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Reducing Turnover Time to Improve Efficiency in the Operating Room

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### Abstract

The purpose of this project is to improve efficiency by reducing turnover time in the operating room (OR) that can consequently enhance patients' and physicians' satisfaction, promote teamwork, and decrease the cost of operating room delays. The increasing trend of turnover time (TOT) requires attention for microsystem improvement in the OR of Santa Rosa Memorial Hospital. The intervention to improve efficiency is to educate the OR team members on roles and responsibilities to establish a standard workflow which can promote accountability and teamwork during the turnover process. Havelock's theory of change is used as a framework for the action plan to cultivate synergy and team engagement. Fishbone diagram, process mapping, and strength, weakness, opportunities, threats (SWOT) analysis were used as quality improvement tools to identify causes of delays and to guide the improvement process. Based on the data collected from the pilot test using the plan, do, study, act (PDSA) cycle, the post-intervention average TOT was reduced to 29 minutes compared to 37 minutes at pre-intervention phase. There is a positive response from the pilot team on the standardized workflow as reflected by the post-intervention survey. The clinical nurse leader student as the team manager has influenced the implementation of this project by providing the support and leadership needed in engaging and promoting the change in the microsystem.

*Keywords:* improve efficiency, turnover time, operating room, teamwork, workflow, and clinical nurse leader.

### **Clinical Leadership Theme**

The Clinical Nurse Leader (CNL) is empowered with a skill set for clinical leadership and serves as an advocate for the patient, healthcare team, and profession, while practicing at the point of care and focused on quality, evidence-based and cost-effective care to ensure patient safety and to improve health care outcomes (ACCN, 2007). The CNL provides a thorough assessment of the microsystem using the 5 P's framework of purpose, patients, professionals, processes, and patterns before embarking on a quality improvement project (Harris, Roussel, Thomas, 2014).

The project to reduce turnover time (TOT) towards improving efficiency in the operating room (OR) focuses on the CNL role as a Team Manager. The team manager serves as a leader in the interdisciplinary health care team to identify clinical and cost outcomes that improve safety, effectiveness, timeliness, efficiency, and quality patient-centered care (AACN, 2013). The CNL as a team manager, can provide support to the issues of turnover process related to procedural flow in the OR with focus on outcomes and variances affecting delays in turnover times (Wesolowski, Casey, Berry & Gannon, 2014). The CNL can properly delegate tasks and promote team collaboration, anticipate and mitigate barriers, as well as evaluate outcomes (ACCN, 2007).

The global aim of this project is to improve efficiency during a turnover process that involves well-defined roles and responsibilities for the OR staff to establish a standardized workflow and to ensure accountability of work (see Appendix A). Educating the team members on their roles and responsibilities will set clear expectations and promote teamwork that can influence efficiency and timeliness of scheduled surgical procedures. The CNL uses appropriate

teaching principles, strategies and current information to prepare OR staff with the change and improvement process (ACCN, 2007).

### **Statement of the Problem**

Based on the microsystem assessment in the OR of Santa Rosa Memorial Hospital (SRMH), TOT is a process that requires improvement. According to the Association of Anesthesia Clinical Directors (AACD), turnover time, also known as turnaround time (TAT), is defined as the time when the patient leaves the OR to the time the next patient arrives in the OR for the sequentially scheduled procedure. TOT is typically described as “wheels out to wheels in” (Vassell, 2016). The following activities are included in TOT: Cleaning the room, gathering equipment and opening sterile supplies for the next procedure, and physically transporting the patient from the preoperative area to the OR (Burlingame, 2014).

The microsystem’s trend of increasing turnover time became evident in 2015 with an average TOT of 30 minutes, increase to 35 minutes in 2016 and the first quarter of 2017, and plateau to 37 minutes during the second quarter of 2017 as compared to the average TOT of 29 minutes in 2014 (see Appendix B1). The average daily turnover time is calculated in the computer system based on the elapsed time in between cases excluding all times beyond 60 minutes which falls in the delay category. Based on the analysis of the OR Benchmarks Collaborative (ORBC) from both hospital and ambulatory settings of 134 US facilities and 107 Canadian facilities, the national benchmark median average turnover time is 28.5 minutes (“Data”, 2012). Benchmarking allows organizations to compare performance with the use of data that drives awareness and focus on improvement (Finkelman, 2016). The TOT of the microsystem keeps trending longer and it falls short of the national benchmark average by 8.5

minutes. Every minute that is wasted correlates to financial loss and longer waiting time for patients and physicians.

### **Project Overview**

The theme for this project is to improve efficiency by reducing turnover time while maintaining patient safety, enhancing patient and physician satisfaction, promoting teamwork, and creating an opportunity to reduce cost of delays in the operating room. The goal is to educate the team members on roles and responsibilities to establish a standardized workflow during the turnover process.

According to Norman and Bidanda (2014), teamwork inefficiencies and variations impact TOT with teams that work and complete tasks effectively while other members of the team would simply take a break and disappear during the turnover process. By educating the team members of their roles and responsibilities, it is expected to establish a standard workflow to set clear expectations and to ensure accountability, thereby promoting teamwork and efficiency. In implementing this project, it is important to recognize that achieving a rapid room turnover involves following the protocols of patient safety. Amid the efforts to improve efficiency and contain cost, it is essential for the members of the team to understand that patient safety is the main priority (Vassell, 2016).

The turnover process starts when the patient is wheeled out of the OR, which initiates the cleaning phase, followed by the setting-up phase which involves bringing in equipment, case carts, instrument trays, and opening of sterile supplies for the succeeding procedure. The process ends with wheeling the next patient to the OR. The turnover team includes the registered nurse (RN), scrub technician (ST), patient care technician (PCT), equipment technician (EQ), and anesthesia technician (AT). The multiple activities during the turnover process need to be

coordinated to establish an efficient workflow, which can be accomplished by providing education on standardized roles and responsibilities to the turnover team.

The specific aim of this project is to reduce the average TOT from the current baseline of 37 minutes to 30 minutes by November 2017, to improve efficiency, thereby increasing satisfaction from the patients and physicians, enhancing staff teamwork, and fostering cost-effectiveness for the microsystem (see Appendix B2).

### **Rationale**

Turnover time (TOT) is an efficiency indicator in the OR that requires attention for improvement as reflected by the increasing trend of TOT from 2015 to the second quarter of 2017. It is important to work on this process because of the need to improve satisfaction from the patients and physicians as well as to decrease costs by potentially eliminating the occurrence of on-call staff staying over their work shifts to finish delayed cases. The Consumer Assessment of Healthcare Providers and Systems (CAHPS) is a program funded and administered through the Agency for Healthcare Research and Quality (AHRQ) that develops patient surveys to assess patient experience and health care (Finkelman, 2016). The 2017 CAHPS overall rating of SRMH is 70% (Health Grades, 2017). Reduced TOT will decrease delays and wait times for patients and physicians, thus creating an opportunity to promote favorable experiences and outcomes which can positively influence the CAHPS rating. Reduced TOT equates to OR time efficiency, which translates to potential savings and financial gain. It also fulfills the goal to provide efficient and excellent service to patients and physicians by a team who takes pride in their work and who understands that while cost containment is important, patient safety and satisfaction is a priority. The Association of periOperative Registered Nurses (AORN)

recommended practice (RP) includes provision of a clean and safe environment for patients which requires a multidisciplinary team working together (Allen, 2014).

