factors. The low ESC rate suggests the effectiveness of the orthopedic department’s perioperative care processes. Nonetheless, upon examination of the results, the data showed 3,264 out of 4,633 (70%) cases were cancelled and
rescheduled more than once. Thus, a considerable amount of perioperative resources was expended during the cancellation and rescheduling process.

This project revealed the need for further examination of ESCs to identify the factors associated with multiple cancellations and rescheduling. The institution will need to develop a protocol to decrease any preventable patient or organizational factors that prevent an ES from occurring as scheduled. Decreasing preventable ESCs may improve organization profitability and patient/family satisfaction.
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BACKGROUND

A lack of operating room (OR) productivity creates fiscal challenges for many hospitals in the United States (Sohrakoff et al., 2014). Both preventable and unpreventable surgical cancellations create a decrease in OR utilization. These cancellations cause anxiety, frustration, and disruptions for patients and their families, and increase the cost of health care (Boudreau & Gibson, 2011). According to literature, the rate of surgery cancellations can be as low as 1% or as high as 26% in Elective Surgery (ES) cases (Souzdalnitski & Narouze, 2014; Xue, Yan, Barnett, Fleisher & Liu, 2013). Past research identifies several organizational and patient factors that contribute to preventable cancellations on the day of surgery (Schuster et al., 2011).

Contributing to these elective surgical cancellations (ESCs) on the day of surgery are the variations in preoperative processes within a healthcare system. Preoperative assessment and planning is a critical component of the perioperative process and promotes positive healthcare outcomes. When adequate assessment and planning is lacking, patients may experience surgical cancellations, lower satisfaction, and increased health care costs (Vetter et al., 2013). This Doctor of Nursing Practice (DNP) quality improvement (QI) project identified factors related to preventable ESCs, and developed recommendations to mitigate these factors for administrative and clinical stakeholders.

Problem Statement

Multiple preventable and unpreventable patient and organizational factors can contribute to ESCs (Vetter et al., 2013). Studies suggest that preventable patient level
factors contributing to ESCs may include issues associated with poor provider-patient communication or medical problems in patients who are not medically suitable for surgery. Poor communication may lead to failure to appear for surgery on time or not appearing at all (Caesar, Karlsson, Olsson, Samuelsson, & Hansson-Olofsson, 2014). In addition, a patient inadequately assessed may be medically unsuitable for surgery. The designation “not medically suitable for surgery” may be due to issues such as not being medically optimized by the Primary Care Provider (PCP) and/or other specialist providers. The definition of medically optimized is when the patient’s comorbidity condition is managed as much as medically possible. The unpreventable patient factors include new health issues that emerge within a short time prior to surgery that can significantly impact perioperative outcomes and changing one’s mind about having the surgery (Xue et al., 2013).

Organizational level factors that contribute to preventable cancellations may include issues with OR scheduling or a lack of available staff members (Dimitriadis, Iyer, & Evgeniou, 2013). Of note, some of the factors associated with cancellations may not be amenable to quality improvement efforts. Limited research suggests that having patients evaluated by specially trained, expert health care providers in the preoperative assessment clinic prior to ES may decrease preventable surgical cancellations (Stavrou, Panidis, Tsouskas, Tsousi, & Kotzampassi, 2014).

**Purpose Statement**

The purpose of this DNP QI project was to identify factors associated with preventable ESCs on the day of surgery in a tertiary multispecialty orthopedic practice and to develop recommendations to mitigate these factors. Ultimately, this project will
lead to changes in processes and procedures to ensure that patients are medically 
optimized and preventable patient and organizational factors are mitigated prior to ES.

Data from electronic health records (EMRs) from January 1, 2015 to December 
31, 2015 were reviewed to identify patient and organizational level factors contributing 
to ESCs. A list of the most prevalent factors related to cancellations as well as 
recommendations to improve the processes of care were identified.

The objectives of this quality improvement project consisted of:

1. Identifying the factors related to preventable ESCs on the day of surgery in the 
   orthopedic practice.

2. Developing recommendations to mitigate these factors for administrative and 
   clinical stakeholders.

Significance of the Project

This DNP project will improve patient experiences and decrease costs for the 
hospital participating in this project. In addition, dissemination of these results will 
serve as a roadmap for other institutions, providers, and administrators for improving 
perioperative care for patients undergoing ES.

Project Product

The present project provided information about the factors related to ESCs on 
the day of surgery. An investigation of patient and organizational factors lead to the 
development of a recommendation report for stakeholders. Presently, patients seek a 
surgical consultation for a health issue and are scheduled for an ES during the office 
visit with their surgeon. At this visit, the surgeon orders preoperative labs, completes 
the surgery orders, and signs the consents. The surgery coordinators then schedule the
surgery date and time, submit requests for insurance authorization, arrange for preoperative history and physical (H&P) examinations, and postoperative appointments. In addition, the surgical coordinators schedule the appointments for patients to see a hospitalist, PCP, cardiologist, and other specialists as appropriate for medical optimization.

Preoperative providers have 30 minutes for a one-to-one in-person interview prior to surgery. The provider assessing the patient may be a nurse practitioner (NP), a physician assistant (PA), an orthopedic resident, or an orthopedic attending physician. The provider performs preoperative risk stratification, a history and physical exam, completes a surgical consent form that the patient will sign, and reviews with the patient: 1) surgery date, 2) diagnostic tests, and 3) medication history, in addition to providing perioperative instructions. The provider orders missing diagnostic tests and addresses clinical issues to ensure medical optimization. The timeline is demonstrated in a chart as illustrated in Appendix A.

Supporting Framework

The Plan-Do-Study-Act (PDSA) model was used as the theoretical framework to support this DNP QI project. The PDSA model is based on the work of Shewhart’s tool (Deming, 2000) and supported by the Agency for Healthcare Research and Quality (AHRQ) and the Institute of Health Improvement (IHI) (AHRQ, 2013). The AHRQ is a part of the U.S Department of Health and Human Services (HHS). It is the leading federal agency in the United States for research on patient safety, outcomes, costs, and healthcare quality (IHI, 2004).
According to the IHI (2004), there are two aspects of the PDSA model. The first aspect asks three questions: 1) What are we trying to accomplish? 2) How will we know that a change is an improvement? and 3) What changes can we make that will result in improvement? The second aspect of the PDSA tool includes the following constructs: Plan – Plan the change to be tested or implemented, Do – Carry out the test or change, Study – Study the data before and after the change and reflect on what was learned, Act – Act on the information and plan the next change cycle (see Figure 1). This model fits well with the present project because it is based on the idea that small rapid cycle changes can result in significant quality improvement.

*Figure 1.* Effective elements in the PDSA Model (Deming, 2000).

The PDSA Model suggests that when changes are trialed on a small scale, allowing for experimentation and removal of failed tests, there is opportunity to increase productivity and the practice of skills. Based on the PDSA model, many small cycles of change can lead to cumulative sizable effects. The PDSA model requires minimal financial support from the administration as changes can be made on a smaller
scale and with nominal staff training to implement. Therefore, there is no need for a large financial investment because the project can be piloted on one unit prior to implementation on other units (Donnelly & Kirk, 2015; Taylor et al., 2013).

**Integration of PDSA Model into the Project**

The *Plan* phase of the PDSA Model was the first component of the present project. The *Plan* phase involved the development of a timeline regarding steps taken to complete the project. Factors associated with preventable ESCs on the day of surgery and the methods for their measurement were identified from the literature review. Stakeholders were identified who were accessed for input regarding the project assembled. Measurable objectives and goals were created. The *Do* phase was the collection of data from all orthopedic scheduled ES cases in the general OR and outpatient OR. The data were retrospectively reviewed and abstracted from information collected from January 1st to December 31st of 2015.

