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Operating Room Efficiency: Time is Money

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Operating Room Efficiency: Time is Money

by

Hannah Leonard

A project submitted to the faculty of
Gardner-Webb University Hunt School of Nursing
in partial fulfillment of the requirements for the
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Abstract

Healthcare costs, including the costs of surgery, are very expensive for patients. The operating room is a huge source of income and expenses for hospitals. In the operating room, there is room for improvement to improve efficiency as well as decrease the costs for patients and healthcare systems without harming patient care. By decreasing turnover time, increasing first case on-time starts, and better preparing for the daily flow in the operating room, there is a proposed cost saving. This project proposal will address methods to decrease turnover time between surgical cases. It will also target improvement in first case start times and improvement in preparation for daily flow of case progression in the operating room. Evaluation of the proposed changes will be evaluated after 6 months of implementation to monitor if there has, in fact, been an improvement in operating room efficiency. Again, the overall goal of the proposal is to improve the efficiency of the operating room to better serve patients.

Keywords: operating room, operating room efficiency, turnover time, first-case on time starts

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CHAPTER I

Introduction

Healthcare is expensive. If someone has ever had surgery, that person understands the costs are high. There are multiple costs associated with surgery-anesthesia, the cost of the room, and special equipment and items necessary for that procedure. That person also may have experienced the delays and inefficiencies of operating rooms (ORs). Hospitals are pressured to reduce costs and patients depend on it. Patients and hospitals feel the financial pressure from the inefficiencies of the operating room as well. In 2018, the United States spent roughly $3.6 trillion on health care, more than any other nation (Stein, 2020). Research from Michigan State University and Rutgers University quantifies the amount of money being wasted in hospital ORs (Stein, 2020). Findings from the research indicate that hospitals could save on average $1,800 per surgery which is roughly $28 million per year by avoiding and reducing unplanned costs (Stein, 2020). The operating room (OR) is known as the big money maker and spender in most hospitals. More than 48 million ambulatory procedures and 51 million inpatient procedures were performed alone in 2010 (Fay, 2021). Care that the surgical patient needs accounts for about one third of all healthcare spending and about one half of inpatient costs (Fay, 2021). The OR may account for up to 40% of a hospital's costs and 60-70% of the hospital's revenue (Rothstein & Raval, 2018).

Problem Statement

Surgeries are expensive and the majority of the reasons why are due to the cost of time spent in the operating room for a procedure. Operating rooms and patients are losing money due to inefficiencies related to scheduling and turnover time. These issues need to

be solved in order to increase patient safety and satisfaction while saving the patient and the operating room time and money.

Significance

Current and past research has identified that there is a huge financial burden of wasted money related to inefficiencies in the operating room. According to Martin and Langell (2017), there is an area of improvement related to first case on-time starts in the operating room. Other inefficiencies are seen with issues with scheduling (emergencies or urgent add on cases), case flow problems (staff coverage, lack of daily preparations, and communication issues), and room turnover delays (Lee et al., 2019). However, there are ways to better increase productivity in the operating room; there are many opportunities to investigate where issues are, as well as, implementing solutions to the issues. There are also many avenues to educate the operating room staff on such issues and solutions.

Due to the significant amount of money that hospitals invest into the OR, there is a strong interest in maximizing the time and efficiency of the operating room. There are very important implications for cost savings and medical team morale. In the OR, time is money, meaning for every minute from the time a patient arrives in the operating room until the time the patient rolls out, the dollars are adding up for the hospital and the patient. On average the cost of operating room time ranges from $15-$50 per minute (Martin & Langell, 2017). Rothstein and Raval (2018) indicate that it cost $30-$100 per minute. Not only is it essential to cut costs for the hospital, but also for patients. Healthcare is expensive, and there is a strong need by patients for healthcare facilities to become more efficient in places such as the OR. It is a snowball effect; when the costs of surgical procedures increase due to inefficiency in the operating room, it in turn creates a

more expensive bill for the patient who needs the surgery. As an example, Table 1 shows the average costs of some surgeries.

Table 1

Surgical Costs of Average Surgeries in 2018

Surgery	Cost
Heart Valve Replacement	$170,000
Heart Bypass	$123,000
Spinal Fusion	$110,000
Hip Replacement	$40,364
Knee Replacement	$35,000
Angioplasty	$28,200
Hip Resurfacing	$28,000
Gastric Bypass	$25,000
Cornea	$17,500
Gastric Sleeve	$16,000

Averaged into the cost of the surgery are things such as physicians, anesthesiologists, nurses, scrub techs, the operating room, instruments and sterilization, medication, recovery room, and other services (Fay, 2021). One of the most important items included is the operating room per hour costs (Fay, 2021). Keep in mind that the costs of surgeries vary vastly depending on patient status.