The stakeholders of this improvement project include the patients, physicians, staff (RN, ST, PCT, AT, EQ), CNL student, and leadership team of the OR director, managers, and educator. The patients and physicians are the customers in the OR, therefore meeting their needs revolve around providing excellent customer service. If not limited by insurance coverage, the patients and physicians have a choice where to schedule surgical procedures which makes them customers in the OR (Taylor, 2014). The staff who are the focus of the intervention need to be engaged with the process change. Their attitudes and participation greatly influence the success of the project. The leadership team provides financial, administrative, and managerial support that can impact the implementation of the project. The CNL student is the project owner who is responsible in planning, analyzing data, implementing, and sustaining the change.

The fishbone diagram shows what influences turnover time and provides a visual representation of the various opportunities to improve during the turnover process. The fishbone diagram is an important graphic tool used to identify and clarify the causes, and to guide a process improvement (Nelson, Batalden, & Godfrey, 2007). The categories of the fishbone diagram that influences TOT include people/staff, environment, materials, methods, and equipment/supplies (see Appendix C). Several factors that can alter TOT include the time required to (a) transfer care of previous patient; (b) clean equipment and surfaces in the OR; (c) remove all the instruments and equipment that will not be used for the next procedure; (d) gather the instruments and equipment needed for the next procedure; (e) open sterile supplies for the next procedure; and (f) get the next patient ready in the preoperative area, as identified by Burlingame (2014). Based on the views of staff members, inconsistency and lack of clear

expectations on roles and responsibilities during the turnover process is the primary issue making the turnover time longer, hence the education intervention was chosen to be implemented.

To identify the aspects that may affect this project negatively or positively, the need to accomplish an assessment of the strengths, weaknesses, opportunities and threats (SWOT) is vital for successful planning and implementation (King & Gerard, 2016). The strength of the improvement project includes the increased satisfaction from patients and physicians, improved efficiency, and the potential to decrease costs by avoiding schedule delays. Lack of participation from the staff, insufficient staffing, and multiple rooms needing simultaneous turnover can pose challenges, thus weakening the process change. The fire disaster on October 9, 2017 in Sonoma county caused three weeks of implementation delay resulting to limited time in standardizing and observing the sustainable outcome. The project can bring opportunities to establish a standard workflow, setting clear expectations, promoting teamwork and accountability, and offers the potential to reduce the occurrence of the staff staying over work shifts to finish cases running past the scheduled time. Threats to successful implementation can emerge from resistance to follow the improvement process, stress and pressure from the 30-minute TOT expectation, and the potential to compromise protocols of patient safety if tasks are performed in hurried manner to meet the target TOT (see Appendix D).

The direct cost of the project to reduce TOT is about \$2,672 which includes 1-hour training of staff, 2-hour meeting of stakeholders, and materials needed to track or collect data (see Appendix E). Based on clinical studies of US hospitals, the average cost per minute of operating room time was \$62 (Surgical Devices, 2016), therefore if the TOT is reduced by 7 minutes, it has the potential yearly savings of \$104,160 (see appendix F). If the average TOT benchmark is met with an 8.5 minutes TOT reduction, the potential yearly savings is \$126,480.

Moreover, reduced TOT will decrease delays correlating to less frequent occurrences of on-call staff staying over their work shifts to finish cases that have gone past the scheduled time. The savings on reduction of delay in the OR and overtime can be tracked as a productivity measure or dark green dollars. Light green dollars represent theoretical or potential savings while dark green dollars can be tracked in budgets, and other financial reports (Penner, 2017).

### **Methodology**

The focus of this project is to educate the staff members on roles and responsibilities during the turnover process. Having well-defined roles and responsibilities for the OR staff ensures that each member knows which steps they are accountable for (Norman & Bidanda, 2014). Creating a meaningful change requires leadership from the CNL student in implementation of the evidence-based intervention. The CNL student can help implement the change by recognizing, along with the staff, the need to reduce turnover time by showing current baseline data and comparing it with benchmark data available.

Havelock's theory of change will be used as a framework for the action plan. Using a change theory is necessary in quality improvement projects to provide the framework for implementing, managing, and evaluating the change (Mitchell, 2013). Havelock's theory of change comprises six simple steps (a) establishing a relationship with the members of team; (b) identifying the problem that needs change; (c) investigating, gathering information and researching literature; (d) choosing the interventions to create the planned change; (e) accepting and adapting the chosen intervention; and (f) sustaining the change and preventing relapse to old practice, as illustrated by Lane (1992). Teamwork needs to be developed to support each other's role and to foster process improvement and long-term success.

Following the framework of Havelock's theory of change, a positive relationship needs to be established by empowering and encouraging the staff to own the change through involvement and representation of every shift and role category. Engaging the team members can promote understanding of the initiative and garner support for the improvement process. The staff in the OR were randomly surveyed through informal discussions regarding their encountered challenges during turnover time. The theme that emerged from the informal survey was the lack of clear expectations for each member during the turnover process.

A turnover task force team was formed composed of the CNL student, business manager of the unit, 2 physicians, RN, ST, PCT, EQ, and AT. A scheduled one-hour meeting on October 2, 2017 was held to discuss the goals and plans of the project. One of the elements of quality improvement is team involvement inclusive of representatives that implement current work processes and those who will implement the workflow change (Harris et al, 2018). Due to the enormity of the work that needed to be accomplished and the detail oriented nature of the project, the task force team decided to have a follow-up meeting on October 9, 2017. It was planned to be a continuation of a deep dive process for in-depth brainstorming on the intervention (Finkelman, 2016). However, due to the circumstances of evacuation, loss, devastation, and uncertainty brought about the fire disaster, the second task force team meeting did not happen until November 13, 2017.

Prior to the educational intervention, a three-day observation and data collection on turnover time was done on twelve surgical procedures inclusive of five total joint cases during the third week of September (see Appendix G). The purpose for this data collection was to observe the current state of the turnover process, obtain baseline TOT data for total joint cases, and to identify the key elements causing delays through process mapping. Process mapping is a

method for creating a diagram that illustrates the steps and flow of the process (Nelson et al, 2007). The opportunities identified during the data collection that have impacted TOT are specifically illustrated on the process mapping (see Appendix H). These key elements causing the delays will be given emphasis during education on roles and responsibilities for each team member. There were variances noted when RNs check their next patients. Some RNs check the patient at the beginning of set-up phase (which is right after taking the previous patient to the patient anesthesia care unit-PACU) and some do it after the set-up phase. Based on the data collected, the RNs who check patients after the set-up phase take twice the time to bring the patient to the OR. Reasons for the delay are missing physician signature on the consent and/or site marking, lacking history and physical assessment update, and the patient needing to go to the bathroom, activities which could have been handled by the preoperative nurse had the missing components been identified by the OR nurse. Some STs leave the room without any relief staff coverage during the turnover process, making the turnover longer because the responsibilities are not done concurrently. Another finding from this TOT observation was the need of an assigned float person (RN or ST) to be available of help during the set-up phase in opening instrument trays and sterile supplies. The observation data further validates the outcome of the informal survey from the staff regarding the need to educate on and redefine roles and responsibilities during the turnover process. It also provided an opportunity to obtain the baseline data of the average TOT for total joint cases which can be used to compare with the pilot test data.