The *Study* phase involved data analysis and the description of variables that were identified as preventable and unpreventable patient and organizational factors associated with orthopedic ESCs on the day of surgery in the general and outpatient OR settings. In addition, the analysis consisted of a simple count of the preventable patient and organizational factors contributing to ESCs in the orthopedic practice. Other methods of analysis are presented in the methods section of this paper. The *Act* phase was the development of a report listing the project’s findings and recommendations to mitigate the factors identified from the literature and noted in the project findings. This report was presented to stakeholders.
The stakeholders consisted of the following individuals employed in the project setting: the Surgery Scheduling Supervisor, Medical Director, and Nurse Manager for the Operating Room. Studies show that the more engaged the management team is in leading change, the more influential the movement is to adopt improvements or changes in the setting (Donnelly & Kirk, 2015). The DNP QI ESCs project was completed with the cooperation and support of the stakeholders.
REVIEW OF LITERATURE

Search Results

A comprehensive literature review was conducted and involved a search of the following databases: PubMed, CINAHL Plus with Full-Text (EBSCO), and Google Scholar. To examine the factors associated with ESCs, key search terms used to identify related research articles included the following: elective surgery cancellations, orthopedics elective surgery cancellations, perioperative surgical home model, perioperative assessment clinic, and nurse practitioner preoperative evaluation. The publication dates of the articles reviewed were from 2006 through 2016. Topics were limited to health care and the language of the articles included in the review was English only. The inclusion criteria for articles selected focused on the identified factors related to surgery cancellations, cost to institution, and evidence-based recommendations for reducing ESCs. The review included both qualitative and quantitative articles. Exclusion criteria eliminated studies that were not healthcare related, conducted outside the timeframe, and/or performed in a developing country.

Overview

This review discusses the literature on the topic of ESCs. These cancellations occur for many reasons and have a great impact on the organization, provider, and the patient. Elective Surgery Cancellations are generally related to patient or organizational factors. However, some causes for ESCs are unpreventable, while others are preventable (Caesar et al., 2014; Lopez, Jowitt, & Mark, 2011; Pohlman, Staulcup, Masterson, & Vemulakonda, 2012). The literature review that follows concentrates on preventable factors, as this QI project focuses on the mitigation of these factors. Many
studies show that ESCs vary significantly, ranging from less than 1% to 26% for all ES cases (Dimitriadis et al, 2013; Lopez et al., 2011; Souzdalnitski & Narouze, 2014; Stavrou et al, 2014).

Boudreau and Gibson (2011) suggest that up to 60% of ESCs are preventable. Trentman, Mueller, Gray, Pockaj, and Simula (2010) found that the rate of ESCs could be less than 2% when using a thorough preoperative evaluation process for surgical patients. They determined that when providers coordinate services among other surgical departments, then cancellations decrease. These authors highlight the importance of exploring the reasons that cancellations occur in order to identify the preventable factors.

Xue et al. (2013) and Fitzsimons, Dilley, Moser, and Walker (2016) identified both patient and organizational factors that lead to cancellations. The organizational factors included inadequate preoperative preparation, inadequate operating room (OR) staff, no available postoperative beds, and inappropriate scheduling of surgeries. Patient factors included health status changes and failure to appear on day of surgery. Therefore, identifying these factors will lead to the development of effective interventions to decrease the costs and emotional impact associated with cancellations.

The following paragraphs address the literature related to patient and organizational factors contributing to ESCs. In addition, a review of the fiscal impact on both patients and organizations is presented. Finally, methods used by hospitals to decrease ESCs are discussed.
**Patient Factors**

According to Caesar et al. (2014), and Boudreau and Gibson (2011), patient factors lead to ~33% of cancellations and tend to be unpreventable. Studies examining the causes of ESCs resulting from patient factors identified the patient’s health status as one of the main reasons. A patient’s health status may change just before surgery due to a new onset of acute infections or exacerbation of chronic medical conditions (Kaye et al., 2015; Trentman et al., 2010; Xue et al., 2013). Researchers found one of the most common causes for cancellations is an acute upper respiratory infection. A chronic condition is often associated with co-morbidities such as cardiac diseases, diabetes, chronic obstructive pulmonary diseases, or metabolic diseases. Exacerbations of these diseases can lead to ESCs.

Both preventable and unpreventable patient factors lead to ESCs. A provider assessment and plan may mitigate preventable factors and result in a decrease in ESCs. Before surgery, most patients must follow specific preoperative instructions, such as taking or avoiding specific medications, washing with antiseptic soaps for 3 to 5 days prior to date of surgery, and/or not eating for at least six hours prior to surgery (Gillen, Catchings, Edney, Prescott, & Andrews, 2009; Xue et al., 2013). A preventable patient level factor leading to ESCs includes non-adherence to specific pre-operative instructions. Ambiguous communication between providers and patients during the preoperative session can cause confusion and can contribute to non-adherence to preoperative instructions (e.g., dietary restrictions or medication administration) that lead to preventable cancellations.
Elective surgeries are scheduled events and a patient scheduled for an ES must appear on time at the pre-op admitting area. Unfortunately, some choose to cancel on the day of surgery because of anxiety or they simply change their mind (Boudreau & Gibson, 2011; Xue et al., 2013). Thus, patient factors may or may not be preventable. A provider may not be able to diminish anxiety or prevent a change of mind, as it is the patient’s right to cancel a surgery. There are additional unpreventable factors related to ESCs, including unforeseen problems related to the weather, traffic, death, or pregnancy that can necessitate a cancellation (Lopez et al., 2011; Boudreau & Gibson, 2011; Xue et al., 2013). Changes in income and health insurance status can lead to cancellations as well, which may or may not be preventable (Pohlman et al., 2012).

Organizational Factors

The literature suggests that healthcare providers in the preoperative clinic can significantly decrease ESCs by risk stratification and medical optimization during the preoperative assessment period (Vetter et al., 2013). Providers need to implement interventions to address the medical or social issues that contribute to ESCs. A study by Edwards and Slawski (2016) found that a phone call within 30 days of surgery to assess the patient’s overall health prior to surgery was an effective method in ensuring that the patient is committed to keeping the surgery appointment.

The lack of an adequate patient preoperative assessment contributes to preventable ESCs (Dimitriadis et al., 2013; Lopez et al., 2011; Souzdanitski & Narouze, 2014; Stavrou et al., 2014). Providers must assess multiple factors to ensure that the patient’s surgery can proceed. The following is a partial list of factors that preoperative providers must assess to prevent ESCs: 1) insurance status and
authorization, 2) informed consent, 3) surgical room scheduling and equipment, 4) patient understanding of preoperative instructions, 5) diagnostic tests, 6) availability of inpatient rooms, and 7) surgeon scheduling (Caesar et al., 2014; Nelson et al., 2015; Pohlman et al., 2012; Xue et al., 2013). Many studies have found that preoperative assessment clinics decrease preventable ESC rates by implementing standardized procedures for providers to follow to ensure comprehensive assessments of preoperative patients (Caesar et al., 2014; Kash, Zhang, Cline, Menser & Miller, 2014; Lopez et al., 2011; Pohlman et al., 2012).

The Impact of Cancellations

Patient

The literature suggests that ESCs have a negative financial and emotional impact on patients (Singhal, Warburton & Charalambous, 2013). Preventable ESCs cause inconvenience to family members and contribute to dissatisfaction with the healthcare system (Pratap et al., 2016; Trentman et al., 2010). In preparation for ES, patients may have arranged for time off from work for extensive diagnostic testing. When the surgery is cancelled, family members or friends who have traveled from afar to care for the patient may experience financial loss due to lost wages or transportation costs (e.g., car rentals, airplane tickets, lodging, etc.). Patients may suffer with painful conditions for an extended period if their surgery is delayed because of preventable causes. Overall, preventable ESCs cause physical suffering, emotional distress, and financial burdens for the patient and their family (Caesar et al., 2014; Dimitriadis et al., 2013; Pohlman et al., 2012; Xue et al., 2013).
Organization

The financial impact of preventable ESCs on an organization is significant. The most expensive area to manage in a hospital is the operating room. The reasons for the high cost include the fixed cost of OR equipment and the diversity of staff required to maintain the unit. Operating rooms employ registered nurses (RNs), scrub technicians, anesthesiologists, and other specially trained personnel regardless of whether the OR is being used or not (Leslie, Beiko, D., Van Vlymen & Siemens 2012; Lopez et al., 2011; Pohlman et al., 2012). The average estimated cost per hour associated with each cancellation is ≥$4,802. The potential for revenue loss per institution is estimated to be greater than $800,000 annually (Argo et al., 2009; Pohlman et al., 2012; Pratap et al., 2016). Surgery cancellations also contribute to loss of surgeon income (Xue et. al., 2013).

To understand the fiscal impact of cancellations on organizations, it is important to review the current state of reimbursement for surgical care under the Affordable Care Act and the Centers for Medicare Services (CMS, 2016). Previously, healthcare providers were paid for each service they performed independent from other services involved with the surgery or pre-operation services. However, under the Medicare global surgery package fee-for-service, the cost of a surgery includes the fees for pre-operation services provided the day before the day of surgery and up to 90-days post operation (CMS, 2016). Medicare specified the global surgery package as the approved amount for surgical procedures and for all services provided by the surgeon related to the surgery (CMS, 2016). Medicare pays fees-for-service that is defined as a separate payment for each type of service (e.g., health care provider, hospital inpatient and
outpatient services, home healthcare, physical therapy, skilled nursing facility) (CMS, 2016).