Purpose

The purpose of this project is to examine issues with operating room time efficiencies and identify a way to decrease costs for the hospital and patients which may also improve patients' satisfaction with their care. One way to help improve OR efficiency is to improve turnover time by implanting policies and procedures to streamline preparing from one case to the next. Another way to improve OR time efficiency is to improve scheduling in the ORs whether it be first-case starts or simply anticipating the needs of the day. Some issues that arise when searching for ways to improve OR efficiency are as simple as how complex and unpredictable the OR is. There are ways to orient and motivate the staff to identify where these areas are and ideas to improve the day-to-day processes. Sterilization equipment could be down and out of order. There could also be scheduling issues, cancelations, and unexpected add-on cases. Could there be a lack of equipment availability? Is the vendor representative present? Again, there is an opportunity to educate and streamline the current processes in the operating rooms. Through this project, the goal is to develop avenues to help improve the OR's time efficiency. Again, not only will OR time efficiency be improved, but patient satisfaction should also increase as well as healthcare team morale and the costs of the operating room should decrease.

Theoretical/Conceptual Framework

Related to implementing new behaviors by replacing the old ones, the Change Theory of Nursing is a model of "dynamic balance of forces working in opposing directions" (Nursing Theory, n.d., para 2). Developed by Kurt Lewin, known as the father of social psychology, this is a three-stage model of change known as unfreezing-change-

refreeze model (Nursing Theory, n.d.). The Change Theory contains three components: driving forces, restraining forces, and equilibrium. Driving forces are those that push in a direction of change. Restraining forces are those that counter change. Equilibrium is met when driving forces and restraining forces are equal. Unfreezing is finding a method of making it possible for people to let go of the old pattern that was counterproductive. The change stage is "moving to a new level" and involves a process of thoughts, feelings, and behavior changes. Refreezing is adopting the new to become "standard operating procedure" (Nursing Theory, n.d.).

The goal of the project is to improve operating room efficiency. Currently, there are practices that are counterproductive to obtaining better efficiency in the OR. Anticipation for staff to evolve through the Change Theory of Nursing model is expected. When implementation begins, that is the time for unfreezing and letting go of the old ways things were done. Next, change is anticipated while orienting staff to new practices. After successful implementation and successful change in efficiencies, the stage of refreezing begins so the new standard practice and procedure is accepted.

Definition of Terms

For the purpose of clarity in this project, the following definition of terms will be included:

- **OR** refers to the Operating Room. The OR is a collection of procedural rooms where there are staff, supplies, equipment, and special necessities for surgery.
- **PACU** is the post-anesthesia care unit that provides care for patients until they recover from anesthesia.

- When referring to **OR Time**, this is time spent in the operating room from the time the patient arrives in the OR until the patient is moved to PACU.
- **Pre-op holding** is a pre-operative area where the patient arrives prior to being moved to the OR.
- **Productivity** is the overall efficiency of the time used in the operating room. This includes time spent in the OR, room turnover time, and setup for the next procedure.
- **On-time start** refers to cases beginning on time at the beginning of the day.
- **Add on case** is any case that has been added to the schedule that was not originally planned for on that day.
- **Turnover** refers to the time it takes to clean and prepare the OR room from the end of one case to the time the next patient arrives for the following case.

The operating room is a very complex system of healthcare that has room for improvement in productivity and efficiency. The purpose of this project is to develop and implement avenues to better increase the efficiency of the operating room for patients and the hospital systems. This project will include evidence-based best practice methods and the best way to achieve improvements in OR efficiency. Some areas of improvement that have been identified are on-time case start times, delay in cases, delay in turnover, and lack of daily surgical preparedness. The goal is to achieve improved efficiency of time and money in the operating room, to not only help the hospital and patients with costs but also increase patient satisfaction.

CHAPTER II

Literature Review

The main focus of improving efficiency in the operating room revolves around decreasing operating room time where there are opportunities such as turnover time, first case starts, and preparations for daily tasks in the operating room. The end goal is to decrease healthcare costs for patients while providing remarkable care.

Healthcare costs, specifically the costs of surgery, weigh a heavy burden on patients and hospitals. Surgical costs are some of the highest amounts that hospitals will have to pay and are also most of the profits for a hospital. There are opportunities for improvement in lowering costs to hospitals and patients by investigating the efficiencies of operating rooms. The main concern is time; OR time is expensive for the hospital and the patient. Some of these areas that can contribute to efficiencies include turnover time, first case on-time starts, daily surgical preparation, and scheduling in the operating room. The following literature review delves into investigation, solutions, and discussions to improve the inefficiencies in the operating room and therefore alleviate some of the healthcare costs for hospitals and patients.

A literature review was conducted by searching a variety of database search engines. These databases include the Cumulative Index to Nursing and Allied Health Literature (CINAHL), ProQuest, Medline, and the search engine Google Scholar. Key terms for the search of the literature included: operating room efficiency, operating room turnover, operating room first-case start, operating room, OR, OR challenges efficiency, OR challenges turnover, OR costs, OR time cost.