Using the plan, do, study, act (PDSA) cycle can lead to early, measured improvements and increased staff enthusiasm that will diminish anxiety and resistance to change (Nelson et al, 2007). The plan is to do a pilot test for a week in total joint rooms to evaluate the effect of the standardized turnover process and to identify needs for modification before implementing the

change (see Appendix I). Again, due to time constraints and project implementation delay, the plan to do a pilot test for a week in total joint cases was reduced to one and a half days with five observed turnover processes. The education on roles and responsibilities for a standard workflow was only limited to the team assigned to do the total joint cases during the pilot test. Each member of the team assigned in the pilot test was given a list of expectations with coordinated responsibilities based on their role for the turnover process. Total joint rooms were chosen for testing because the turnover times in 2014 had a consistent average of 22-25 minutes. The CNL student supervised the pilot test, collected, and analyzed data using the TOT data collection form. The pilot test helped determine if an educational intervention is effective in influencing the key elements that impact delays during the turnover process. In addition, a post-intervention survey from the pilot test team was completed on November 17, 2017 to measure staff satisfaction (Appendix J for survey questions; Appendix K for survey results).

A run chart, graphical data to show the average TOT trend, will be displayed on the operating room daily pursuit of clinical excellence board (DPCE) to reflect the daily average of turnover times in minutes starting from the third week of November. The microsystem's average TOT data from 2014-2017, and the national benchmark average TOT will also be displayed for comparison. The previous day turnover average time will be announced daily by the lead nurse during morning shift huddle to keep the staff informed on the TOT progress. Problems and barriers will be discussed during monthly staff meetings, and changes or adjustments will be made based on assessments and feedback presented. Any improvements necessary will be included during the monthly staff in-service as well as communicated through staff email to facilitate an across the board involvement.

The education for OR staff on standard workflow will be provided by the CNL student on December 4, 2017 during the monthly staff meeting. Implementing the change and integrating the turnover process into the daily workflow will impact and sustain the results of the reduced TOT shown during the pilot testing. According to Nelson et al. (2007), standardize-do-study-act (SDSA) cycle is an approach to hold the gains that were made and to standardize the process in daily work. Teamwork needs to be developed to support the process improvement and to foster long-term success. If positive outcomes are achieved, celebrate the team success, if not, examine the data and identify opportunities for improvement (Vassell, 2016). Based on Havelock's theory of change, Lane (1992) recommends continued recognition of the members' contributions to promote ongoing cooperation and engagement.

#### **Data Source/Literature Review**

The population, intervention, comparison, and outcome (PICO) statement utilized to help search for literatures needed to support the project includes:

- P- Operating room staff
- I- Education on Roles and Responsibilities for a Standard Workflow during Turnover Process
- C- Prior Turnover Time (2014, 2015)
- O- Reduced Turnover Time

The search strategy included in the literature during 2012-2017 are from CINAHL database with research articles from AORN Journal, Journal of Nursing Management, Journal of Clinical Outcomes Management, International Journal of Health Care Quality and Assurance, Hospital Topics, Canadian Journal of Surgery, International Journal of Collaborative Enterprise, and British Journal of Health Management. Relevant articles on reducing turnover time in

surgical settings were peer reviewed and published in English using the key words: Improve efficiency, turnover time, operating room, teamwork, workflow and clinical nurse leader. To focus on the roles of the operating room staff during TOT and be able to compare the benchmark average of TOT to the outcome of the project, additional search was done on Google Scholar using the combination of words such as operating room staff, role, turnover time and turnover time benchmark.

The CNL has the skill to critically appraise literature and to gather sources for evidence-based projects to determine their strengths, limitations, and significance to reducing turnover time (King & Gerard, 2016). Nine studies will be reviewed to determine the relevance of reducing TOT in improving efficiency in the operating room.

Beaule, Frombach, & Ryu (2015) performed a cohort retrospective study which established the benchmark times for successful completion of four joint replacement surgeries within an 8-hour shift by maximizing operating room efficiency with a turnover time of 15 minutes. This initiative was instituted to minimize wait times for joint replacements by improving throughputs while also minimizing the need to increase the number of OR days due to the increasing demand of joint replacement surgeries. This study provides a guide to efficient utilization of resources within a standard 8-hour shift without increasing the budgetary demands of overtime, extra personnel, or extra rooms for spinal or block anesthetic. Four successful benchmarks on joint replacement surgeries were established on anesthesia prep time, surgical prep time, anesthesia finishing time, and turnaround time, which can be replicated to other surgical specialties. This proves that reducing TOT can improve efficiency in the OR.

Burlingame (2014) defines turnover time and identifies the team involved and the several factors that alter TOT. The article briefly discussed common areas of concern affecting TOT

that can determine steps to alter without compromising patient safety. This article supports the contributing factors illustrated on the fishbone diagram that resulted from the microsystem assessment on aspects affecting turnover time.

Fixler & Wright (2013) identified the important performance and efficiency indicators as follows: Average turnover time, excess staffing cost, off-hours surgery, same day cancellation, first-case start accuracy, case duration accuracy, and percentage of OR use/unplanned closures. The authors concluded that developing a scorecard or dashboard tracking of core performance indicators is essential in measuring, monitoring, and benchmarking OR performance and efficiency. This article supports the need to visually display a run chart in the operating room to show the daily average of turnover times in minutes and to reflect the progress of the improvement project.

Norman & Bidanda (2014) performed a case study on OR turnaround analysis that focused on identifying areas of improvement to reduce turnaround time from 45-55 minutes to 30 minutes. The recommended guidelines to address the identified problems affecting turnaround time include standardization of responsibilities to ensure accountability, effective synchronization and sequencing of activities, teamwork efficiency, accurate surgical length estimation, and improved communication. A six-step process was initiated to (a) establish project goals, objectives and performance metrics; (b) process observation and documentation; (c) data collection; (d) data analysis to identify barriers, constraints, and challenges; (e) recommendations and guidelines to reduce OR TOT; and (f) implement the change, as illustrated by the authors. This study supports and validates the need to establish standardized roles and responsibilities of team members involved in the turnover process as well as the recommended methodology of change implementation.

O'Rourke-Suchoff et al., (2016) used quality improvement methods such as assessment, process mapping, fishbone diagram, and PDSA cycles to address management problems. Application of these tools provides an insight about OR efficiency and potential improvements, as well as a visual expression on how small issues can impact the overall OR system. This article endorses the use of quality tools that will be used for the project as a framework for improving OR efficiency.