The Centers for Medicare and Medicaid Services were authorized by the Affordable Care Act to evaluate the Bundled Payments for Care Improvement (BPCI) initiative models by the end of 2018. The Bundled payments model is defined as a value based payment, which includes episodic care such as total hip or knee replacement. The reimbursement rate is a fixed payment amount based on the total cost of services for the episode. The surgery related services include surgeon, hospital, and all providers who coordinate care for the surgical patient (Froemke et al., 2015; Plate, Brown, Wohler, Seyler, & Lang, 2016). A cancelled surgery would mean the hospital, surgeon, and other coordinated providers will not be reimbursed for the surgery related services because the surgery did not occur. Thus, it is imperative for facilities and providers to work together to decrease preventable ESCs in order to decrease hospital costs and loss of income for providers.

**Preoperative Assessment**

Evidence is strong that having a standardized risk stratification and medical optimization protocol improves the preoperative assessment process and mitigates preventable ESCs (Boraiah et al., 2015; McKendrick, Cumming, & Lee, 2014; Sebach, Rockeli, Reddish, Jarosinski, & Dolan, 2015). Risk stratification is defined as the identification of risk factors such as comorbidities, or behavioral or neurocognitive issues that can be optimized prior to the date of surgery (Boraiah et al., 2015; Jones et al., 2013). Employing practice guidelines of the American College of Cardiology,
American Heart Association and American Society of Anesthesiologists was demonstrated to improve preventable ESCs on day of surgery (Fleisher et al., 2014).

Studies show that clear communication among surgeons, anesthesiologists, NPs, PAs, caregivers, and surgery coordinators improves risk stratification and medical optimization. Clear communication encourages patients to participate in their shared-decision making and perioperative care. Furthermore, clear communication helps the surgery coordinator schedule the day and time for patients appropriately. Thus, clear communication is essential to decrease the errors that can lead to cancellations (Fleisher et al., 2014; Sebach et al., 2015; Siragusa, Thiessen, Grabowski & Young, 2011).

Several studies suggest well-designed preoperative clinics managed by mid-level providers (e.g., NPs or PAs) improve perioperative outcomes including length of stay, infection rates, pain management, and patient satisfaction. These clinics may decrease cardiac and respiratory arrests and preventable ESC rates for medically complex surgical patients (Sebach et al., 2015; Varughese, Byczkowski, Wittkugel, Kotagal, & Kurth, 2006; Vazirani, Lankarani-Fard, Liang, Stelzner, & Asch, 2012).

Summary

This literature review identified patient and organizational factors associated with ESCs on day of surgery and their impact on healthcare outcomes. The preoperative period is a critical time to identify these factors through systematic assessments. Providers who optimize patient level factors (e.g., education about medications, pre-operative instructions) and organizational level factors (e.g., operative room administration) can potentially decrease ESCs (Garson et al., 2014; Jones et al., 2013; Raphael et al., 2014; Sebach et al., 2015). A detailed Table of Evidence (TOE)
(see Table 2) provides the key elements for several of the research articles discussed in this proposal.
METHODS

The method section describes the plan for meeting the study aims which included: 1) identifying the factors related to preventable ESCs in an orthopedic clinic; 2) and developing recommendations to mitigate these factors for administrative and clinical stakeholders to guide practice change. The project had two components. First, a retrospective chart review identified organizational and patient factors associated with ESCs on the day of surgery. The review consisted of collecting relevant data associated with ESCs that occurred during the year of 2015. Second, a report was generated that outlined evidence-based recommendations and interventions to mitigate factors associated with preventable ESCs.

Retrospective Chart Review

Design

The project design consisted of a retrospective chart review of ESCs. Only charts of patients scheduled for elective orthopedic surgery from January 1, 2015 to December 31, 2015 whose surgeries were cancelled on the day of surgery were reviewed. Elective surgery cancellation was defined as a scheduled surgery that was cancelled on the day of surgery.

Setting

The setting was a Magnet designated Level 1-trauma and academic teaching facility. The facility consisted of 411 medical and surgical beds in urban Southern California. In 2015, there were over 1,200 elective orthopedic surgeries performed out of 13,332 inpatient and outpatient surgeries conducted at the facility.
Sample

Charts were reviewed of patients who were 18 years and older, who were scheduled for any elective orthopedic surgical procedure in the general or outpatient OR during 2015, and who had a surgery cancelled on the day of surgery. The following were common elective orthopedic surgeries seen in the clinic: joint replacements, carpal tunnel release, cervical or lumbar spine disectomy or fusion, bunion removal, etc.

Procedures

Commencement of the project began after approval from the Institutional Review Board (IRB) was granted from California State University, Long Beach (CSULB) IRB and at the project setting (see Appendix B). A systematic review of the retrospective electronic medical record (EMR) of cases from January 1, 2015 to December 31, 2015 identified preventable factors associated with ESCs on the day of surgery. The author obtained the orthopedic ESCs on the day of surgery report from the OR manager, who was responsible for the collection and completion of the monthly reports of orthopedic ES on the day of surgery. The reports were sent to the author via secure encrypted facility email with the following variables: date of surgery, procedure, cancellation reason, location of surgery, and patient medical record number (MRN).

Using the EMR, the author abstracted patient demographics and variables related to ESCs (patient, organizational) on the day of surgery. Each patient was assigned a unique identification (ID) number in sequence to prevent repetition, which was recorded on the data abstraction file as well as the original data file from the OR manager. The data abstraction file and the original data file were kept separately on the facility server. A code sheet was used during data abstraction. The de-identified data
abstraction file was stored on a secure, encrypted, password-protected laptop given to
the DNP investigator by the Orthopedic Department Medical Director. Only the author
and chair had access to the data.

Each cancellation variable was categorized as preventable or unpreventable. Preventable
cancellations were defined as modifiable factors that could be identified prior to day of surgery. Unpreventable cancellations were defined as non-modifiable factors that were not identifiable prior to day of surgery. A code sheet was used to assist with data recoding (see Appendix C). The author abstracted the following factors from the EMR:

**Patient Factors**

1) Age (number in years)
2) Gender (male, female, other)
3) Race (Black, White, Asian)
4) Ethnicity (African American, Caucasian, Hispanic, other)
5) Primary language (English, other)
6) Marital status (married, single, divorced, widowed)
7) Education level (grade 1-3, grade 4-8, grade 9-12, high school graduate, some college, college graduate, graduate level)
8) Primary Payer mix (Medicare, Medi-Cal, Commercial)
9) Surgical procedure cancelled (total shoulder replacement, total hip replacement, total knee replacement, neck, spine, shoulder, elbow, hand, knee, ankle and foot)
10) Month of cancellation (January, February, March, April, May, June, July, August, September, October, November, December)

11) Day of the week cancellation (Monday, Tuesday, Wednesday, Thursday, Friday, Saturday, Sunday)

12) Location of cancellation (general OR, outpatient OR)

13) Provider level for pre-op assessment (orthopedic resident, NP, PA, orthopedic attending)

Preventable and unpreventable ESCs due to patient factors were categorized as follows:

**Preventable Patient Factors**

1) Did not appear for surgery (yes, no)

2) Non-Adherence to NPO (yes, no)

3) Non-Adherence to medication regime (yes, no)

4) Other

**Unpreventable Patient Factors**

1) Patient self-cancelled (yes, no)

2) Change of medical condition (e.g., new onset of acute illness/exacerbation of chronic disease) (yes, no)

3) Other

**Organizational Factors**

Preventable and unpreventable cancellations due to organizational factors were categorized as follows:
**Preventable Organizational Factors:**

1) Need of further studies (e.g., missing labs/medical optimization) (yes, no)
2) OR scheduling issues (e.g., scheduler/administrative staff error) (yes, no)
3) Orthopedic implant(s) not available (yes, no)
4) Medical staffing issues (e.g., error in surgeon scheduling) (yes, no)
5) OR staffing issues (e.g., no available ancillary staff) (yes, no)
6) Health insurance approval issue (yes, no)
7) Other

**Unpreventable Organizational Factors:**

1) No surgeon (e.g., no surgeon due to illness/personal/family issues) (yes, no)
2) Natural disasters (yes, no)
3) Other

**Analysis**

Patient and organizational factors associated with ESCs on the day of surgery were reported as frequencies and percentages. The following metrics were used to describe ESCs:

1) Total preventable percentage: Numerator of total preventable factors/denominator of total ESCs
2) Patient preventable percentage: Numerator of patient preventable factors/denominator of total preventable ESCs
3) Organizational preventable percentage: Numerator of organizational preventable factors/denominator of total preventable ESCs
Development of the Recommendations

The development of the recommendations to mitigate organizational and patient preventable factors of ESCs and rescheduling 24 hours prior to day of surgery was created from the frequency counts of preventable factors and the review of the literature (see Appendix D).
RESULTS

There were a total of 4,633 orthopedic surgical scheduled cases from January 1, 2015 to December 31, 2015. The number of cases that met inclusion criteria was 4,618. The 151 cases that were cancelled between 24 to 72 hours prior to the scheduled surgery date were excluded. Also, there were 3,264 cases excluded due to being cancelled multiple times. The number of cases which ultimately went to surgery as scheduled were 1,203 (see Figure 2). An examination of the number of ESC cases on the day of surgery was 15, which is 1.2%.