Literature Related to Problem Statement Turnover Time Efficiency

The operating room is one of the most productive areas of a hospital (Kumar & Malhotra, 2017). Turnover time is non-productive time but is very important in the overall day-to-day flow (Kumar & Malhotra, 2017). Kumar and Malhotra (2017) identified common delays in turnover time. Turnover time (TOT) is time when multidisciplinary team members work to get the OR clean and set up as efficiently as possible for the next case (Kumar & Malhotra, 2017). TOT is calculated as the duration of time between one patient leaving the OR and when the next patient enters the OR, and includes the time taken for setting up and cleaning the OR. High performance is <25 minutes, medium performance is 25-40 minutes, and poor performance is >40 minutes (Kumar & Malhotra, 2017). Some factors that contribute to turnover time are complexity of cases, special needs of cases, and personnel delays. Causative findings for delays in turnover times were surgeon related (22%), anesthesia related (9%), patient related (18%), and hospital/staff related (51%), which ranked the highest (Kumar & Malhotra, 2017). Some delays include no surgeon availability, no consents given, support staff related delays, porters/partners related delays, nursing technicians' availability, delay of moving patients from a ward or pre-op area to OR, delays in moving patients from OR to PACU, emergency operations among scheduled OR cases, infected cases, equipment unavailability or malfunction, and communication gaps (Kumar & Malhotra, 2017). Avoidable delays, meaning delays that have room for improvement related to efficiency were determined as follows: surgeon unavailability, scheduling error, unavailability of staff, delays in moving patients, infrastructure problems, equipment failure, communication gap, untimely preparation by OR staff, delays in receiving laboratory

results and blood products, and surgical consent not given (Kumar & Malhotra, 2017).

Kumar and Malhotra (2017) identified OR turnover time issues. Surgeons were anticipating TOT taking longer than it did therefore the availability of the surgeon caused delay. Surgeons could be available to position and move patients as well as encourage the team to turn over quickly. ORs were only used 54% of the time for operating while the remaining time was used for anesthesia, prepping and draping, and delays/turnovers. The hospital officials considered the time not spent operating was inefficient. The time of day, OR size, OR length, or complexity of the case were not contributing factors to delayed turnover time (Kumar & Malhotra, 2017). Another idea to aid in TOT would be to have a multidisciplinary team come together to remodel the turnover process. The same staff present in the room that established roles at the beginning of the day had lower TOT (Kumar & Malhotra, 2017). The next idea was to have standardized instrument trays as well as multiples of the trays that are used the most. To expedite patients' movement through the OR, anesthesia could be inducing one patient while the other patient is about to wake up (Kumar & Malhotra, 2017). Concurrent care reduces non-operative time and improves efficiency. Lastly, dedicated ORs for emergencies, clean and dirty cases, and invasive monitoring cases could eliminate extra time for setting up and cleaning rooms after cases (Kumar & Malhotra, 2017). Overall, some recommendations include discontinuing mopping on "bloodless" cases, preparing surgical sets and packs per specialty rather than surgeon specific, using a more efficient cleaner that takes less time to dry, establishing dry-erase boards to help manage time, using disposable turnover packs, and require that anesthesia be responsible for cleaning and preparing the work areas (Kumar & Malhotra, 2017).

Other innovations that have shown drastic improvements in operating room turnover time include using the Lean process (Lee et al., 2019). This allows anesthesiologists to meet the next patient earlier to get intravenous lines and other necessities handled earlier (Lee et al., 2019). Another area for improvement was also identified with circulating nurses regarding how to eliminate unnecessary traveling to gather supplies during a case by attempting to ask surgeons what is needed and anticipate needs (Lee et al., 2019). Circulating nurses have also assisted in creating carts for specialties for the day to anticipate possible case needs (Lee et al., 2019).

Expanding on the process of dedicated operating rooms, evidence has shown that turnover time decreased by 8 minutes (Reznick et al., 2016). Several studies determined that using a block for a specific room along with the same staff helped decrease turnover time and increase output from the OR (Reznick et al., 2016). The increase in efficacy did not show that there was a compromise of patient care (Reznick et al., 2016). There was consistency with staff that were trained and educated on the procedures completed and the equipment and supplies needed which kept the amount of time for turnover of rooms less than rooms constantly switching needs of specialties (Reznick et al., 2016).

Reznick et al. (2016) indicated that dedicated OR teams succeeded with total intraoperative time decreasing from 125.51 minutes to 112.12 minutes while the control group had no statically different changes. Turnover time decreased from 29.0 minutes to 26.4 minutes with a dedicated team for each OR. Surgeons preferred a dedicated team that was very familiar with the specialty because turnover times were better. Not only were turnover times better, but surgeons and staff felt that it was overall safer for the patients. There was consistency in the standardization of care and reduction in

distractions. With turnover times decreasing and overall operating room time decreasing by using a consistent team, there may be as much or more than $1,000 of savings per case (Reznick et al., 2016).

In addition to dedicated teams and rooms, attention should also be brought to instrument pans and turning over for cases as well. Efficiency in the operating room can be compromised due to delays in reprocessing instruments (Dyas et al., 2018). Dyas et al. (2018) observed that many instruments in a standardized tray were not used for a thyroidectomy. The original instruments used for head and neck procedures (Tray 1 and Tray 2) came in two separate trays. The processing department took the two trays originally created and broke them down into three separate specialized trays: head and neck tray, thyroid tray, and parathyroid tray. The two trays originally used had 98 instruments. Rather than using the head and neck trays that were composed of two trays with a total of 98 instruments, there became head and neck trays with only 36 instruments. The thyroid tray and parathyroid tray were composed of instruments originally found in the head and neck tray, but now had fewer instruments and made for a more streamlined process of preparing trays for surgery. The preparation time decreased from 8 minutes to 3 minutes (Dyas et al., 2018). The newly converted tray saved $31.62 per operation in reprocessing costs (Dyas et al., 2018). The idea is that by having dedicated trays, it reduces wait times when turning over instruments and time of preparation which streamlines the process for the day.

