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Surgical Site Infections: Reducing Excessive Foot Traffic in the Surgical Room to Minimize the Risk of Surgical Site Infections

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May 20, 2022
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Abstract

**Problem:** In 2021, a perioperative unit experienced 21 different surgical site infections (SSIs). SSIs are associated with increased medical complications and financial costs. One risk factor for SSIs is the increased or excessive operating room (OR) foot traffic, which increases airborne contaminants within the OR.

**Context:** A seven-room operating department performing 5,800 surgical procedures annually. The unit specializes in general, elective, and emergent procedures for the adult population predominately in the East Bay Area. A diverse mix of surgical procedures was observed throughout this project.

**Assessment:** A microsystem assessment was conducted to determine the causes and patterns that lead to increased or excessive OR foot traffic in the surgical setting that may lead to the increased risk for SSIs.

**Measures:** The total amount of door openings was counted during 17 observed surgical procedures and separated into four different categories (Big Door Normal, Big Door Abnormal/Avoidable, Core Door Normal, and Core Door Abnormal/Avoidable).

**Results:** There was a total of 850 door opening throughout all procedures observed. One hundred ninety-two of those door openings were considered to be abnormal and avoidable. The number of door openings also decreased throughout the day. Based on observations, it was determined that daily door openings were 20.41/hr and abnormal and avoidable door openings were 8.37/hr. Ideal conditions should be 12.04/hr for door openings.
Proposed Interventions: Proposed interventions include reinforced education on SSIs and OR foot traffic, increased inventory checks, standardized break, and relief system, standardized communication policies, and installing door counters in all OR rooms.

**Conclusion:** Studies have shown that increased OR foot traffic leads to an increased risk of SSIs. Throughout an observation period in the surgical setting, it is determined that there is room for improvement to decrease foot traffic, and based on these observations, proposed interventions may aid in this effort.

*Keywords:* Surgical Site Infections, Operating Room, Foot Traffic, Surgery
Section II. Introduction

Introduction

Surgical site infections (SSIs) are infections that occur at or near the surgical incision site within 30 days postoperatively or within 90 days in surgical cases involving a prosthetic or implant (CDC, 2022). It is reported that SSIs extend hospitalizations by an average of 9.7 days and can lead to a 2-11 time increase in the risk of death. The CDC also reports that SSIs continue to be a significant cause of extended hospitalizations, morbidities, and death. SSIs are among the leading types of hospital-acquired infections (HAIs) and account for approximately 20% of all HAIs (CDC, 2022). SSIs are also described as the most costly type of HAIs, with an estimated annual cost of $3.3 billion, an increase of $20,000 per admission (CDC, 2022).

According to John Hopkins Medicine, the common signs and symptoms of SSIs include redness, fever, pain, tenderness, warmth, swelling, and can lead to purulent drainage to the infection site. SSIs are also categorized into three different types: superficial incisional, deep incisional, and organ or space (Johns Hopkins Medicine, 2022). Superficial incisional SSIs occur on the skin level of the incision, while deep incisional SSIs are described to be within the muscular and tissue areas directly beneath the incision site. Lastly, organ or space SSIs refer to infection outside the skin, muscle, or tissue associated with a surgical procedure and affects an organ or space between organs (John Hopkins Medicine, 2022).

SSIs are a result of bacterial contamination, most commonly through *Staphylococcus, Streptococcus, and Pseudomonas* bacterial contamination (John
Hopkins Medicine, 2022). Standard transmission of these bacterial contaminants includes contaminated care providers, surgical instruments, and airborne contaminants, to name a few (Johns Hopkins Medicine, 2022). Risk factors for SSIs include length and type of surgical procedures, pre-existing medical conditions, such as diabetes, age, obesity, smoking, and a compromised immune system (John Hopkins Medicine, 2022).

In 2016, the World Health Organization (WHO) published preventative measures and guidelines concerning SSIs, including prophylactic antibiotics and chlorhexidine baths in preparation for surgical procedures. However, the effects and significance on operating room traffic and the correlation to SSI prevention have not been thoroughly studied (Buckner, 2022).

**Description of the Problem**

In 2021, there were 21 occurrences of SSIs within a perioperative unit at a local East Bay Area hospital. While conducting an introductory observation day on the unit, it was apparent that there was an issue with excessive staff within the operating rooms during surgical preparations. So much so that even a few team members brought attention to observation. There are many risk factors regarding SSIs; one such risk factor is OR traffic, also referred to as OR foot traffic, but specifically increased OR traffic. Increased OR traffic is defined as the number of door openings needed to disturb the positive pressure environment in the OR, which results in an increased amount of airborne bacteria and other contaminants, leading to an increased risk of SSIs for surgical patients (). Common causes for increased OR traffic include equipment
retrieval, staff breaks and relief, information and progress reports, and social
communication () .