Figure 2. Flow-chart analysis for Orthopedic Elective Surgery cases collected from January 1, 2015 to December 31, 2015 with ESC cases extracted based on exclusion and inclusion criteria. n = number.
The 15 ESC cases included consisted of 12 (80%) males and 3 (20%) females. The mean age of the sample was 53, with an age range from 18 to 88. The racial makeup of the sample was 10 (66%) Caucasians, 4 (27%) Blacks, and 1 (7%) Asian. English was the primary language spoken by the majority of the cases with 13 (87%) and 2 (13%) speaking a language other than English. The type of medical insurance used among the 15 cases was primarily state or federally funded. There was no data available regarding patient educational levels for the cases. The demographics for the 15 cases are presented in Table 2.

There were a variety of orthopedic surgeries cancelled. There were 5 (33%) hand surgeries, 2 (13%) knee surgeries, and 2 (13%) shoulder surgeries. One case of each of the following surgery types was cancelled: total hip and knee replacement, neck, back, ankle and foot (see Figure 3).

The ESC cases were examined for the month in which the surgery was cancelled. The month with the highest number of ESCs was February with 4 (27%) cases. The months of August and November both had 3 (20%) ESC cases. In October and June, there were 2 (13%) ESC cases in each month. September had the least number of ESC cases with only 1 (.07%). There were no day of surgery cancellation cases in the months of January, March, April, May, July, and December.
Table 2

Patient demographics of ESCs on the day of surgery

<table>
<thead>
<tr>
<th>Patients’ Characteristics</th>
<th>ESCs on the day of surgery (n = 15)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean Age (years)</td>
<td>53 (18 – 88)</td>
</tr>
<tr>
<td>Male</td>
<td>12 (80%)</td>
</tr>
<tr>
<td>Female</td>
<td>3 (20%)</td>
</tr>
<tr>
<td>Caucasian</td>
<td>10 (66%)</td>
</tr>
<tr>
<td>Black</td>
<td>4 (27%)</td>
</tr>
<tr>
<td>Asian</td>
<td>1 (7%)</td>
</tr>
<tr>
<td>English is primary speaking language</td>
<td>13 (87%)</td>
</tr>
<tr>
<td>Language speak other than English</td>
<td>2 (13%)</td>
</tr>
<tr>
<td>Married</td>
<td>7 (47%)</td>
</tr>
<tr>
<td>Single</td>
<td>6 (40%)</td>
</tr>
<tr>
<td>Divorced</td>
<td>2 (13%)</td>
</tr>
<tr>
<td>Medicaid insurance</td>
<td>8 (53%)</td>
</tr>
<tr>
<td>Medicare insurance</td>
<td>4 (27%)</td>
</tr>
<tr>
<td>Commercial insurance</td>
<td>3 (20%)</td>
</tr>
</tbody>
</table>

n = number of cases
The day of the week with the most ESC cases was examined. It was determined that Monday had the highest number of ESC cases with 6 (40%). There were 2 (20%) ESC cases on Tuesday, Wednesday, and Thursday (see Figure 4). There were no cancellations on a Friday. The hospital location in which the surgery was performed was also examined. There were 8 (53%) cancellations in the Outpatient OR and 7 (47%) in the General OR. The level type of the provider who performed the Preoperative H&P was examined to determine the number of cancellations. The number of ESC cases performed by orthopedic residents was 10 (67%). The orthopedic residents had the most cancellations among all providers. There were 4 (27%) ESC cases among the NPs, and 1 (7%) case performed by a PA. There was no Preoperative H&P performed by an orthopedic attending that could be identified.
The ESC cases were examined to determine whether patient factors or the organizational factors caused the day of surgery cancellation. The reasons for day of surgery ESCs were entirely related to patient factors. The reasons were examined in terms of preventability and un-preventability. There was one preventable factor identified in which the patient was confused about which day the surgery was to occur. There were 14 un-preventable cases. Seven patients changed their mind: one stated personal issues, one-stated changes in income, and five stated “I changed my mind.” Seven cancelled due to a change in their medical condition: three developed open wounds and four had respiratory infections (see Figure 5). There were no organizational factors identified related to ESCs.

Figure 4. Days of the week for ESCs
Figure 5. Patient related factors for ESCs on the day of surgery.

The following metrics were used to describe the number of ESCs on the day of surgery:

1) Total preventable percentage: Numerator of total number of preventable ECS factors/denominator of total ESCs.
   a. $1/15 = 7\%$

2) Patient preventable percentage: Numerator of patient preventable factors/denominator of total preventable ESCs.
   b. $1/1 = 100\%$

3) Organizational preventable percentage: Numerator of organizational preventable factors/denominator of total preventable ESCs.
   c. $0/1 = 0\%$
DISCUSSION

Although the original aims of this project were to identify factors associated with ESCs on the day of surgery and develop recommendations to mitigate these factors, this DNP project did not unfold as planned. When identifying a potential DNP project, the author and her employers (the stakeholders) identified mitigating ESCs on the day of surgery as an appropriate target to improve patient and organizational outcomes. However, when the actual data related to ESCs was examined, the incidence of ESCs on the day of surgery was not consistent with what the author or stakeholders anticipated. In fact, there was only one case of preventable patient factor ESCs on the day of surgery in 1,203 elective orthopedic surgical cases at this facility.

Although ESCs on the day of surgery do not appear to be an issue for this facility or a worthy target for a QI project, the author took the opportunity to identify lessons learned from implementing this DNP project. First, the author recognizes the importance of basing QI on empiric data rather than speculation or individual clinical perspectives. In most PDSA QI projects, the planning phase would identify whether a problem exists and provide baseline data to gauge the effectiveness of the practice change. Nonetheless, in this project, empiric data was unavailable until after the initial proposal defense and IRB approval. Thus, there was limited opportunity to anticipate the finding that in fact ESCs were limited at this facility.

One of the challenges identified in the current project was the perception of the stakeholders regarding the number of ESCs cases on the day of surgery. The initial development phase of the project was selected based upon this perception. McCabe (2014) describes perception as the person’s belief of an issue that is based on the
person’s observation of an event or situation, rather than based on measurable objective data. Therefore, it was surprising to determine that in actuality the number of ESC cases on the day of surgery was quite low. Data should have been collected from January 2014 to December 2014 to determine the feasibility of using the data from 2015 to examine the ESC rate for the day of surgery. The implication for a future project would be to obtain data regarding all cancellations in order to examine the reason for cancellation as they relate to preventable or un-preventable factors for both patient and organization. This would increase the scope of the project as well as mitigate the factors for prevention of cancellations.

One preventable patient related factor was identified. This patient was confused about the date of the surgery and thus, missed it. Most ESC cases on the day of surgery were unpreventable patient related factors. According to Pohlman et al. (2012), changes in income and health insurance status can lead to cancellations as well, which may or may not be preventable. The patients identified changes in their medical condition or changed their mind in following through with the surgery. Many studies identified patient’s change of medical condition as the most common reason for ESCs on the day of surgery (Emanuel & Macpherseon, 2013; Olson & Dhakal, 2015). This DNP QI project found that seven patients changed their mind for the following reasons: personal issues, change in income, and simply a change of mind. The other seven patients suffered changes in their medical condition due to open wounds and upper respiratory infections.