Moving away from strictly discussing the operating room, there are improvements to be made related to flow with PACU. The availability of PACU beds is important to the flow of moving patients out of the operating room to prepare for the next case. If the

PACU does not have enough staff or beds, the patient and staff are forced to remain in the operating room until there is availability (Lee et al., 2019). This begins to discuss scheduling considerations for the operating room by attempting to consider the flow and capacity of the OR, and how it affects the capacity of the PACU (Lee et al., 2019). For example, if the operating room is completing multiple cases quicker than the PACU can recover patients this could lead to a hold in the operating room until a bed becomes available in the PACU. There is a machine learning algorithm that can predict the PACU time for each type of procedure and it was used and was able to reduce total PACU time by 76% which led to more availability in the PACU for patients coming from the OR (Lee et al., 2019).

Operating Room Scheduling

First case on-time starts (FCOTS) can lead to lower operating room utilization and efficiency, inflated costs of the facilities, and dissatisfaction among staff and patients (Allen et al., 2019). FCOTS has been a focal point in the journey to improve OR efficiency. The aggressive approach was to have no grace period for on-time start. No grace period refers to on-time starts beginning at the scheduled time, with no exceptions for being late. To monitor this, data collection forms were given to nurses of the OR. The data collection forms included information regarding patient data, type of surgery, in-room time, procedure start time, and reason for the delay (Allen et al., 2019). If the case was simple, the case was scheduled 30 minutes prior to incision. This meant the patient was to be in the room at the scheduled case time. If the case was more complex, the case was scheduled 45 minutes prior to incision (Allen et al., 2019). The analysis for the improvement initiative includes three subjects: (1) FCOTS metric, as evaluated by

physician service line, (2) cost savings attributed to improvement of FCOTS, and (3) types and rate of specific delays (Allen et al., 2019). Before the implementation of the study, patients were in the room on time 25% of the time and the procedure on-time start was 30.4% (Allen et al., 2019). After the implementation of policy changes and education for staff, on-time starts improved to 73.6% (Allen et al., 2019). With these improvements and an overall improvement of 80,587 minutes per year, there would be approximately $771,220 in savings per year (Allen et al., 2019).

Keys to success in obtaining the FCOTS goal was buy-in from physicians and staff using evidence-based practice process improvement. This included a physician committee that agreed upon process improvement metrics related to FCOTS (Allen et al., 2019). Rather than punishing, physicians were notified of failure to comply, and processes were reviewed again (Allen et al, 2019). The goals of surgeons were to have consents signed, and notes, history, and physicals updated in the chart at least 1 hour before case start (Allen et al., 2019). There were daily huddles to identify the attainable goals for the day as well as determine anticipation for the day. These meetings included coordinators, board-runners, managers, and scheduling (Allen et al., 2019). A primary anesthesiologist was assigned to enable the OR schedulers to make better decisions for scheduling by fostering an open line of communication (Allen et al., 2019).

In 1 year, an operating room identified that 27% of neurological cases were delayed (Ng et al., 2022). One year of those cases delayed was estimated to cost $25,843.68 to $238,252.32 (Ng et al., 2022). Some of the reasons the first cases were delayed were due to median ASA (American Society of Anesthesia Physical) scores of delayed vs. non-delayed cases, patient preparation, and surgeon tardiness. A one-way

analysis determined a significant difference between ASA 2 and ASA 3 groups in delayed or non-delayed cases (Ng et al., 2022). Delayed cranial and spinal cases were not significantly different, but still very delayed. This is due to the increased risk of anesthesia with these types of patients (Ng et al., 2022). Related to patient preparation, there appeared to be a bottleneck of patients being registered for first-case starts. This could subsequently affect the remainder of the pre-operative checklist completion. One solution to that issue was to preadmit the neuro patients during clinic visits. Also identified during the system analysis was that equipment issues were one of the most common delays. Specialty neurological cases typically need very advanced and specialized equipment. This was solved by creating a morning huddle with OR staff. The last, which was a surgeon-delayed issue was site marking and surgical consent documentation in which first cases were delayed 9.67 minutes (Ng et al., 2022). Over a year of implementation of having surgical consents completed in the clinic and surgeons arriving at the pre-op area earlier, there was a decrease in delay time to 7.17 minutes (Ng et al., 2022).

The operating room is an area that requires a bit of planning for the day to run smoothly. That begins with first case starts. First-case starts are relatively easy to predict, but everything that happens after the first case is very difficult to predict. With the pressure to run efficient operating rooms, it is crucial to have a planned schedule, or at least attempt a planned schedule. In order to better plan adherence to first case starts, case durations and turnover times are essential (Balzer et al., 2017). Balzer et al. (2017) discovered that out of 14,014 surgeries, with 4,346 being first case 7:00 a.m. start time, 52% resulted in a delay, which resulted in an overall change of 36% of case times

changing. After 7:00 a.m., 87% of those cases delayed started more than 10 minutes late (Balzer et al., 2017). Balzer et al. (2017) also discovered that there were deviations in case durations which also resulted in delaying cases scheduled after the current case. Most cases that ran just over an hour in length were the most correctly predicted. Short or extra-long case durations were less reliable and therefore had higher deviations from allotted times (Balzer et al., 2017).