Reiter et al., (2016) assert that quality care requires efficiency, safety, and teamwork. Based on this study, the leadership team identified OR TOT as a potential area of improvement in a trauma center in northeastern US. They used quality improvement tools such as Lean Six Sigma, Define Measure Analyze Improve and Control (DMAIC) to standardize and sustain the turnover process as well as to improve efficiency and safety in the OR. The trauma center sustained an average TOT of 25 minutes or less in 29 months with a saving potential per month of \$19,000 or \$228,000/year. The desired outcomes were increased awareness, safety, financial savings, and clear role expectations which clearly supports the aim and planned intervention of the project.

Scagliarini et al., (2016) in a retrospective analysis, monitored OR turnaround time of five ORs from January 2013-February 2014 with an average TOT of 56.55 minutes, to increase understanding by assessing process behavior and identifying changes that indicate either improvement or deterioration in quality. The results show that control charts can detect improvement and deterioration processes. Analysis supports the need to evaluate and monitor efficiency indicators and the need to establish benchmarks to reduce costs and increase efficiency. It asserts that OR wasted time through turnaround time can be expensive, thus makes it a good measure for efficiency supporting the improvement project.

Sohrakoff et al., (2014) launched an initiative at University of California, Davis in 2010 to increase OR capacity and bolster patient and staff satisfaction by identifying key opportunities for improvement. Efficiency freed up roughly 5,500 annual hours for three years translating to how many million dollars in additional revenue, and improved patient and staff satisfaction as the microsystem ran more smoothly, with less waiting and delay, and stronger teamwork and coordination. This corroborates that efficiency in the OR has important implications on reducing cost of delays and patient satisfaction which align with the goals of the project.

Vassell (2016) stated that inefficiency in the OR can increase cost and lead to dissatisfied patients, physicians, and staff members. Metrics for evaluating efficiency include on-time starts, turnover time, procedure cancellation, and delay. The author also pointed out to consider the regulations for improving efficiency and to recognize standard processes of a working environment such as communication, collaboration, effective decision-making, appropriate staffing, meaningful recognition, and authentic leadership. This article reinforces that efficiency in the OR requires staff member engagement in achieving desired outcomes.

### **Timeline**

The Gantt chart is used to illustrate the timeline created and to keep the project on track as it trends over time to achieve the goal to improve efficiency by reducing TOT (see appendix L). The action plan for tracking is based on the framework of Havelock's model for change and use of PDSA cycles.

The microsystem assessment was conducted from March to April 2017. Based on microsystem assessment and upward trending of TOT, the need to improve efficiency by reducing turnover time was identified. Staff were randomly surveyed through informal discussions regarding their encountered challenges during turnover time. The theme that has

emerged from the informal survey was the lack of clear expectations on the roles and responsibilities of the team members during the turnover process. Literature search and relevant articles on improving efficiency and TOT in the operating room were reviewed from April until September. Microsystem observation and data collection on TOT was carried out through September, enabling the creation of fishbone diagram, process mapping, and SWOT analysis.

Meeting with TOT task force team was conducted on October 2, 2017. PowerPoint slides focused on the past and current trends of TOT, factors affecting TOT, and the planned intervention were presented. Open discussion and brainstorming was initiated after the presentation to engage participation of the team. A second task force team meeting with the unit director and manager present, was held on November 13, 2017. The follow-up meeting was dedicated to an in-depth brainstorming towards the intervention implementation. The education on roles and responsibilities for a standard workflow was limited to the team assigned to do total the joint cases during the pilot test. PDSA cycle was initiated and pilot testing was conducted on November 16-17, 2017, followed by analysis of the data results. A post-intervention survey was completed after the pilot test to appraise the staff perception and experience (Appendix K). Education on roles and responsibilities to establish a standardized workflow for all the staff will be done on December 4, 2017 prior to project implementation and standardization.

### **Expected Results**

After implementation of the intervention to educate the OR staff on their roles and responsibilities during the turnover process and to establish an efficient workflow, it is anticipated to improve efficiency by reducing TOT. The reduced TOT will decrease delay and wait times which is expected to increase patient and physician satisfaction. The reduced TOT will also incur potential savings from eliminating the waste of time and resources in the

operating room. Another expectation is enhanced teamwork, cooperation, and engagement of the staff towards achieving the goals of this project. After successful adoption of the standardized workflow, this improvement project can segue to improving case carts and preference cards accuracy to complement the established workflow and to gain more traction in reducing turnover time.

### **Nursing Relevance**

Nurses play a role in ensuring that quality care is provided in addition to being responsible to participating in continuous quality improvement within the organization (Finkelman, 2016). The nursing role therefore, is pivotal in achieving the goal to reduce turnover time while providing patient care that is efficient, safe, and cost-effective. The CNL in the microsystem facilitates change and ultimately, is part of the team that achieves good outcomes for the microsystem. The CNL equipped with the skill set to utilize quality improvement tools can streamline activities to promote a smooth workflow. Establishing an efficient workflow on turnover process benefits performance and outcomes of care. Perioperative nurses work with a team of professionals, unlicensed assistive personnel, and ancillary staff to provide patient care. The CNL as the team manager can greatly influence the success of this project by providing the support and leadership needed in engaging, promoting and sustaining change among peers.

### **Summary**

The purpose of this project is to improve efficiency by reducing turnover time in the OR that can consequently enhance patients' and physicians' satisfaction, promote teamwork, and decrease cost of delays in the operating room. TOT is an efficiency indicator that requires attention for microsystem improvement in the OR of a regional hospital in northern California.

The increasing trend of TOT became evident in 2015-2017 with an average TOT of 30-37 minutes as compared to the average TOT of 29 minutes in 2014. The intervention to improve efficiency is to educate the OR team members on roles and responsibilities to establish a standard workflow that can promote accountability and teamwork during the turnover process. Havelock's theory of change is used as a framework for the action plan to cultivate synergy and team engagement. Fishbone diagram, process mapping, and strength, weakness, opportunities, and threats (SWOT) analysis were used as quality improvement tools to identify causes of delay and to guide the improvement process.

Due to time constraints and project implementation delays caused by the fire disaster that happened on October 9, 2017 in Sonoma county, the plan to do a pilot test for a week in total joint cases was reduced to one and a half days with five observed turnover processes (see Addendum). The education on roles and responsibilities for a standard workflow was only limited to the team assigned to do total joint cases during the pilot test. Despite these limitations, meaningful data were collected and analyzed. The average TOT during the pilot test was significantly reduced to 29 minutes on the first day and 32 minutes on the second half day of observation. Moreover, during the pre-intervention data collection in September, the observed average TOT of five total joint surgeries with the two surgeons were 39.5 minutes and 37 minutes respectively. During the pilot test, the average TOT of five similar surgeries with the same surgeons were 32 minutes and 23.66 minutes, which consequently reduced the microsystem's overall average TOT of the pilot test days. The pilot test result of 29 minutes as the average TOT clearly supports the expectation to reduce the TOT from 37 minutes to 30 minutes as an achievable and realistic project objective.