In this project, patient factors were the main contributors to day of surgery ESCs. The percentage of day of surgery ESC cases was low (1.2%). The number of
ESCs found in the present project was low, which was also consistent with previous research conducted in a tertiary teaching facility (Lopez et al., 2011). Other studies reported that ESCs could be as low as 1% or as high as 26% (Souzdalnitski & Narouze, 2014; Xue et al., 2013). Per Trentman et al. (2010), less than 2% of ESCs is achievable when practices related to good communication and coordination between patients and the surgical team occur during the perioperative period. The low ESC rate on the day of surgery in the present project may be attributed to the orthopedic department’s well-developed perioperative processes.

While the incidence of preventable ESCs at this facility was low (1/15 cases), this facility did experience 15 ESCs. It was estimated that the average revenue loss per ESC case was approximately ≥$4,802 (Argo et al., 2009; Pohlman et al., 2012; Pratap et al., 2016). The potential loss in annual revenue for the 15 cases was estimated to be greater than $72,000. In addition to the loss in revenue, the cancellations create anxiety, frustration, and disruptions for patients and their families, which can add to an increase in the cost to health care (Boudreau & Gibson, 2011).

When the data was examined for the day of the week with the most cancellations, it was determined that Monday had the most. This information can be used to engage in specific practices that mitigate preventable patient related factors. It is recommended that a phone call or text message reminder to the patient a couple days prior to date of surgery would be helpful in decreasing the ESCs (Caesar et al., 2014). This recommendation can also be applied to all scheduled surgeries in order to decrease the possibility of a missed surgery date. Caesar et al. (2014) found that sending a reminder text message to the patients prior to date of surgery decreased the rate of
cancellations on the day of surgery. The data found orthopedic residents had the most
(10/15) ESC cases among all providers who performed the Preoperative H&P. The
high results may be due to the fact that a majority of Preoperative H&P cases were
conducted by orthopedic residents.

The data provided for the project was based upon the number of cases scheduled
for surgery. Many cases were rescheduled multiple times and each cancellation
appeared to be a new scheduled surgery. However, upon examination, it was
determined that each cancellation could be attributed to a single case that was rebooked
several times upon cancellation prior to date of surgery. This inflated the number of
ESC cases and provided the misconception that stakeholders held regarding their belief
that there was a high number of cancellations on the day of surgery. In actuality, there
were only 15 ESCs cases on the day of surgery.

Based on literature, it is common for patients to have at least one or several
cancellations prior to the date of surgery (Caesar et al., 2014). Reasons for
cancellations and rescheduling range from both patient and organizational related
factors (Caesar et al., 2014). Many studies suggest other causes for multiple
cancellations and surgery rescheduling. The causes may be due to the effectiveness of
preoperative evaluation processes by identifying patients who required further medical
evaluation and were unable to have surgery on the scheduled date (Olson & Dhakal,
2015; Sebach et al., 2015). This was the situation identified in the present project as
the causes for patient related ESCs. Many ES cases were rescheduled multiple times.

There were no organizational factors identified in this project. Caesar et al.,
(2014) suggests that in order to mitigate ES and multiple cancellations prior to surgery,
it is important to describe the reasons for surgery cancellations to stakeholders and patients. This helps increase awareness regarding cancellations and improves the perioperative processes to decrease surgery cancellations. Organizations should review their procedures in creating ES cases to reduce the number of rescheduled surgeries. Awareness of preventable patient and organizational factors can lead to mitigation of these types of factors associated with specific patients being scheduled for surgery. This should improve utilization of surgery scheduling resources.

Nevertheless, the author suggests caution when applying the project results. There is a small possibility that the data provided for analysis may not be complete, since an administrative analyst abstracted the data for analysis. It should be noted that the project took place at a tertiary academic medical center committed to clinical excellence with many ongoing research projects. This fact lends credence to the validity of the project conclusions. The 15 ESC cases identified is consistent with the literature, which recognizes that cancellations can be as low as 1%. The low cancellation rate of the orthopedic department in the project can be attributed to the current comprehensive practices of perioperative processes between patients and healthcare providers. However, upon examination of the results, the data showed 3,264 out of 4,633 (70%) cases were cancelled and rescheduled more than once. In addition, 151 cases were cancelled between 24 to 72 hours prior to the scheduled surgery date which were excluded. Thus, a considerable amount of perioperative resources was expended during the cancellation and rescheduling process.

In conclusion, this DNP QI project identified 1.2% ESCs on the day of surgery. There were 15 patient related factors identified with one preventable patient factor and
14 cases of unpreventable patient factors. These findings were consistent with the literature. The low number of ESCs suggests that the orthopedic department was effective in their perioperative care protocol. The perioperative care protocol includes communication between and among the patient and their surgeons, surgery coordinators, and the preoperative clinic and anesthesia department. This project identified the need for further examination of the total number of ES cancellations and the rescheduling of cases to determine a protocol to decrease any preventable patient or organizational factors that prevent an ES from occurring as scheduled. Decreasing preventable ESCs will improve the organization’s profitability and patient and family satisfaction. The implications of this QI project included a thorough examination during the planning phase to identify a credible baseline for the total number of ESC cases prior to the day of surgery. This information will assist in developing a protocol for preventing ESCs prior to the day of surgery. Additional ESC data will provide a broader perspective on the magnitude of the factors related to ES cancellations.
REFERENCES


http://www.ahrq.gov/research/findings/factsheets/quality/qifactsheet/index.html


## APPENDIX A

### TABLE OF EVIDENCE

**Table 1**  
*Summary of studies for Elective Surgery Cancellations*

<table>
<thead>
<tr>
<th>Purpose, Author(s), Year</th>
<th>Design &amp; Key Variables</th>
<th>Sample &amp; Setting</th>
<th>Measures</th>
<th>Results</th>
<th>Conclusion, Limitations &amp; Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Incidence and root causes of ortho ES cancel (Caesar et al., 2014)</td>
<td>Retrospective case control design</td>
<td>N = 17,625</td>
<td>Times cancelled:</td>
<td>Cancelled:</td>
<td>Conclusion: 39% cancelled at least once</td>
</tr>
<tr>
<td></td>
<td>IDV: Ortho procedures</td>
<td>Ortho Surgery Hospital Clinic</td>
<td>At least once</td>
<td>At least once = 39%</td>
<td>Unavoidable factors caused by factors outside individuals or clinic</td>
</tr>
<tr>
<td></td>
<td>DV: Root causes for ES cancel</td>
<td>Sweden</td>
<td>1 time</td>
<td>1 time = 58%</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2 times</td>
<td>2 times = 28%</td>
<td>Avoidable factors: Change pt view and involve them in planning care process</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3 times</td>
<td>3 times = 9%</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>4 or more times</td>
<td>4 or more = 2%</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Reasons for cancel:</td>
<td>Reasons for cancel:</td>
<td>Limitations: Retrospective study, one center, data entry from diff staff leads to inconsistent grouping data, variations of number due to continuous inflow and outflow from waiting list.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Planned surgery was transferred</td>
<td>Planned surgery was transferred = 29.3%</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Pt refrained fr surg</td>
<td>Pt refrained fr surg = 17%</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Pt refrained fr surg for social reasons</td>
<td>Pt refrained fr surg for social reasons = 16.5%</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Incomplete pre-op prep</td>
<td>Incomplete pre-op prep = 12%</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Changes to scheduled surg program</td>
<td>Changes to scheduled surg program = 8.8%</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>On-going infection</td>
<td>On-going infection = 7%</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Lack of personnel</td>
<td>Lack of personnel = 2.6%</td>
<td></td>
</tr>
<tr>
<td>Purpose, Author(s), Year</td>
<td>Design &amp; Key Variables</td>
<td>Sample &amp; Setting</td>
<td>Measures</td>
<td>Results</td>
<td>Conclusion, Limitations &amp; Notes</td>
</tr>
<tr>
<td>--------------------------</td>
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</tr>
<tr>
<td>To design and implement a NP led preop assessment clinic in multispecialty ortho practice to reduce cancellation of surg (Sebach et al., 2015)</td>
<td>Program evaluation: Pre &amp; Post Intervention IDV: NPMPEC</td>
<td>Pre – non-NP-PCP N = 2,789 Scheduled surg N = 77 cancelled</td>
<td>Age (yrs), Gender (Male/Female) Race (White/Black/Other) JR (#) # surg cancelled (anest/pt) Preop assessment (NP/PCP) Pts referral to preop clearance (#) Rev ($ lost) NPMPEC: Nurse Practitioner-Managed Preoperative Evaluation Clinic</td>
<td>Pre – NP Cancellation: 77 Age: M = 65 yrs Male: 37 (48%) Female: 40 (52%) White: 62 (81%) Black: 13 (17%) Other: 2 (2%) JR = 59 Cancelled by anest: 69 Cancelled by pt: 8 Lost rev: $386,033</td>
<td>Conclusion: Improved pre-op process Decreased surg cancellation Decrease rev loss Limitation: English speaking only pts One clinic evaluated One NP The researchers did not explain what determined which pts received NP versus PCP for post. Notes: This study is similar to DNP project</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Post - NP N = 2,372 Scheduled surg N = 36 cancelled N = 571 required preop clearance N = 121 seen by NP N = 450 seen by non-NP-PCP Multispecialty orthopedic practice</td>
<td></td>
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<tr>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>Notes: this is similar to DNP project.</td>
</tr>
</tbody>
</table>