Based on the 21 different occurrences and the observation of excessive people going in
and out of the surgical setting, a further evaluation regarding SSI prevention needed to
be investigated, explicitly regarding OR foot traffic. A microsystem assessment was
conducted on the unit before the start of this quality improvement (QI) project, which
revealed the behaviors and patterns seen within the surgical setting that led to
increased foot traffic and could ultimately lead to increased risk for SSIs for surgical
patients leading to adverse patient outcomes, extended care plans, and increased costs
for both the patient and the hospital.

**Available Knowledge**

After making the initial observation and assessment of the surgical unit, an
extensive and comprehensive literature review on both SSIs and OR traffic was
conducted to understand both subject matters better. The databases used for the
literature review were CINAHL and PubMed using the access through the University of
San Francisco's library. Through this literature review, we were able to find several
articles and studies on SSIs and the correlation to OR foot traffic. Some studies focused
on determining behaviors and patterns that lead to increased OR traffic, while others
focused on possible interventions to reduce or inhibit increased OR traffic. The literature
review also presented a few quality improvement projects on SSIs and OR traffic
reduction with some positive results. This review gave us insight and evidence to
validate the performance of this QI project. A quick synopsis of these findings can be
seen in the appendix.
After reviewing the literature, the QI project team came up with the following PICOT question: For surgical patients in the OR (P), will new interventions designed to reduce OR foot traffic (I) lead to a decreased occurrence of SSIs (O), compared to current policies (C) within a six month period (T)?

**Rationale**

The conceptual framework that is best applied and utilized when conducting a QI project like this would be Lewin's Theory for Change. This change model is applicable and could prove effective because it focuses on the realization and needs for change and trends towards new and desired behaviors. The unfreezing, change, and the refreezing method could dramatically help reduce OR traffic and ultimately reduce the risk for SSIs within the surgical microsystem. The unfreezing aspect of this model could refer to the unit education on OR traffic and the correlation with SSIs along with the statistical data of SSI occurrences in 2021 and microsystem assessment observations, which could help all the team members realize that there is a problem in terms of patterns and behaviors that may lead to increased OR traffic. The change portion of this model would be the interventions designed to reduce OR traffic in the surgical setting. The refreezing aspect of this model and QI project would be the practice and maintenance of the newly implemented interventions to reduce OR foot traffic.

The type of leadership that would be used to drive this new change within the microsystem would be a democratic style of leadership approach. In observing the dynamic between all the team members in the unit, it seems that this microsystem already utilizes this style of leadership. Democratic leadership promotes open communication and team member participation in the decision-making process. The
democratic approach also allows team members to have responsibilities and accountability and receive feedback based on their performance. Along with the democratic leadership style, a transformational approach may be employed. A transformational approach allows leaders to motivate, trust, and inspire to encourage the team to work towards a common goal. The utilization of these approaches in leadership will cultivate an open, self-aware, and positive environment while working towards improvement within the unit.

**Specific Aim**

This quality improvement project focuses on reducing excess and unnecessary foot traffic in the surgical setting to reduce the risk and occurrences of SSIs. The 21 different occurrences of SSIs within a year in a singular perioperative unit suggest room for improvement in decreasing the risks for SSIs. Due to unforeseen complications in the onboarding process and limited time, all of our time was dedicated to conducting a microsystem assessment to identify potential behaviors, patterns, and other factors that may contribute to excessive or unnecessary OR foot traffic. Based on this microsystem assessment and the data we were able to measure, proposed interventions and recommendations were formulized to aid the surgical unit in decreasing excess and unnecessary OR foot traffic. The proposed interventions and recommendations include reinforced education of SSIs and increased OR foot traffic, increased frequency of inventory checks and restocks, a more standardized employee break or relief system, a standardized communication policy for the surgical setting, and to install door counter in each of the seven surgical room in the surgical unit. Based on the microsystem assessment and the proposed interventions and recommendations, the goal is to
reduce the amount SSI occurrences compared to the current conditions and policies in
the surgical unit in hopes of improving patient outcomes, increasing efficiency, and
decreasing costs associated with SSIs.