The debriefing done with the pilot test team revealed significant information that can help improve and sustain the gains of the standard workflow. Along with the need to establish standard roles and responsibilities for a better workflow during the turnover process, the other factors that can exert an influence in improving efficiency include:

- assign a float person (RN or ST) to help open instrument trays and sterile supplies during the set-up phase
- team coordination during the cleaning phase
- pick and sort out suture supplies on the case cart by the PCT
- sort out implant instrument trays as open or hold and labelled accordingly by the company representative
- open sterile supplies in a designated space on the sterile table to provide the scrub person enough working space to organize the trays and instruments
- take out empty trays and cart out of the room by PCT or float person
- include the standard workflow as part of the unit orientation for new staff.

The post-intervention survey was done to measure staff satisfaction which showed a positive result. Based on the survey, the six staff members involved in the pilot test all strongly agree that the intervention established what is expected of them and that decreasing turnover time is of value, therefore will support its implementation (see Appendix K).

The two surgeons with total joint cases during the pilot test expressed great satisfaction both verbally and through e-mail correspondence to the leadership team. The OR team involved showed cooperation and engagement in the initiative to improve the workflow of the turnover process. Upon implementation, the average TOT of the previous day will be announced daily by the lead nurse during huddle to keep the OR staff informed. Keeping the OR team involved and

updated with the TOT outcome and progress will encourage interest and motivation. Sustainable results can be celebrated with a monthly pizza party as suggested during the stakeholders' meeting which will be presented for final group approval at the staff meeting in December.

To take advantage of the momentum and successful result of the pilot test, the education on the standard workflow for the OR staff during the turnover process will be provided by the CNL student on December 4, 2017 during the monthly staff meeting. Integrating the standardized turnover process into the daily workflow will impact and hold the gains of the reduced TOT. To complement, gain traction, and sustain the reduced turnover time and improved efficiency over time, it is suggested to segue the improvement project into checking the surgeons' preference cards and case cart lists for updates and accuracy. This transition project will address the delay factors identified on the fishbone diagram under materials category and will require the participation of all team members. Following Havelock's theory of change, empowering and encouraging the staff to own the change through involvement and continued recognition will promote teamwork that can foster process improvement and long-term success.

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Appendix A

**Roles and Responsibilities for a Standard Workflow**

Table A1

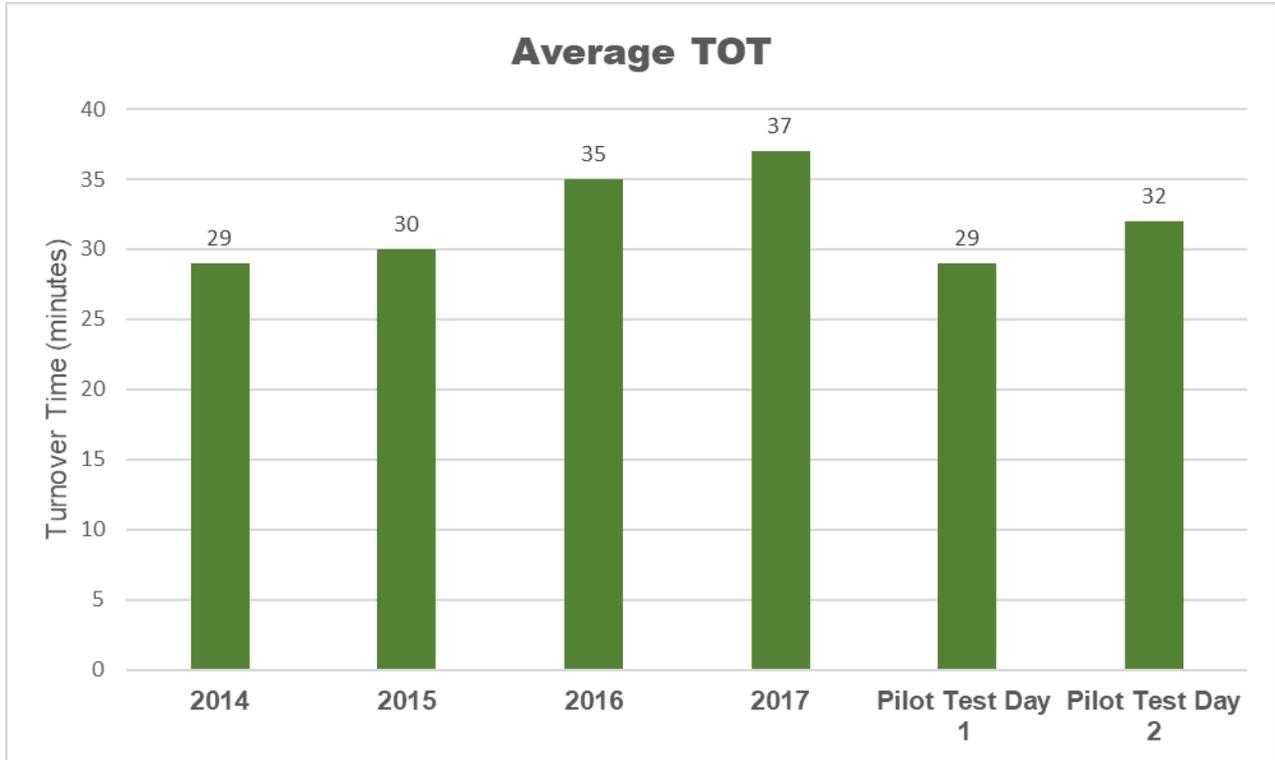
<b>Important steps</b>	<b>RN circulator</b>	<b>Scrub Tech</b>	<b>PCT/AT/ET</b>	<b>Reason</b>
Prepare room for closure	Disconnect bovie cords, suction tubings, position garbage at foot of bed.  Apply tape for dressings per surgeon's preference	Prepare supplies needed for dressing. Clean operative site and apply dressing.  Remove drapes and clean patient		Infection control
Page PCT	Page PCT and call PACU		Bring gurney or bed in the room	Standard workflow
Assist anesthesiologist during extubation	Stay at head of the bed			Patient safety
Assist with transfer of patient to gurney or bed	Assist anesthesiologist in removing monitor cables	Assist with transfer of patient	Assist with transfer of patient	Patient safety Reduce staff injury
<b>Start of turnover process (5 min)</b>				
<b>Cleaning Phase</b>				
Transfer patient to PACU or ICU	Go with anesthesiologist to PACU/ICU for handoff report	Prepare used case/instrument cart to leave the room	Remove linens from the OR table	Proper care of instruments Infection control