Pt deceased or pregnant = 1%
Missing equipment = 0.4%
Lack of ward space = 0.4%
<table>
<thead>
<tr>
<th>Purpose, Author(s), Year</th>
<th>Design &amp; Key Variables</th>
<th>Sample &amp; Setting</th>
<th>Measures</th>
<th>Results</th>
<th>Conclusion, Limitations &amp; Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Day of surg cancellations, 1 year review in a tertiary hosp (Trentman et al., 2010)</td>
<td>Retrospective design</td>
<td>N = 12,176</td>
<td>Cases cancelled</td>
<td>Cases canceled = 1.96%</td>
<td>Conclusion: Less than 2% cancel on DOS is obtainable.</td>
</tr>
<tr>
<td>IDV: Preop Eval clinic</td>
<td>Preop Eval clinic, Mayo Clinic, Arizona</td>
<td>Hospital related factors: avoidable and unavoidable</td>
<td>Hospital related:</td>
<td>Hospital related:</td>
<td>Limitations: retrospective study, single facility, no RTC, no report on financial impact, subjectivity on reporting factors related to cancellations</td>
</tr>
<tr>
<td>DV: DOS cancel reasons: avoidable and unavoidable</td>
<td>Arizona</td>
<td>Pt related factors: avoidable and unavoidable</td>
<td>Avoidable = cancel but not communicated, incomplete surg eval, miscommunication, no insurance auth, OR behind schedule, rep/implants not avail, scheduling error</td>
<td>Avoidable = cancel but not communicated, incomplete surg eval, miscommunication, no insurance auth, OR behind schedule, rep/implants not avail, scheduling error</td>
<td>Notes: This study is similar to DNP project</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Unavoidable = surgeon unavail due to emergency, organ unusable for transplant.</td>
<td>Unavoidable = surgeon unavail due to emergency, organ unusable for transplant.</td>
<td>Notes: This study is similar to DNP project</td>
</tr>
</tbody>
</table>

Eval by NP: 121 (1 cancelled = 0.8%)

Eval by PCP: 450 (35 cancelled = 7.7%)