Due to the operating rooms being among the most expensive resource of the hospital, there needs to be improvement among productivity and efficiency (Park et al., 2020). While managing the scheduling, there are multiple factors that play into efficiencies such as delays, cancellations, and emergencies. In a tertiary teaching hospital, a new OR scheduling office system (ORSO) was used to revise schedule allocations (Park et al., 2020). The ORSO was composed of the nursing team, anesthesiologists, and administrators responsible for the cases that ran from 8 a.m. to 5 p.m. (Park et al., 2020). ORSO was able to analyze the duration of surgery and the utilization, then continued to become more specialized for each surgeon (Park et al., 2020). Surgeons were able to request block times as well as release block times if not being used. If there were no cases, then the OR session was left for add-ons or emergencies. The program modified code names rather than using procedure names and was able to ascertain the case duration for the code. By using the ORSO system, day-time utilization was 100% (Park et al., 2020). The system was user-friendly and had an electronic dashboard in which case times, case durations, and status of operations could be viewed by the entire OR. Overall, with the ORSO system implemented, OR utilization increased from 115.1% to 117.6% (Park et al., 2020). This allowed for more appropriate staffing during the day as well as

an increased number of cases per day and per month. ORSO allowed for more flexible case reallocation which increased overall OR efficiency (Park et al., 2020).

The concept of dedicated rooms or teams has been touched on previously in this document. To simply reiterate how important scheduling is related to the room that a procedure is scheduled in, a dedicated OR specialty suite allows for the equipment and supplies to be readily available. The staff available to the room are also more prepared for the day ahead by knowing the expectations for the schedule of the day (Small et al., 2013). By dedicating ORs to an orthopedic specialty, the overall productivity of the OR improved for anesthesia times (4 minutes), operative times (7 minutes), and turnover times (8 minutes) (Small et al, 2013). Not only was the room set up for the specialized cases, but the staff was also prepared for the day ahead by anticipating the needs of the day. Overall efficiency increased but did not cause any harm to the patients (Small et al., 2013).

In relation to dedicated staff and dedicated operating rooms for specific specialties, there are some cases that are high volume and short duration procedures. This means simply that many, short length cases are performed. These cases are also related to a specialty such as pediatric otolaryngology (Perkins et al., 2014). In order to maximize block time and maintain efficiency, there are some variables that need to be addressed (Perkins et al., 2014). For example, variables may include difficulty with intravenous (IV) placement, dedicated anesthesia team, surgeon availability, training for OR staff on equipment, scheduling similar cases back-to-back for like equipment, auditing preference cards, having the surgeon obtain consent in the clinic or first thing in the morning, and completing notes the morning of the surgery (Perkins et al., 2014). One of the main

focuses needs to be scheduling similar cases back-to-back in the same room to ease turnover and set up for the next case. This allows the surgeon to anticipate where to go, the staff can expedite the setup for the case, and anesthesia can prepare for the next case in a timely manner as well (Perkins et al., 2014). Another concept related to scheduling is to have the surgeon obtain consent while in the office with the patient (Perkins et al., 2014). This practice will eliminate unnecessary time before the next procedure if the consent is already signed; there would only be an anesthesia consent to complete prior to the procedure start.

Strengths and Limitations of Literature

The most common limitation within the literature that was found during the literature review is that the research was very specific. Some research only used a tertiary hospital to test and implement changes while some only studied a specific specialty, forsaking the other specialties. Related to the ORSO system implementation and other such systems, the research was limited to that single study. In the operating room, there is always room for the unpredictable which can never be truly accounted for no matter the planning. Some of the unpredictable issues that may occur are emergency surgeries, patient emergencies, and surgeons addressing emergencies.

Strengths of the research are that there have been findings indicating significant improvements with chosen and studied implementations. Operating room efficiency has improved in many cases, as well as reduction of costs. Patient safety was not compromised related to increased efficiency. With ORs running more efficiently, the goal would be for patient satisfaction to be higher.

CHAPTER III

Needs Assessment

Higher patient care costs related to the operating room affect the patient and the hospital; it goes hand in hand. The changes to better the operating room efficiency begin at the source, which is our hospitals. There must be an analysis of what is needed to begin policy changes.

Target Population

For this project, there are many different disciplines in the operating room that are needed and will be included in the project. Nurses, scrub technicians, operating room assistants, sterilization team, and surgeons are considered the population targeted. The staff of the hospital who work with the daily tasks of the OR will be implementing the protocol as well as using the new protocols and procedures. The staff as well as the management of the operating room, PACU, and holding units will be others who will be using the new protocols and procedures and will also be working to enforce and implement the project.

Target Setting

The setting for this quality improvement project is the operating room department at a 921-bed hospital located in central North Carolina. At this large, non-profit hospital, there are 18 operating rooms which average turnover times anywhere from 26-60+ minutes. First-case start goal for the OR is 75% or greater. Currently, the first-case start time is approximately 34%.