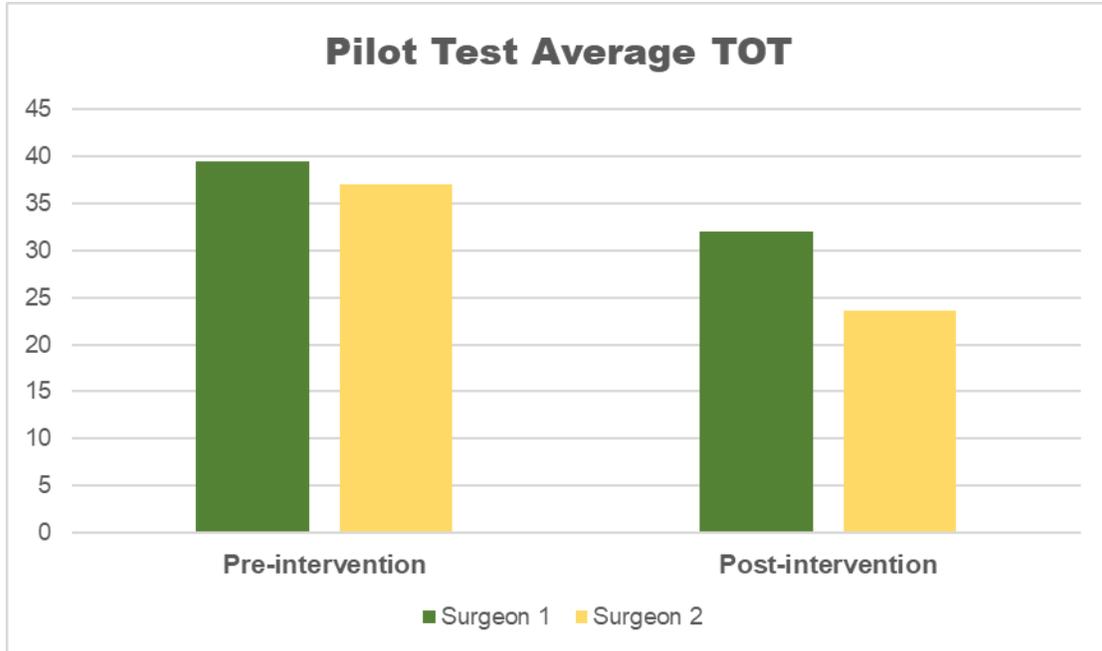
Appendix B1

**Average Turnover Time**

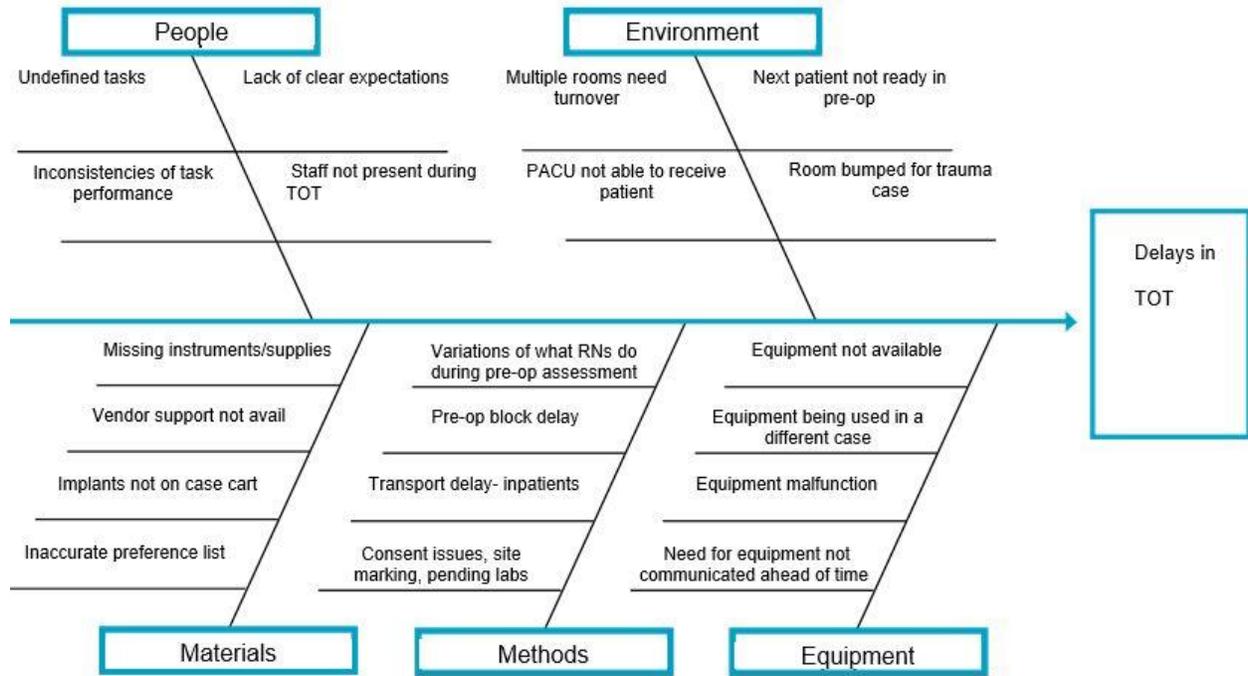


Appendix B2

**Pilot Test Average Turnover Time on Total Joint Cases**



Appendix C  
TOT Fishbone Diagram



Appendix D

**Turnover Time SWOT Analysis**

<p style="text-align: center;"><b>Strengths</b></p> <ul style="list-style-type: none"> <li>• Buy in from management and physicians</li> <li>• Improved efficiency</li> <li>• Cost-savings</li> </ul>	<p style="text-align: center;"><b>Weaknesses</b></p> <ul style="list-style-type: none"> <li>• Lack of staff participation and engagement</li> <li>• Insufficient staffing (Float, PCT)</li> <li>• Multiple rooms needing turnover</li> <li>• Limited time to implement</li> </ul>
<p style="text-align: center;"><b>Opportunities</b></p> <ul style="list-style-type: none"> <li>• Standardize turnover process/workflow</li> <li>• Establish clear expectations</li> <li>• Ensure accountability</li> <li>• Enhance teamwork</li> <li>• Potential to reduce overtime use to finish delayed cases</li> </ul>	<p style="text-align: center;"><b>Threats</b></p> <ul style="list-style-type: none"> <li>• Resistance to follow the improvement process of change</li> <li>• Potential for stress and pressure to the staff in achieving the goal of 30-minute TOT</li> <li>• Potential to perform tasks in a hurried manner compromising protocols of patient safety</li> <li>• Fire disaster (October 9, 2017) in Santa Rosa delayed project implementation</li> </ul>