Lost rev: $4,276 (2.32% by NP)
$180,204 (97.68% by PCP)
<table>
<thead>
<tr>
<th>Purpose, Author(s), Year</th>
<th>Design &amp; Key Variables</th>
<th>Sample &amp; Setting</th>
<th>Measures</th>
<th>Results</th>
<th>Conclusion, Limitations &amp; Notes</th>
</tr>
</thead>
</table>
| To describe the development and implementation of PSH for TJR (Garson et al., 2014) | Observational Design | JR: N = 95 TKR  
N = 51 THR  
PSH | 30 days readmit (Y/N)  
LOS (#days)  
Periop blood transfusion (Y/N)  
Postop comp (Y/N)  
ED visit (Y/N)  
Mortality in 30 days (Y/N)  
Patient satisfaction survey (1-10) | 30 days readmit: 0.7% total (0% THR, 1.1% TKR)  
LOS: 3 days  
Periop blood transfusion: 6.2% total  
Postop comp: 0.0%  
ED visit: 3.9%  
Mortality: 0%  
Pt satisfactory↑  
Cost effective: ↓LOS, ↓cost | Conclusions: Implementation of PSH improved pts satisfaction.  
Improved cost effectiveness  
Limitation: No control group  
No Predata collected  
Survey not validated-no reliabilities reported  
Survey skewed  
Only one comparison study  
Revenue not reported in $ the researchers just state the cost effectiveness.  
Notes: This project is aligned to the current DNP project |
<p>| Analyze ES cancel to recommend nursing | Prospective review design | N = 6,325 | Compared cancel rates in 2 phases. | Cancel rate: Phase 1 = 6% | Conclusion: POAC effectively decreased |</p>
<table>
<thead>
<tr>
<th>Purpose, Author(s), Year</th>
<th>Design &amp; Key Variables</th>
<th>Sample &amp; Setting</th>
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<th>Results</th>
<th>Conclusion, Limitations &amp; Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>practice change in the preop assessment clinic (Boudreau et al., 2011)</td>
<td>IDV: POAC team of NP, RN, Anesthesiologist  DV: factors related ES cancel</td>
<td>Magnet designated Tertiary Pediatric Institution, Children’s Hospital Boston, MA East Coast</td>
<td>Cancel tracking tool: Procedure cancel, MRN, surg service, date of pre-op assessment, DOS, same day work up, cancel at preop, cancel btw preop and DOS, cancel on DOS, reschedule date, not rescheduled in 3 mos. Reason for cancel: Illness, NPO status, no inpt bed, no ICU bed, OR delay, missing med info, rescheduled by family, other</td>
<td>Phase 2 = 3.6% Reasons for cancel: Most frequent: acute illness = 48%, other (needs further work-up etc.) = 22.7%, cancel by service = 13.5%, cancel by family = 8.5%, NPO noncompliance = 2.7%, Cancel day of preop = 0.7%, cancel btw preop &amp; DOS = 1.7%, cancel DOS = 2.6%</td>
<td>ES cancel rates. Using team and patient-centered approach by following preop standardized protocol and educating families on illness preventions. Limitations: single center study. QI audit without RCT Notes: This project is aligned to the current DNP project</td>
</tr>
<tr>
<td>Examine cancel pattern in the preop clinic (Nelson et al., 2015)</td>
<td>Mixed methods observational review</td>
<td>N = 16,955 Preop assessment center Brigham and Women’s Hospital East Coast</td>
<td>Patient’s characteristics: age, BMI, sex, ASA, Race, Procedure types. Cancel cases: N = 147 (1%) Age = 61.8, p &lt;0.0001 ASA = p&lt;0.0001 BMI = 30.1 Male = 67 Female = 80 White = 123 Black = 12 Hispanic = 9 Asian = 3 Procedures: Ortho = 27, p&lt;0.0001 Reasons for cancel:</td>
<td></td>
<td>Conclusion: Preop clinic provides additional pause point for important reconsideration if the goal of surg are best for pt’s interest Identify pt at risk. Limitations: did not identify day of surg cancel, not RCT Notes: This project is aligned to the current DNP project</td>
</tr>
<tr>
<td>Purpose, Author(s), Year</td>
<td>Design &amp; Key Variables</td>
<td>Sample &amp; Setting</td>
<td>Measures</td>
<td>Results</td>
<td>Conclusion, Limitations &amp; Notes</td>
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</tr>
<tr>
<td>Causes for ES cancel for general OR vs amb surg center (Xue et al., 2013)</td>
<td>Retrospective design</td>
<td>Total N = 4261</td>
<td>Reasons for cancel in:</td>
<td></td>
<td>Uncontrolled or severe comorbidity require further eval</td>
</tr>
<tr>
<td>IDV: surgery in Gen OR and amb surg center</td>
<td>Gen OR N = 2751</td>
<td>Amb surg N = 1510</td>
<td>Gen OR</td>
<td>Amb surg</td>
<td>Changes condition in preop period</td>
</tr>
<tr>
<td>DV: causes for ES cancel, cancel rate</td>
<td>Hospital of University of Pennsylvania</td>
<td>Cancel rates:</td>
<td>Gen OR</td>
<td>Amb surg</td>
<td>Pt compliance w tx or social habits make procedure inappropriate</td>
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<td>East Coast</td>
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<td>Pt changed mind</td>
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<td>Change in surg indication</td>
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<td>Scheduling issues</td>
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<td>Social issues, insurance denial, transportation issues</td>
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<td>No show</td>
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<td>Reasons for cancel in:</td>
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<td>Gen OR: 4.5% high INR, NPO violation.</td>
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<td>10.2% not cleared by internal medicine. Lack of communication among staff.</td>
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<td>Amb surg: 5.2% pt no show, due to weather, traffic, inadequate preop prep</td>
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<td>Cancel rates:</td>
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<td>Gen OR = 7.5%</td>
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<td>Amb surg = 5.1%</td>
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<td>Total = 6.6%</td>
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<td>Amb OR: 59% preventable (inadequate preop prep (schedule, consent) 5.9% maybe preventable (pt no show, staff avail, OR avail, misc) 10% non preventable (change in med condition)</td>
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<td>Conclusion: Gen OR: major reasons is inadequate preop, med condition change, scheduling issues</td>
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<td>Amb OR: 59% preventable (inadequate preop prep (schedule, consent) 5.9% maybe preventable (pt no show, staff avail, OR avail, misc) 10% non preventable (change in med condition)</td>
</tr>
<tr>
<td>Purpose, Author(s), Year</td>
<td>Design &amp; Key Variables</td>
<td>Sample &amp; Setting</td>
<td>Measures</td>
<td>Results</td>
<td>Conclusion, Limitations &amp; Notes</td>
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<tr>
<td>To predict patient med adherence by using standardized simple preop med instructions (Vetter et al., 2014)</td>
<td>Prospective case control design</td>
<td>Preintervention N = 521</td>
<td>Age (yrs), Gender (Male/Female), Race (African-American/Caucasian), ASA (classification 0-4), Education level (postsecondary), Accompanied by relative (Y/N), Recall receiving instruction both verbal and written (Y/N), Preop med instruction sheet (Y/N)</td>
<td>Age: 65 yrs &amp; older (aOR 0.67, p &lt; 0.014), Caucasian: (aOR 1.74, p = 0.007), ASA &gt; 3: (aOR 0.60, p = 0.004)</td>
<td>Conclusion: Simple preop med instructions sheet improved pt med adherence when given in both written and verbal methods, Limitations: Hawthorne effect, incomplete identification of high risk groups, no stratification for pt med noncompliance and chronic med issues, Notes: This study support preop medication</td>
</tr>
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<td></td>
<td>IDV: Clinical, demographic, preop med instruction sheet (intervention)</td>
<td>Postintervention N = 531</td>
<td>PACT clinic at UAB Alabama</td>
<td>Recall receiving instruction both verbal and written (Y/N), Preop med instruction sheet (Y/N)</td>
<td>Conclusion: Simple preop med instructions sheet improved pt med adherence when given in both written and verbal methods, Limitations: Hawthorne effect, incomplete identification of high risk groups, no stratification for pt med noncompliance and chronic med issues, Notes: This study support preop medication</td>
</tr>
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<td>Purpose, Author(s), Year</td>
<td>Design &amp; Key Variables</td>
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<td>Conclusion, Limitations &amp; Notes</td>
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<tr>
<td>Development and</td>
<td>Prospective case control design</td>
<td>Pre bundled payment N = 32 historical pts</td>
<td>Age (yrs), Gender (Male/Female), Race (White) Diagnosis ICD 9 (#) Gagne Comorbidity score (0-2) Obese (#) DRG rate group (Baystate/HMO/PPO) LOS (# days) D/C (home/SNF/Home health services) Facility total payment ($) Total Adjusted DRG payment ($) Payment (physician/hosp/hops adj DRG/posthosp) ($) Quality of care (care processes, harm, mortality, 30 days readmit) Guideline consistence care (Y/N)</td>
<td>vs 74% postintervention (p &lt; 0.001)</td>
<td>Conclusion: Bundled payment program improved quality &amp; decreased posthosp costs. Other costs &amp; variables were similar for pre &amp; post implementation. Limitation: One center, no detailed reports on quality of care, small N, retrospective records, challenges w manual administration claims, delayed approval for contracts, posthosp services only include physical therapy. Note: This study supports the need for streamline perioperative assessment clinic</td>
</tr>
<tr>
<td>implementation of THR bundled payment program (Whitcomb et al., 2015)</td>
<td>IDV: bundled payment, clinical &amp; demographic</td>
<td>Post bundled payment N = 45</td>
<td>Age: M = 58.5 Male: 16 (50%) White: 31 (97%) LOS: M = 3 days D/C Home: 2 (6%) SNF: 10 (31%)</td>
<td>Pre bundled payment Facility total payment: M = $26,412, p = 0.0001 Total Adjusted DRG payment: M = $22,272 Payment Physician: M = $2,736, p = 0.0011 Hosp: M = $22,043, p &lt; 0.0001 Hosp adj DRG: M = $18,007, p &lt; 0.0001 Posthosp payment: M = $1,121, p = 0.0018 Guideline consistence care: 95%, p = 0.05</td>
<td>Post bundled payment</td>
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<td>DV: ↑quality &amp; ↓cost</td>
<td>Baystate Health East Coast</td>
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<td>Purpose, Author(s), Year</td>
<td>Design &amp; Key Variables</td>
<td>Sample &amp; Setting</td>
<td>Measures</td>
<td>Results</td>
<td>Conclusion, Limitations &amp; Notes</td>
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<td>Age: M = 55</td>
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<td>Male: 22 (49%)</td>
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<td>White: 44 (98%)</td>
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<td>LOS: M = 3 days</td>
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<td>D/C</td>
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<td>Home: 1 (2%)</td>
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<td>SNF: 5 (11%)</td>
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<td>Home health services: 39 (87%)</td>
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<td>Facility total payment: M = $22,567, ( p = 0.0001 )</td>
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<td>Total Adjusted DRG payment: M = $22,567</td>
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<td></td>
<td>Payment Physician: M = $2,541, ( p = 0.0011 )</td>
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<td>Hosp: M = $19,101, ( p &lt; 0.0001 )</td>
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<td>Hosp adj DRG: M = $19,101, ( p &lt; 0.0001 )</td>
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<td>Posthosp payment: M = $704, ( p = 0.0018 )</td>
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<td>Guideline consistence care: 99%, ( p = 0.05 )</td>
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</tbody>
</table>

Note: Amb = ambulatory, anest = anesthesia, adj = adjusted, ASA = American Society of Anesthesiologists, auth = authorize, BMI = body mass index, btw = between, cancel = cancellations, D/C = discharge, DNP = Doctor of Nursing Practice, DRG = diagnosis related group, DOS = date of surgery, DV = dependent variable, ED = emergency department, ES = elective surgery, eval = evaluation, fr = from, gen = general, HMO = Health maintenance organization hosp = hospital, ICD = international classification of diseases, ICU = intensive care unit, IDV = independent variable, INR = international normalized ratio, IV =
intravenous, JR = Joint Replacement, med = medication, LOS = Length of Stay, M = mean, med = medical, misc = miscellaneous, MRN = medical record number, N = sample, NP = Nurse Practitioner, NPMPEC = Nurse Practitioner-Managed Preoperative Evaluation Clinic, NPO = nothing by mouth, ortho = orthopedic, OR = operating room, POAC = preoperative assessment clinic, PACT = Preoperative Assessment, Consultation, and Treatment, PCP = Primary Care Provider, periop = perioperative, posthosp = posthospitalization, pre = preparation, PPO = preferred provider organization, postop = postoperative, preop = preoperative, Pt/pts = patient, PSH = Perioperative Surgical Home, QI = quality improvement, RCT = randomized control trial, readmit = readmission., RN = registered nurse, SNF = Skilled Nursing Facility, surg = surgery, THR = Total Hip Replacement, TKR = Total Knee Replacement, TJR = Total Joint Replacement, tx = treatment, UAB = University of Alabama at Birmingham, unavail = unavailable, vs = versus, Y/N = yes/no, yrs = years, w = with, # = number.
**APPENDIX B**

**Development and Implementation Timeline**

DNP Quality Improvement on Elective Surgery Cancellations

<table>
<thead>
<tr>
<th>2016</th>
<th>2017</th>
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<tbody>
<tr>
<td>January</td>
<td>October</td>
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<td>February</td>
<td>November</td>
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<td>March</td>
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<td>September</td>
<td>June</td>
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<thead>
<tr>
<th>Purpose Statement</th>
<th>TOE/ROL</th>
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<tbody>
<tr>
<td>Conceptual framework</td>
<td>Method Plan</td>
</tr>
</tbody>
</table>

- **2016**
  - **February**: 3/7 Conceptual framework
  - **March**: 4/16 ROL
  - **April**: 5/15 Project proposal
  - **May**: IRB
  - **June**: Submit content
  - **July**: 8/1 Collect data
  - **August**: 9/1 Analyze data

- **2017**
  - **February**: 1st Draft manuscript
  - **March**: Final Draft
  - **April**: Present poster
  - **May**: Final Defense
  - **June**: Podium Presentation

(Reference: Author had approval from Maria Letts, DNP to use this timeline table, 2016)
APPENDIX C
INSTITUTIONAL REVIEW BOARD LETTER OF APPROVAL

CALIFORNIA STATE UNIVERSITY, LONG BEACH
OFFICE OF RESEARCH & SPONSORED PROGRAMS

DATE: June 2, 2016
TO: Diep Pham
FROM: California State University, Long Beach Institutional Review Board
PROJECT TITLE: [915524-3] Improving Elective Surgery Cancellations: A Quality Improvement Project
REFERENCE #: 18-388
SUBMISSION TYPE: Revision
ACTION: APPROVED
APPROVAL DATE: June 2, 2016
EXPIRATION DATE: June 1, 2017
REVIEW TYPE: Administrative Review

This is to advise you that the Institutional Review Board for the Protection of Human Subjects (IRB) of California State University, Long Beach, has reviewed your protocol application.