**Section III. Methods**

**Context**

The following quality improvement project was conducted within a surgical unit at
a local East Bay Area hospital that serves approximately 265,000 patients. The
observed surgical unit conducts 5,800 surgical procedures annually. The unit conducts
various general, elective, and emergent surgical procedures. Laparoscopic procedures
were the most conducted surgical procedure with about 1,200 cases within the last year.
It is reported that in 2021 there were a total of 21 SSI occurrences within the
perioperative setting.

The surgical unit consists of seven separate operating rooms. Six of the seven
rooms are used for general, elective, and emergent surgeries and the last room is
primarily used for urological surgical cases. The main six operating rooms are
connected by a central hallway entitled "the core." The core is where most of the
supplies and inventory for the unit are stored. All of the operating rooms have very
similar, if not identical, configurations. Each room consists of a surgical gurney, a
surgical tower with oxygen, nitrous oxide, and suction, a medication cart for use by the
anesthesia provider, and several c-lockers with various supplies and equipment used in
surgical procedures. Each operating room also has two points of access, the main door
or the door that leads in and out into the core, which is used by surgical staff and other
essential personnel, and a more oversized door that leads to the hallways outside of the
surgical setting and core where patients are escorted into the operating room through
and for equipment needed for the surgical procedure or surgical clean up too big to fit
through the core door.

The nursing staff abides by the Association of Perioperative Registered Nurses
(AORN) guidelines for sterile techniques in the surgical setting. These are
recommended guidelines outlined to help nurses maintain a sterile field and aseptic
technique during the preoperative, intraoperative, and postoperative phases of surgery.
These guidelines are designed to reduce the risks of SSIs.

The surgical process at the observed surgical unit consists of a patient care plan
developed by the conducting physician with orders and a preference card which details
all of the items and pieces of equipment needed for the surgical procedure. These items
and pieces of equipment are then prepared and compiled the day before the procedure.
The circulating nurse conducts surgical preparation, and the surgical technician
(surgical scrubs) by setting up and ensuring that all the items on the surgeon's
preference card are accounted for and ready for the surgical procedure. Once the
surgical preparation is complete, the circulating nurse will retrieve the patient from the
pre-operation unit and escort them into the operating room. The patient is then prepared
for the surgical procedure, including the final call out, surgical site preparation and
sterilization, and anesthetization. The surgical team will then exit the operating room
and scrub in for the procedure. Once the surgical procedure is complete, the patient is
then transferred to tot the PACU unit, and patient care is then transferred.

Microsystem Assessment
A microsystem assessment was conducted to understand the observed surgical unit better and establish any behaviors or patterns that may be an underlying issue. The microsystem assessment allows for an opportunity to determine any opportunities for improvements for the observed underlying issues. Due to an unforeseen delay in the onboarding process at the observed hospital, this quality improvement project primarily focused on the microsystem assessment and determining behaviors, patterns, and other factors that increased the risk of SSIs.

**The 5 Ps**

One aspect of the microsystem assessment is establishing the 5 Ps of the unit, which consists of the purpose, patients, professionals, processes, and patterns. Determining the different components of the 5 P's provides the framework of the unit or a snapshot of the unit and to determine any potential issues that may be seen within the unit. Through the first few days of observing the unit and talking to various team members within the unit, the 5 P’s were established.

The purpose of the unit is to provide safe, high-quality care and treatment during surgical procedures while minimizing the risks of infections. The patient group of the unit was all the surgical patients who were at risk for SSIs. The professionals involved, especially during surgical procedures, were built by multidisciplinary teams, including physicians (surgeons), physician assistants (PAs), nurses (circulators), surgical technicians (surgical scrubs), and anesthesia providers (CRNAs, anesthesiologists), sterilization team, and vendors. The processes observed were surgical preparation, procedure, completion, and patient handoff. Some of the apparent detrimental patterns observed in the first couple of days were Excessive staff during surgical preparation,
multiple staff breaks/reliefs, excessive equipment retrieval, unnecessary social communication, and use of incorrect entrance and exit.

**SWOT Analysis**

Another microsystem assessment tool used to evaluate the surgical unit was the SWOT analysis. The acronym SWOT stands for strengths, weaknesses, opportunities, and threats. This assessment tool helps establish the good things about the microsystem and the weak points of the microsystem and the where there may be room for improvement and factors that may make it difficult for beneficial change within the unit. Throughout the observation phase of this project, the surgical unit's strengths, weaknesses, opportunities, and threats were established. Through observation and surveying staff, the unit's strengths include good leadership, good communication amongst the staff, efficient and timely surgical care plans and schedule, and the unit's self-awareness of SSI occurrences.