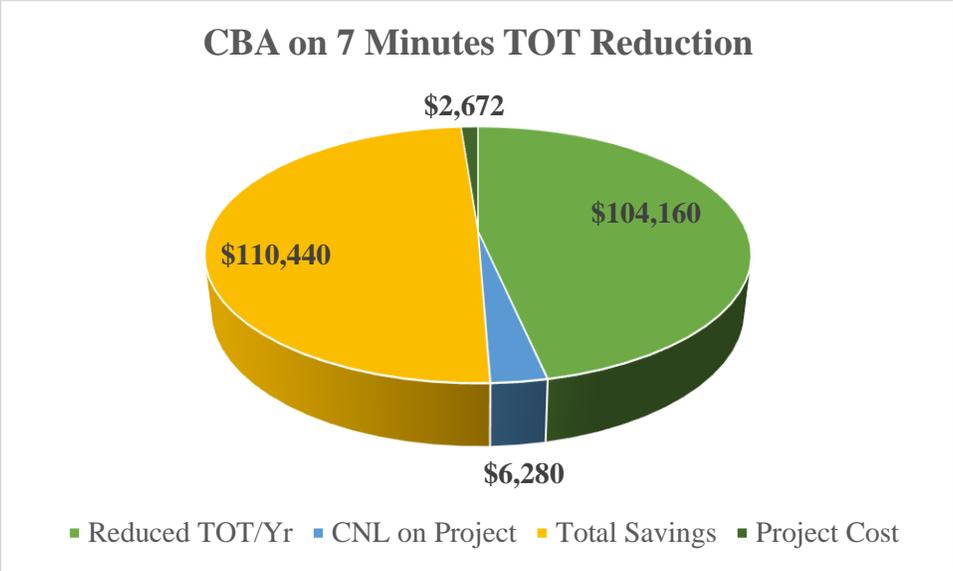
Appendix E

**CBA Analysis**

<b>Items</b>	<b>Avg. Hourly Salary</b>	<b>1-Hr Training</b>	<b>2-Hr Meeting</b>
RN x 24	\$60	\$1,440	RN x 2 \$240
ST x 15	\$32	\$480	ST x 1 \$ 64
PCT x 6	\$21	\$126	PCT x 1 \$42
AT x 1	\$35	\$35	AT x 1 \$70
EQ x 1	\$30	\$30	EQ x 1 \$60
<b>Total</b>		<b>\$2,111</b>	<b>Total \$ 476</b>
<b>CNL student</b>	\$78.50	80 hours	<b>Total \$ 6,280</b>
<b>Materials</b>		<b>Reduced TOT</b>	<b>OR time/min</b>
Stop Watch x 5	\$50	7 min	\$ 62
Clip Board x 5	\$35	8.5 min	\$ 62
<b>Total</b>	<b>\$85</b>		
<b>Savings on TOT</b>	7min/62/min	8.5 min/62/min	
Weekly	\$2,170	\$2,635	
Monthly	\$8,680	\$10,540	
Yearly	\$104,160	\$126,480	
<b>Saving Items</b>			
Reduced TOT/Year	\$104,160	\$126,480	
CNL on Project	\$6,280	\$6,280	
<b>Total</b>	<b>\$110,440</b>	<b>\$132,760</b>	
<b>Expenses</b>			
Training/Meetings	\$2,587		
Materials	\$85		
<b>Total</b>	<b>\$2,672</b>		
Project Savings	<b>\$110,440</b>	<b>\$132,760</b>	
Project Cost	\$2,672	\$2,672	
<b>Total Savings</b>	<b>\$107,768</b>	<b>\$130,088</b>	

Appendix F

Cost Benefit Analysis



Appendix G

**TURNOVER DATA COLLECTION SHEET**

**Date:**

**Room:**

<b>Procedure</b>	<b>Surgeon</b>	<b>Out Time</b>	<b>Clean Time (minutes)</b>	<b>Set up Time (minutes)</b>	<b>RN/ Pt Back to room (minutes)</b>	<b>Next Procedure</b>	<b>Time in room</b>

**TOT:** \_\_\_\_\_

**Did RN check patient after PACU report: Y/N**

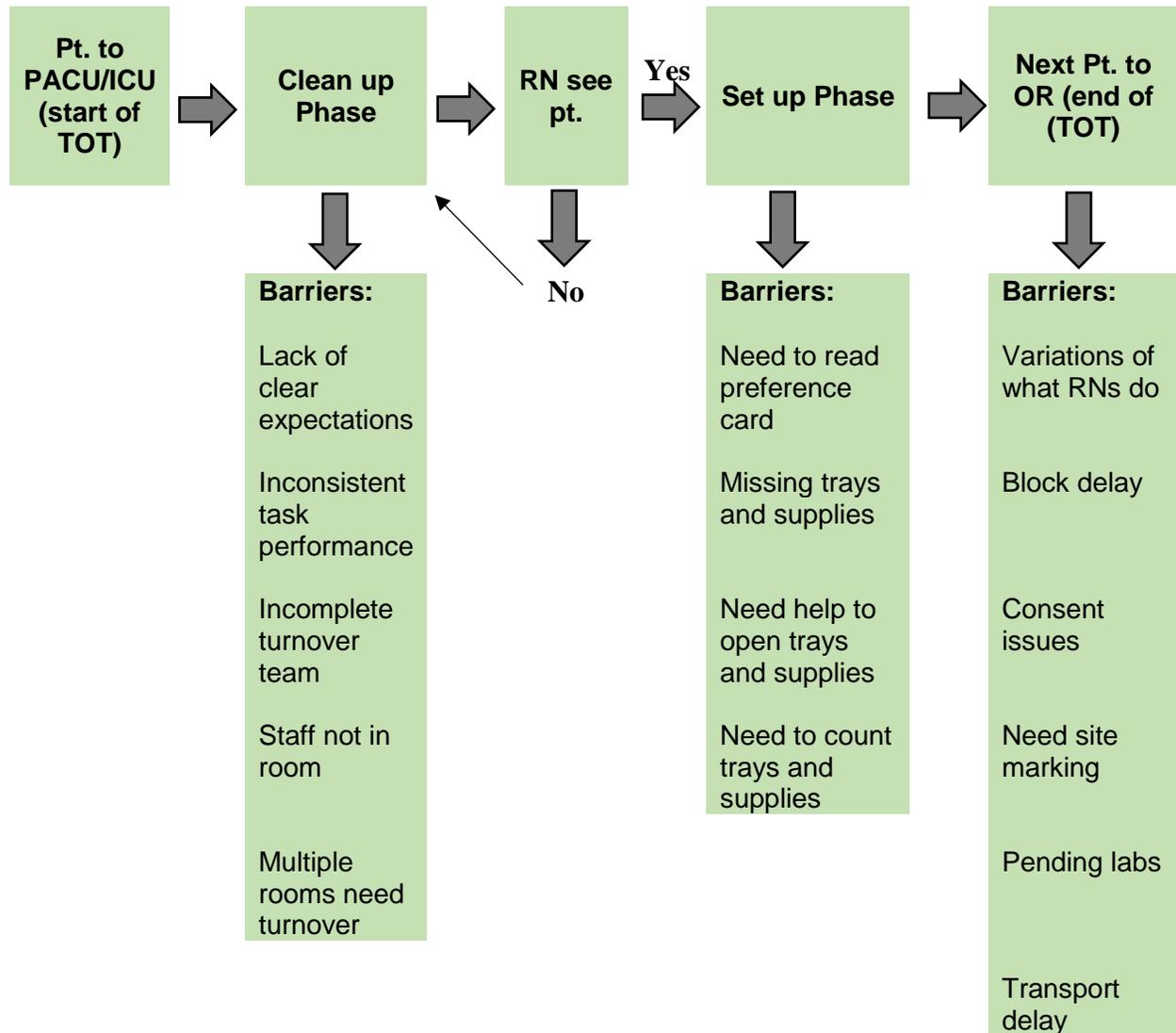
**Delay Reasons:**

- 1.
- 2.
- 3.
- 4.