Sponsors and Stakeholders

Those sponsoring and investing in the project include flow coordinators (specific service line managers that oversee the surgeons and needs of the surgeons and procedures) and OR management, as well as the OR staff at the project site. The stakeholders involved are the patients and their families. Patients may be directly affected by the efficiency of the operating room related to the costs of surgery. The hospital systems and third-party payers are also stakeholders. The patients will be experiencing a more efficient process when visiting the operating room.

Desired Outcomes

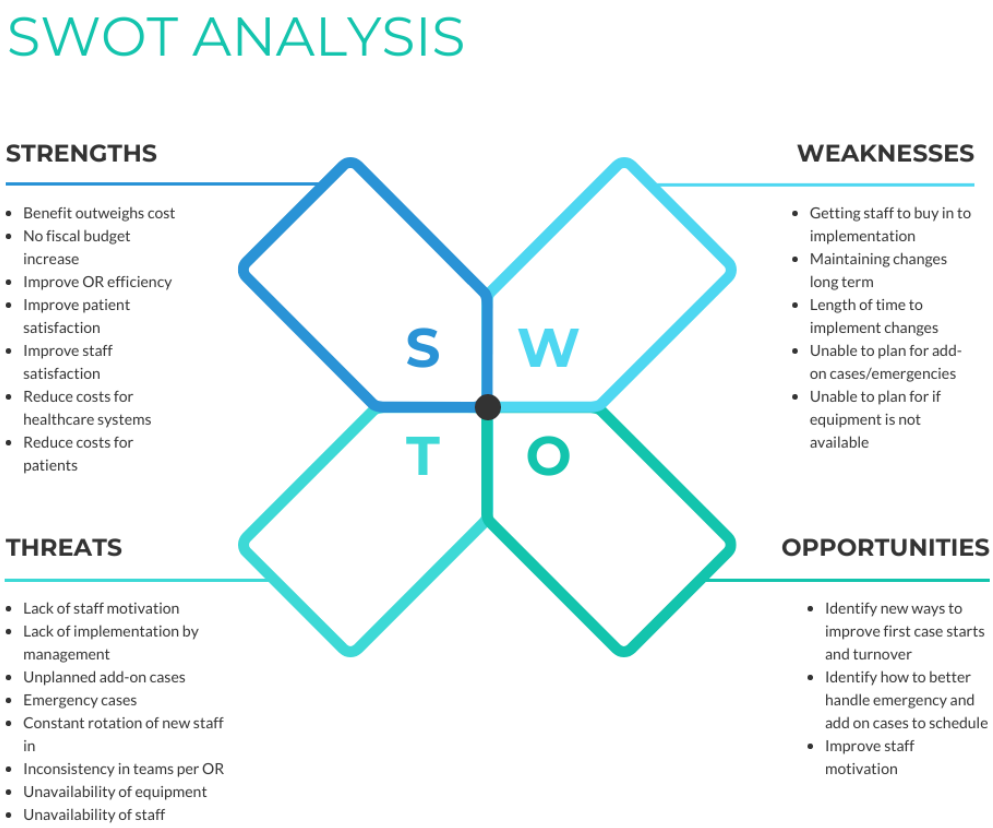
To determine if the project is meeting the goal of improving turnover times, on-time starts, and fewer cases running over the scheduled time, the focus is the improvement from past data compared to data after new practices will be implemented. The goal of this project is implementation of changes to practices and procedures necessary to improve the efficiency of the operation room. Lastly, overall patient satisfaction will be taken into consideration after implementation to determine if improving efficiency in the operating room had a positive impact on patients.

SWOT Analysis

The SWOT analysis is used to examine the strengths, weaknesses, threats, and opportunities for the quality improvement project. The SWOT analysis effectively allows a developer to identify where the project can make improvements and how the improvements benefit the overall end goal. The developer can also identify the risks and downfalls of the implementation. Figure 1 provides a SWOT Analysis related to the project.

Figure 1

SWOT Analysis



Resources

The resources needed for this project include the operating room staff, equipment, and supplies. There also needs to be access to current turnover data regarding what causes delays in case starts and by how much time, wasted money in the operating room, and current daily surgical preparations. The project questionnaire sheets will also be needed to assess how effective the implementation is. Support from the management is essential in implementing changes to current practices in the OR related to efficiency.

Team Members

The team members of the project include the Project Leader, the Project Chair, and the Project Practice Partner. The Project Leader is the team leader and is responsible for creating and carrying out the quality improvement project. The Project Leader develops the interventions to be utilized to meet the goal of the project as well as developing the implementation process. The Project Chair is a faculty member that shares a knowledge base of quality improvement related to the healthcare field. This team member provides support, oversight, and recommendations related to the project. The Project Practice Partner is an individual who works with the Project Leader to implement the project and policy changes. This team member will serve as a liaison with the project site and assist the project leader in developing the policies and protocols of the project proposal. These members are utilized to aid in completing the quality improvement project for improving efficiencies in the operating room.

Cost-Benefit Analysis

The benefit of the project outweighs the cost of the project. There is essentially no increase to a fiscal budget in order to implement changes to current practices in the operating room. However, if turnover times decrease, first-case starts increase, and overall wasted time decreases in the operating room, the benefit is improved efficiency, higher patient satisfaction, and less operating room costs.

CHAPTER IV

Project Design

This quality improvement project is to focus on implementing policies at the proposed site to aid the operating room in reducing turnover time; therefore, reducing the overall costs to patients and hospitals.