It was evident from the morning huddles at the beginning of the shift and in talking to team members throughout the unit that the leadership was a strength of the unit. The nursing managers were very knowledgeable and supportive of all the team members and seemed very passionate about the various ongoing projects within the unit. The leaders were often involved in all aspects of the unit, from unit preparation, scheduling, and decision making. The staff also spoke highly about all leadership members.

Most of the observations occurred in the surgical setting, and most of the observed weaknesses were noted during surgical procedures. Observed weaknesses included
● an excessive amount of team members during surgical preparation,
● excessive supply and equipment retrieval,
● excessive and unnecessary social communication, and
● use of incorrect entrance and exit doors.

All of these factors increase the risk factor for SSI occurrences.

Based on these observed weaknesses, there were several opportunities and room for improvement within the unit. Most of the opportunities contemplated centered around decreasing excessive foot traffic in the operating room and consequently lowering the occurrence of SSIs. Through the observation of excessive supply and equipment retrieval during surgical procedures, an opportunity for a more standardized inventory check and restocking system presented itself. Another opportunity that presented itself was the education on excessive OR foot traffic and its association with an increased risk for SSIs. Some of the surgical team members had no idea what foot traffic referred to or understood that it increased the risk for SSIs. Lastly, by decreasing the excessive OR foot traffic and occurrences of SSIs, some other considerable opportunities are improving patient outcomes and decreasing costs to the hospital due to SSI care and treatment.

Some threats considered when examining the potential opportunities within the microsystem included increased costs, increased time and effort in inventory checks and restocking, increased education time for staff in regards to OR foot traffic and SSIs, and possibly push back from staff from the potential changes in the unit, and potentially decreased staff morale. There will be an inevitable increase in cost with any change or implementation. A more standardized inventory system could potentially add additional
work and time to team members, while the same is true by reinforcing additional education on OR foot traffic and SSIs. Also, with any change, there is a chance of potential pushback by the team members who are not keen on the change within the microsystem, which could ultimately lead to decreased staff morale.

**Project Direction**

After conducting the microsystem assessment of the surgical microsystem, it was evident that the unit had behaviors and patterns that clearly increased the risk of SSI occurrences, specifically through increased OR foot traffic. Based on this observation and assessment, the project's next step was to investigate further the behaviors and patterns that lead to increased OR foot traffic. Like the previous studies discussed earlier, we wanted to establish the microsystem's specific reasons and the frequency for increased OR foot traffic. Due to a limited amount of time for this project, the rest of the time spent in the microsystem was spent observing various surgical procedures, observing the number of door openings in the operating room, and determining the different reasons and the frequencies of why they occurred.

**Measures**

As previously mentioned, most of this project was spent observing various surgical procedures and observing OR foot traffic. The objective of this observation was to account for all door openings in the operating room during surgical preparation, and the surgical procedure up until the patient is ready for transfer to the PACU. All door openings were separated and categorized into four categories based on the door used. The four categories used for this measure are core door normal, core door abnormal/avoidable, big door normal, and big door abnormal/avoidable. Normal door
openings are defined as any expected door openings that are routine in all surgical procedures, such as but not limited to surgical team members going in and out to scrub in for the procedure, the patient being escorted in for the procedure, or retrieving the transporting gurney for patient transport to the PACU. Abnormal/avoidable door opening is defined as an unscheduled or unexpected door opening that is not routine during the surgical procedure. These occurrences include instances such as but are not limited to retrieval of supplies and equipment outside of the operating room due to no stock within the inventory of the c-lockers in the operating room, non-essential personnel who come into the operating room and socialize, or team members using the big door to as an entrance or exit during the surgical procedure when it should be kept shut at all times during the procedure. The duration of time of each surgical procedure observed was also tracked.

Section IV. Results

Results

A total of 17 surgical procedures were observed in the limited amount of time allotted at the microsystem. In those 17 surgical procedures, 850 door openings were counted, and of those 850 door openings, 192 were deemed abnormal or unavoidable, as described in the measures section. Based on these measures, it was calculated that the surgical microsystem had a daily of 20.41 door openings per hour and 8.37 abnormal/avoidable door openings per hour. Based on these statistics, the ideal surgical procedure should only average 12.04 door openings per hour, which theoretically would be the conditions of the least amount of risk for SSIs by OR foot traffic. An interesting observation was also made during this assessment. The number of door openings
decreased throughout the day, meaning morning procedures often had the most door openings during surgical procedures and late afternoon surgical cases had the least amount of door openings.