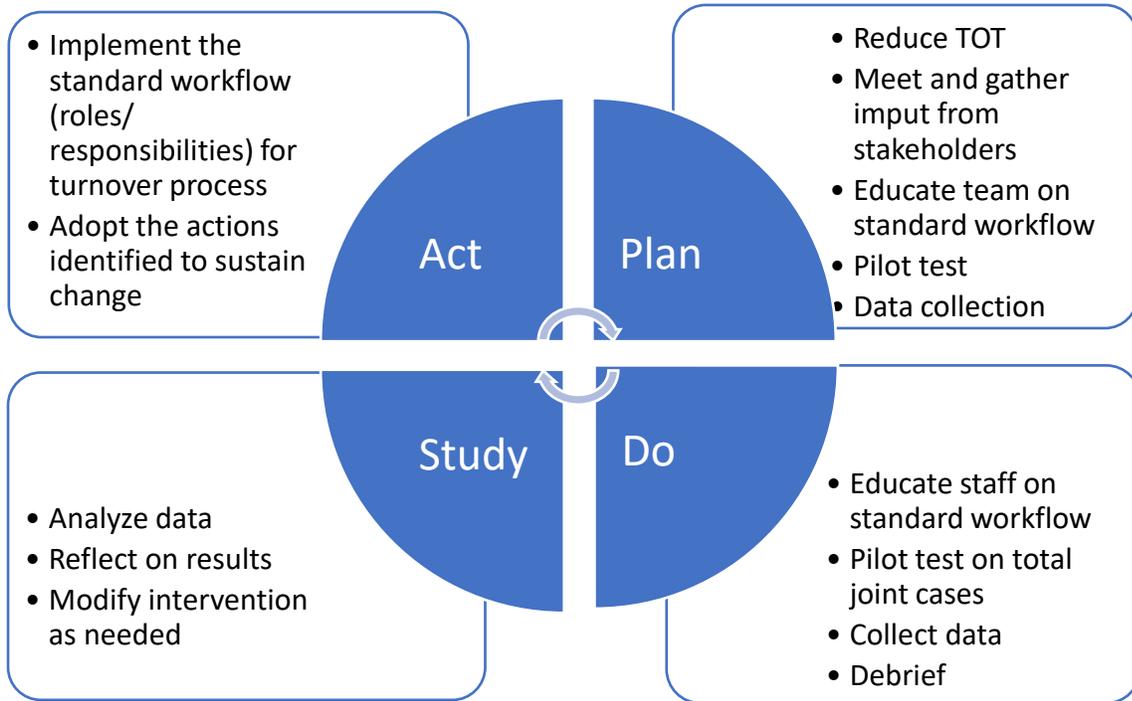
**Present for Turnover: RN / ST / PCT /AT / EQ / Lead Nurse / Extra staff (Float)**

Legends: RN, registered nurse/ ST, scrub technician/ PCT, patient care technician/ AT, anesthesia technician/ EQ, equipment technician

Appendix H  
TOT Process Map



Appendix I  
**PDSA Pilot Test**



Appendix J

**Satisfaction Survey on the Standardized Turnover Process**

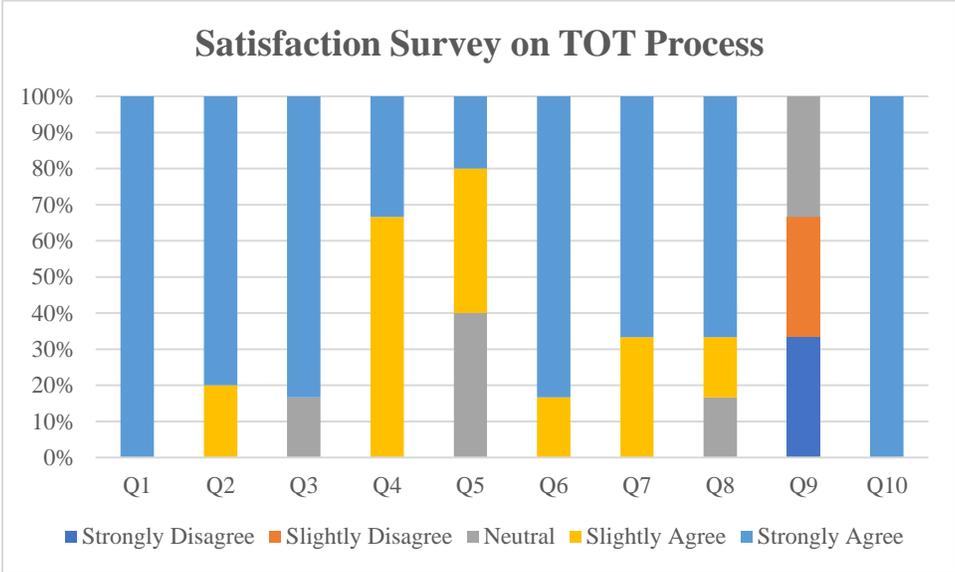
Please circle your answer based on your perception or experience:

Perception/Experience	Strongly Disagree	Slightly Disagree	Neutral	Slightly Agree	Strongly Agree
1. I am clear on what is expected of me.	1	2	3	4	5
2. My role is clearly identified within the standard workflow.	1	2	3	4	5
3. Different ways in performing tasks can affect turnover time.	1	2	3	4	5
4. There is a standard workflow based on established roles and responsibilities.	1	2	3	4	5
5. There is coordination among tasks to be performed.	1	2	3	4	5
6. The work for which I am responsible is clearly identified within the standard workflow.	1	2	3	4	5
7. Identifying roles and responsibilities is of value.	1	2	3	4	5
8. Improving the turnover time will enhance teamwork.	1	2	3	4	5
9. I feel stressed and pressured by the initiative to reduce turnover time.	1	2	3	4	5
10. Decreasing turnover time is of value and I will support its implementation.	1	2	3	4	5

Comments: \_\_\_\_\_

Appendix K

Satisfaction Survey Result



Appendix L

**Gantt Chart**

Timeline to Reduce Turnover Time

Activities (2017)	March	April	May	June	July	August	Sept	Oct	Nov
Microsystem assessment	■	■							
Establish relationship (ask for input)		■							
Identify need (Reduce TOT)		■							
Research literature		■	■	■	■	■	■		
Choose intervention		■							
TOT Observation							■		
Fishbone diagram Process mapping SWOT Analysis							■		
Task Force Team Meetings								■	■
Education/Training									■
PDSA cycle (Pilot test)									■
Collect data									■
Analyze data									■
Implement TOT workflow									■
Survey									■

Legend: blue square is completed task

### **Addendum**

While the improvement project is about to be implemented, the most destructive fire in California's history wrought devastation on Santa Rosa as the wee hours of morning approached on October 9, 2017 (Callahan & Warren, 2017). The fires devastated Coffey Park, Fountain Grove, Larkfield-Wikiup, and various parts of Sonoma county. Many lives were lost, thousands of homes destroyed, and half of the city residents, including my husband and I, were displaced from home for a week due to mandatory evacuations. In the aftermath of the fire, residents experienced shock, loss, and hardship. It will take years for Santa Rosa to recover from this tragedy; however, the community rallied together, coming out stronger than ever. The quote posted around the city, "The love in the air is thicker than the smoke" resonates within the hearts of all the residents of Santa Rosa (CNN, 2017).

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