Goal

The overall goal for this quality improvement project is to improve the operating room efficiency and therefore decrease unnecessary costs to the patient and the healthcare system. By improving the turnover time, first case on-time starts and daily preparedness, the time spent in the operating room decreases and the costs of the operating room decreases for the patient and the hospital.

Objectives

The main objective of this project is to increase efficiency in the operating room. This can be achieved by improving turnover time, better preparing for that daily schedule, and ensuring appropriate staffing for the cases. Other objectives that may come with increased efficiency in the operating room include an increase in patient satisfaction and staff satisfaction, as well as decreased costs to the patient and the healthcare systems.

Plan and Material Development

This project will result in changes in protocols and procedures. To ensure that staff engage and continue to follow protocols and procedures, education will be provided and readily available to access. The new procedures and protocols will be presented via PowerPoint to all staff. The PowerPoint and change of protocol sheets will be presented to the staff prior to implementation. Once implementation is started, all changes will be

emailed to staff as well as placed in common areas such as holding room, PACU, and break rooms for anesthesia, doctors, and staff members.

Timeline

For a smooth effective flow of the project proposal development, an established timeline will assist in a successful completion. The following phases have been identified:

- Phase one: Identification of the problem
- Phase two: Literature review to gather evidence-based information related to the problem
- Phase three: Needs assessment conducted
- Phase four: Project development and evaluation method developed based upon evidence-based information and needs assessment
- Phase five: Dissemination of project proposal to key stakeholders to obtain feedback and additional recommendations

Evaluation Plan

The evaluation plan helps determine if there has been any improvement made to the quality improvement process. For this particular project, the efficiency of the operating room is what is being examined. This includes turnover time (TOT), first case on-time starts, and case length times. The goal is to see a decrease in turnover time, an increase in cases starting on-time first thing in the morning, and decrease or maintain case lengths. In order to determine if there has been an improvement, a quality improvement survey will be given to the nurses in the operating room after each case. The quality improvement survey sheet will take into account the surgeon, type of surgery,

turnover time, delay (if applicable and what was the delay and how long), team members in the room, and suggestions for improvement from the team member. Ideally, there would be improvement in as little as 3 months; however, the data will be collected 6 months from when implementation began. At the end of 6 months, the survey will be examined, and quantitative data will be analyzed through descriptive analysis to determine if there has been any improvement in operating room efficiency.

Summary

The project proposal is designed to improve the issues identified in hindering operating room efficiency. Issues that will be addressed are turnover time, first case on-time starts, and case lengths. The end goal of the project is to see improvement in operating room efficiency and therefore decrease patient costs and hospital costs, and more importantly maintain and increase patient safety and satisfaction. The project will take approximately 6 months to a year to introduce and to be implemented. Once implementation occurs, within 6 months, data will be collected that focuses on turnover time, case lengths, and first case on-time starts. In order to further evaluate, there will be project improvement questionnaires given to the nurses of the operating room. By the conclusion of the project, it is anticipated that there will be increased operating room efficiency through a change of protocols.

CHAPTER V

Dissemination

Dissemination Activity

The project proposal was presented to the nurse manager of the operating room along with an assistant nurse manager and several faculty members from Surgical Services. During the project proposal discussion, information was given based on where the issue lies with efficiency in the operating room. There was an in-depth discussion about the potential amount of savings a hospital could see if procedures and protocols were updated. Information about protocol and procedure change ideas were given to better increase the operating room efficiency related to turnover time, first case on-time starts, and daily preparedness. The project questionnaire was also reviewed by members of the meeting to gain feedback regarding its value in obtaining evaluation data.

Recommendations

The project proposal was presented to the Project Practice Partner and an assistant manager of the operating room. After the presentation of the proposal, the remaining time of the meeting was used for recommendations for the project proposal. The first recommendation given was that the project would need to be implemented in multiple operating rooms in which efficiency needed improvement. It is difficult to know how effective the changes of implementation will be without testing the proposal multiple times. Another recommendation was to find more ways to improve upon efficiency. According to the Project Practice Partner and the assistant manager, some of these things were already implemented at the current facility. It was advised to research other protocol implementations related to operating room efficiency. The idea of questionnaires was a

consideration; however, there would need to be a short, condensed version to increase the completion of the questionnaires. The nurses' time in the operating room is valuable and there is no need to increase the workload immensely. Some other recommendations were related to the timeline of the project proposal. It would take longer than the timeline proposed. The Project Practice Partner said that the implementation timeline was realistic, but that ideally the amount of time that the project would need to be implemented should be at least 6 months. After a lengthy discussion after the proposal was presented, it was determined that the project proposal could be implemented beginning at the current facility and then spread to neighboring facilities under the same healthcare system.

Implications for Nursing

This project proposal impacts nursing by putting the focus on patient safety. By improving the operating room efficiency, patient safety will be improved as well. With turnover time improving, the patient will spend less time waiting for surgery and be less likely to cancel or reschedule due to the surgery schedule running too late. This means less time waiting for surgery that may be time sensitive. If the length of surgeries can better be anticipated, then there can be better scheduling for surgeries. Lastly, with protocol change that can better prepare the operating room for the daily flow, staff members may be able to anticipate the needs of the surgery, therefore expending less time gathering supplies or equipment during surgery. This can result in extended surgery times which is longer times that patients are under anesthesia and vulnerable to hypothermia and risk of infection. The changes implemented in the project proposal focus on increasing patient safety, and improving patient outcomes and satisfaction.