Section V. Proposed Interventions and Recommendations

Proposed Interventions and Recommendations

Again due to an unforeseen delay in the onboarding process at the observed hospital and a limited amount of time allotted for the project, this quality improvement project was still in the planning phase and mainly focused on the microsystem assessment and determining the behaviors and patterns that lead to increased OR foot traffic in the unit. Based on our data and observation, there is room for improvement in the unit. Some proposed interventions and recommendations were drafted to decrease excessive OR foot traffic and ultimately decrease the risk for SSIs for the microsystem. These interventions include reinforced education on SSIs and OR foot traffic, a more standardized and frequent inventory check system, a standardized break and relief system, standardized communication policies, and installing door counters in all OR rooms.

Reinforced Education

In talking with some of the team members within the microsystem, it was clear that many had not heard of or had knowledge of the term foot traffic and its correlation to an increased risk of SSIs. So with this proposed intervention, the goal is to spread awareness of excessive foot traffic and its association with SSIs and hopefully change some of the behaviors and patterns observed during the project's microsystem assessment.
Standardized Inventory Audits

The most significant observed factor for abnormal or avoidable door openings during surgical procedures was excessive supply and equipment retrieval. This was often done because necessary items for surgical procedures were not in stock within the c-lockers in the operating room, causing the circulating nurse to go out into the core to retrieve the items needed. Currently, the microsystem has a monthly inventory audit. This proposed intervention calls for a more frequent inventory audit in a bi-weekly audit. This recommendation also would like to incorporate a digital tracking of the audit for accountability in the form of a shared spreadsheet on a shared drive, requiring an electronic signature validating completion of the audit and that all items are restocked and ready to go. This is done to minimize unnecessary trips and door openings in the operating room and ultimately decrease the risk for SSIs.

Standardized Break and Relief System

Another observed factor that increased OR foot traffic was multiple breaks and reliefs amongst the staff during surgical cases. It is common for surgical team members outside of the surgeon and physician assistant to be switched out for mandatory breaks and lunch breaks. However, based on observation, there was no record of breaks. During surgical procedures, multiple breaking personnel often came in even though the participating team member had already gone on break or lunch. The proposed intervention involves a more standardized system where breaks and lunch breaks are logged and tracked using a digital system like a shared spreadsheet and drive similar to the inventory log previously mentioned. The breaking personnel will be responsible for
updating the log as breaks are given. This intervention, too, will reduce unnecessary door openings.

**Standardized Communication Policy**

In addition to the supply and equipment retrieval and excessive breaks and switching out of team members, another risk factor for increased OR foot traffic is unnecessary personnel coming into surgical procedures to socialize with surgical team members or to get status reports on the surgical procedure or other updates for the day. This behavior was seen quite a bit during all the surgical procedures observed. The proposed intervention is designed to place policies that reduce or inhibit unnecessary personnel entering the operating room. The intervention calls for other forms of communication while surgery occurs, such as using the phone to call the surgical staff, texting, a system like the Vocera communication system, or other digital formats.

**Door Counters**

Door counters were recommended to act as a visual aid for team members to see the amount of foot traffic that occurs during a surgical procedure and potentially help with changing the behavior and habits that lead to increased OR foot traffic and increased risk for SSIs. It will also be an easy way for leadership to track foot traffic.

**Section VI. Discussion**

**Summary**

Surgical site infections (SSIs) continue to be a leading type of hospital-acquired infection and have increased costs and negatively affected patient outcomes. Bacterial contaminants cause SSIs, and one transmission route is through airborne contaminants. The increased OR traffic is one risk factor for increased airborne bacterial
contaminants in the surgical setting. Increased OR traffic leads to a disturbance in the positive air pressure environment of the operating room, allowing for an environment of increased airborne contaminants leading to an increased risk of SSIs for surgical patients. A Bay Area perioperative unit observed 21 different SSI incidents in a one-year span. The QI project team's initial observation and assessment observed some patterns and behaviors that potentially increased OR foot traffic.

Causes for avoidable door openings within the unit were excessive supply and equipment retrieval, excessive breaks and the switching out of staff during surgical procedures, unnecessary social communication, and the incorrect use of entrance and exit doors. A microsystem assessment was conducted to further investigate these patterns and behaviors utilizing microsystem assessment tools in the 5 Ps, a SWOT analysis, and an evaluation of door openings in the operating rooms. Observation of 17 different surgical procedures produced a total of 850 door openings, and a total of 192 of these door openings could have been avoided. The observed unit had 20.41 door opening per hour and 8.37 avoidable door openings per hour, meaning ideal conditions only allow for 12.04 door openings per hour.