Your application is approved. The requested modifications have been received, reviewed, and accepted.

Approval is for a period of one year from June 2, 2016 and conditional upon your willingness to carry out your continuing responsibilities under University policy. If you would like to continue this research after this one year period, please submit a renewal application and an annual report to the Office of University Research two months prior to your expiration date of June 1, 2017.

1. You must clearly indicate in the header or footer of each page of your approved Informed Consent Form the approval and expiration dates of the protocol as follows: “Approved from June 2, 2016 to June 1, 2017 by the CSULB IRB”.

2. You are required to inform the Director or Senior Associate Director, Office of Research & Sponsored Programs, in writing (email is acceptable) or through IRENet within twenty-four hours of any adverse event in the conduct of research involving human subjects. The report shall include the nature of the adverse event, the names of the persons affected, the extent of the injury or breach of security, if any, and any other information material to the situation.

3. You may not change any aspect of your research procedure involving human subjects without written permission from the Director, Office of Research & Sponsored Programs or the Chair of the IRB. Please use the Protocol Modification Form on IRENet to request any changes.

4. Maintain your research records as detailed in the protocol.
Should you have any questions about the conduct of your research under this protocol, particularly about providing informed consent and unexpected contingencies, please do not hesitate to call the Office of Research & Sponsored Programs at (562) 985-8147. We wish you the best of success in your research.

This letter has been electronically signed in accordance with all applicable regulations, and a copy is retained within California State University, Long Beach Institutional Review Board's records.
APPENDIX D
CODES FOR ELECTIVE SURGERY CANCELLATIONS DATA EXCELS SHEET

Patient Data
1) Age = number in years
2) Race
   • Black = 1
   • White = 2
   • Asian = 3
3) Gender
   • Male = 1
   • Female = 2
   • Other = 3
4) Ethnicity
   • African American = 1
   • Caucasian = 2
   • Hispanic = 3
   • Other = 4
5) Primary language (PrimLang)
   • English = 1
   • Other = 2
6) Marital status (MaritalStat)
   • Married = 1
   • Single = 2
   • Divorced = 3
   • Widowed = 4
7) Education level (Edlevel)
   • Grade 1- 3 = 1
   • Grade 4 – 8 = 2
   • Grade 9 – 12 = 3
   • High school graduate = 4
   • Some college = 5
   • College graduate = 6
   • Graduate level = 7
8) Primary Payer mix (Paymix)
   • Medicare = 1
   • Medi-Cal = 2
   • Commercial = 3
9) Month of cancellation (MonCan)
   • January = 1
   • February = 2
   • March = 3
   • April = 4
   • May = 5
   • June = 6
   • July = 7
   • August = 8
   • September = 9
   • October = 10
   • November = 11
   • December = 12
10) Day of the week cancellation (dayCan)
   • Monday = 1
   • Tuesday = 2
   • Wednesday = 3
   • Thursday = 4
   • Fridays = 5
   • Saturday = 6
   • Sunday = 7
11) Location of cancellation (LocCan)
    • General OR = 1
    • Outpatient OR = 2
12) Surgical Procedure cancelled (ProCan)
    • Total shoulder replacement = 1
    • Total Hip replacement = 2
    • Total knee replacement = 3
    • Neck = 4
    • Spine = 5
    • Shoulder = 6
    • Elbow = 7
    • Hand = 8
    • Knee = 9
    • Ankle = 10
    • Foot = 11
13) Reason for cancellation (ReaCan)
● Preventable patient = 1
● Unpreventable patient = 2
● Preventable organizational factors = 3
● Unpreventable organization factors = 4

14) Provider level for pre-op H&P (ProLevel)
● NP = 1
● PA = 2
● Orthopedic resident = 3
● Orthopedic attending = 4

Preventable patient factors (PPF):
1) Did not appear for surgery
   ● Yes = 1
   ● No = 2
2) Non-adherence to NPO
   ● Yes = 1
   ● No = 2
3) Non-adherence to medication regime
4) Other

Preventable Organizational factors (POF)
1) Need of further studies (missed labs/medical optimization)
   ● Yes = 1
   ● No = 2
2) OR scheduling error (scheduler/administrative staff error)
   ● Yes = 1
   ● No = 2
3) Orthopedic implant(s) not available
   ● Yes = 1
   ● No = 2
4) Medical staffing issues (error in surgeon scheduling)
   ● Yes = 1
   ● No = 2
5) OR staffing issues (no available ancillary staff)
   ● Yes = 1
   ● No = 2
6) Health insurance approval issue

Unpreventable patient factors (UPPF)
● Yes = 1
● No = 2

Unpreventable organizational factors (UPOF)
1) No Surgeon (due to illness/personal/family issues)
   ● Yes = 1
   ● No = 2
2) Natural disasters
   ● Yes = 1
   ● No = 2

Missing Data = .
Improving Elective Surgery Cancellations:  
A Quality Improvement Project.  
February 12, 2017

To:  
Dr. Gregory Rafijah  
Medical Director, Orthopedic Surgery Department

From:  
Diep Pham, FNP, MN, MBA  
Southern California CSU DNP Consortium Student
BACKGROUND

The Doctor of Nursing Practice project has been completed and recommendations were developed based on the findings. The purpose of the project was to identify factors associated with elective surgery cancellations (ESCs) on the day of surgery. Research shows that ESCs increase the cost of health care delivery and contribute to patient and family dissatisfaction with care. The rate of ESCs varies significantly from 1% to 26% across settings. Organizational (perioperative processes) and patient factors (knowledge deficits, communication issues, etc.) contribute to preventable surgical cancellations.

PROJECT

A quality improvement project was initiated in the orthopedic surgery department. After approval by the facility’s Institutional Review Board, a retrospective chart review of the orthopedic ESC cases was performed for the timeframe of January 1, 2015 to December 31, 2015. The operating room manager and administrative analyst provided 4,633 ES cases for review. The 4,633 ES cases were examined, and cases that met the exclusion and inclusion criteria were extracted. Preventable and unpreventable ESC cases were evaluated using frequency counts and percentages based upon patient and organizational factors.

RESULTS

The QI project found that there were no organizational factors that contributed to ESCs on the day of surgery. It was determined that 1.2% of the ESCs were attributed to patient related factors. The low ESC rate reflects the effectiveness of the orthopedic department’s perioperative care processes in preventing ESCs. Nonetheless, upon examination of the results, the data showed 3,264 out of 4,633 (70%) cases were
cancelled and rescheduled more than once. Thus, a considerable amount of perioperative resources was expended during the cancelation and rescheduling process.

**RECOMMENDATIONS**

This project discovered the need for further examination to identify the factors associated with rescheduling of elective orthopedic surgery cancellation cases 24 hours prior to the day of surgery.

The recommendations are following:

- Identify a champion to lead the quality improvement project. Assemble a team to develop timeline and identify steps needed to complete project including goals and objectives.

- Identify factors associated with elective surgery cancellations and rescheduling 24-hours prior to date of surgery, in addition to identifying the methods for their measurement from literature review.

- Collect and review data from all orthopedic scheduled ES cases in the general OR and outpatient OR.

- Analyze data and identify variables associated with preventable patient and organizational factors for orthopedic ESCs.

- Develop a protocol to mitigate factors for preventable patient and organizational factors.

  The development and implementation of protocol and procedures can potentially decrease any preventable patient or organizational factors that prevent an ES from occurring as scheduled. Decreasing preventable ESCs may improve the organization’s profitability and patient/family satisfaction.