Conclusion

Healthcare is an ever-changing environment and in order to be successful, changes need to be made to adapt. A proposed way to be successful is to be more efficient. The operating room is one area where there is an opportunity to improve efficiency and become more successful not only for the healthcare system but also for the patients. Patients arrive at the operating room in one of the most vulnerable times of their lives and trust the operating room staff implicitly with their care. Members of the operating room work to keep the patient safe. There is room to improve for the patients, whether it be decreasing turnover time, increasing first case on-time starts, or being better prepared for that day and procedures. Improving upon those three items may increase patient satisfaction along with satisfaction for the healthcare system. Most importantly, improving operating room efficiency will improve patient care by providing better care.

References

Allen, R. W., Taaffe, K. M., Neilley, V., & Busby, E. (2019). First case on-time starts measured by incision on-time and no grace period: A case study of operating room management. *Journal of Healthcare Management, 64*(2), 111-121. https://doi.org/10.1097/JHM-D-17-00203

Balzer, C., Raackow, D., Hahnenkamp, K., Flessa, S., & Meissner, K. (2017). Timeliness of operating room case planning and time utilization: Influence of first and to-follow cases. *Frontiers in Medicine*, *4*. https://doi.org/10.3389/fmed.2017.00049

Dyas, A. R., Lovell, K. M., Balentine, C. J., Wang, T. N., Porterfield, J. R., Chen, H., & Lindeman, B. M. (2018). Reducing cost and improving operating room efficiency: Examination of surgical instrument processing. *Journal of Surgical Research*, *229*, 15–19. https://doi.org/10.1016/j.jss.2018.03.038

Fay, B. (2021). Hospital and surgery costs. *Debt.org*. https://www.debt.org/medical/hospital-surgery-costs/

Kumar, M., & Malhotra, S. (2017). Reasons for delay in turnover time in operating room-An observational study. *Bangladesh Journal of Medical Science, 16*(2), 245-251. https://doi.org/10.3329/bjms.v16i2.27473

Lee, D. J., Ding, J., & Guzzo, T. J. (2019). Improving operating room efficiency. *Current Urology Reports*, *20*(6). https://doi.org/10.1007/s11934-019-0895-3

Martin, L., & Langell, J. (2017). Improving on-time surgical starts: The impact of implementing pre-OR timeouts and performance pay. *Journal of Surgical Research*, *219*, 222–225. https://doi.org/10.1016/j.jss.2017.05.092

Ng, P. R., Zaki, M. M., Collier, C. G., Robertson, F. C., Hauser, B. M., Farren, S., Babu, M., Rhee, J., Levine, W., Akeju, O., & Nahed, B. V. (2022). Systems analysis of neurosurgical first-case delays identifies opportunities to optimize operating room efficiency. *Perioperative Care and Operating Room Management*, *28*, 100262. https://doi.org/10.1016/j.pcorm.2022.100262

Nursing Theory. (n.d.) *Lewin's change theory*. Retrieved May 22, 2022. https://nursing-theory.org/theories-and-models/lewin-change-theory.php

Park, H.-S., Kim, S.-H., Bong, M.-R., Choi, D.-K., Kim, W.-J., Ku, S.-W., Ro, Y. J., & Choi, I.-C. (2020). Optimization of the operating room scheduling process for improving efficiency in a tertiary hospital. *Journal of Medical Systems*, *44*(9). https://doi.org/10.1007/s10916-020-01644-0

Perkins, J. N., Chiang, T., Ruiz, A. G., & Prager, J. D. (2014). Auditing of operating room times: A quality improvement project. *International Journal of Pediatric Otorhinolaryngology*, *78*(5), 782–786. https://doi.org/10.1016/j.ijporl.2014.02.010

Reznick, D., Niazov, L., Holizna, E., Keebler, A., & Siperstein, A. (2016). Dedicated teams to improve operative room efficiency. *Perioperative Care and Operating Room Management*, *3*, 1–5. https://doi.org/10.1016/j.pcorm.2016.01.003

Rothstein, D. H., & Raval, M. V. (2018). Operating room efficiency. *Seminars in Pediatric Surgery*, *27*(2), 79–85. https://doi.org/10.1053/j.sempedsurg.2018.02.004

Small, T. J., Gad, B. V., Klika, A. K., Mounir-Soliman, L. S., Gerritsen, R. L., & Barsoum, W. K. (2013). Dedicated orthopedic operating room unit improves operating room efficiency. *The Journal of Arthroplasty, 28*(7). https://doi.org/10.1016/j.arth.2013.01.033

Stein, C. (2020, February 17). *How can hospitals save tens of millions of dollars annually in their operating rooms?* Eli Broad College of Business | Michigan State University. Retrieved February 4, 2022, https://broad.msu.edu/news/how-can-hospitals-save-tens-of-millions-of-dollars-annually-in-their-operating-rooms/#:~:text=New%20research%20from%20Michigan%20State,avoiding%20and%20reducing%20unplanned%20costs