Based on the microsystem assessment and observations made within the surgical unit, interventions and recommendations are designed to reduce increased OR traffic to decrease the prevalence of SSIs compared to the unit's current patterns, behaviors, and policies. Proposed interventions and recommendations include reinforced education on SSIs and OR foot traffic, a more standardized and frequent inventory check system, a standardized break and relief system, standardized communication policies, and installing door counters in all OR rooms.
Conclusion

Unfortunately, due to a delay in the onboarding process at the observed hospital, this QI project is still in the planning stages, and the majority of the project was focused on the microsystem assessment and determining the patterns and behaviors that led to increased OR traffic during surgical procedures at the unit. The following steps in the progression of this QI project are implementing the recommended interventions and evaluating whether they are successful in reducing increased OR traffic and ultimately decreasing the risk of SSIs for surgical patients over six months. Throughout the implementation phase of the project team, member feedback should be obtained along with audits of door openings in the surgical procedures to better improve and adjust the project goals and outcomes. The goal and overall objective is to reduce the number of SSIs in the unit moving forward and establish effective interventions.
Section VII. References


Section VIII. Appendix

Literature Review. Synopsis of literature review.

Lynch et al. (2009). Observational study to evaluate the behavior in the OR that contributed to OR traffic. The results show that door openings coincided with the length of the surgical procedure and the number of people within the OR.

Rezapoor et al. (2017). A quantitative simulated study that aimed to evaluate the direct effect of personnel and door openings on the air quality in the OR setting. The results concluded that the number of personnel and the amount of door openings during surgical procedures directly coincide with the density of particles in the OR air.

Buckner et al. (2022). A narrative review of literature to further understand the issue of increased OR traffic and the contributing factors. The review also aims to determine interventions to help reduce OR traffic. Result show that the EB interventions they found in their review showed a reduction in OR foot traffic.

Elliot et al. (2015). Quality improvement project aimed to identify the amount of OR foot traffic during surgical cases and to determine if interventions designed to decrease supply and equipment retrieval in general surgeries would be effective. The results revealed a reduction in nursing foot traffic.

Rovaldi and King (2015). Quality improvement project conducted in an effort to reduce OR door opening. The interventions used were designed to discourage OR door opening and traffic processes. The results revealed a 50% decrease in in door openings.
Hamilton et al. (2018). Observational study aimed to reduce door opening in the OR in a three phase process. The results reveal a 17% decrease in door openings per surgical case.
PDSA Cycle. Detailed PDSA Cycle for the QI project process.
## SWOT Analysis

Highlight of the strengths, weaknesses, opportunities, and threats observed in the microsystem.

<table>
<thead>
<tr>
<th>Strengths:</th>
<th>Weaknesses:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Good Leadership</td>
<td>Excessive staff during surgical preparation</td>
</tr>
<tr>
<td>Good communication amongst staff</td>
<td>Excessive equipment retrieval</td>
</tr>
<tr>
<td>Efficient and timely surgical care plans and schedule</td>
<td>Excessive social communication</td>
</tr>
<tr>
<td>Self awareness of SSI occurrences</td>
<td>Use of incorrect entrance and exit</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Opportunities:</th>
<th>Threats:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decrease in unnecessary foot traffic</td>
<td>Increased costs</td>
</tr>
<tr>
<td>Reduction in hospital costs</td>
<td>Increased time checking inventory/supplies</td>
</tr>
<tr>
<td>More efficient OR supply standardization</td>
<td>Increased time in staff education</td>
</tr>
<tr>
<td>Staff education on reduction of foot traffic</td>
<td>Push back from staff</td>
</tr>
<tr>
<td>Lower occurrence of SSI</td>
<td>Decreased staff morale</td>
</tr>
</tbody>
</table>
### Results

Total amount of door openings broken down into the four categories used in the measures of the QI project, as well as by the time of day the surgical procedure was conducted.
| MEAN of morning =door swings/hr | 24.49 |
| MEAN of noon =door swings/hr    | 19.29 |
| MEAN of afternoon =door swings/hr | 16.13 |
| MEAN=door swings/hr            | 20.41 |
| Mean=Avoidable door swings/hr  | 8.37  |
| Total Hours of surgery         | 2432  |
| Total door swings              | 850   |

**Results Interpretation.** Calculated interpretation of the measures.