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13. ABSTRACT (Maximum 200 words) The author conducted an exploratory case study on the operating room (OR) at Silas B. Hays Army Community Hospital (SBHACH) to provide more objective data to the hospital executive staff and to aid them in making decisions regarding the OR. The author collected data using three methods: surveying OR staff, observing activities in the OR and attending the OR Quality Improvement Process Action Team (QI PAT) meetings. The OR QI PAT was an interdisciplinary team which met to identify and solve problems in the OR. The study highlighted the major problems in the OR: OR surgical scheduling, equipment maintenance and repair, adequate staffing and surgical delays. The study supported use of interdisciplinary QI PATs for information gathering and problem solving, but pointed to a limitation of the QI PAT, namely the reluctance of personnel to speak openly about some of the problems because of the lack of anonymity. The survey provided anonymity to the respondents who commented more openly on the issues. The study emphasized the value of automation to some of the processes in the OR.					
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Exploratory Case Study
of the Operating Room
Silas Beach Hays Army Community Hospital
Fort Ord, California

A Graduate Management Project
Submitted to the Faculty of
Baylor University
In Partial Fulfillment of the
Requirements for the Degree
of
Master of Health Administration
by

Captain Margaret S. Tosi, SP

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The author conducted an exploratory case study on the operating room (OR) at Silas B. Hays Army Community Hospital (SBHACH) to provide more objective data to the hospital executive staff and to aid them in making decisions regarding the OR.

The author collected data using three methods: surveying OR staff, observing activities in the OR, and attending the OR Quality Improvement Process Action Team (QI PAT) meetings. The OR QI PAT was an interdisciplinary team which met to identify and solve problems in the OR.

The study highlighted the major problems in the OR: OR surgical scheduling, equipment maintenance and repair, adequate staffing and surgical delays. The study supported use of interdisciplinary QI PATs for information gathering and problem solving, but pointed to a limitation of the QI PAT, namely the reluctance of personnel to speak openly about some of the problems because of the lack of anonymity. The survey provided anonymity to the respondents who commented more openly on the issues. The study emphasized the value of automating some of the processes in the OR.

I. Introduction

A. Conditions Prompting This Study

The command at Silas B. Hays Army Community Hospital (SBHACH) felt that problems existed in the operating room (OR). Department of Surgery and OR personnel alike had voiced various complaints to the executive staff. OR personnel felt strained attempting to support the workload. They were concerned that in the frenzy to support the workload with their staffing, they were somehow compromising quality of care. The impending closure of SBHACH and reduction in staff exacerbated the staff's concern regarding this issue. Staff understood the importance of minimizing any negative impact to beneficiaries and staff alike as closure changes and reduction of staff occurred.

In order to get a comprehensive representation of the situation, the executive staff tasked a Quality Improvement Process Action Team (QI PAT) consisting of an anesthetist, OR nurses (RNs), surgeons, supply personnel, OR technicians (techs) and same day surgery personnel to identify the factors hindering efficient OR utilization.

The intent and purpose of a QI PAT is not only to empower staff by including them in decision making and problem solving, but to identify problem areas with objective data. Once the problems have been identified objectively, the QI PAT makes recommendations to the executive committee. Quality Improvement or Total Quality Management focuses on fixing systems so that the same problem does not reoccur.

The PAT team identified operating room staffing, decentralized scheduling, and supply as some of the areas that they believe were causing problems. The team offered their experiences and professional opinions but no objective data.

The focus of this study was to gather objective data on the activities in the OR. The data identified areas that management should address and substantiated some of the PAT's findings.

B. Statement of the Management Problem

The QI PAT at SBHACH identified problem areas in the OR but did not provide objective data to support them. An objective study of the activities of the OR and perceptions of the OR, surgical, anesthesia and Central Material Supply (CMS) staff will help to support the QI PAT's findings, identify areas they may have overlooked, and/or identify areas where staff should concentrate their efforts.

C. Literature Review

References on ORs seemed to have one of three purposes: to identify what has happened or is actually happening in an OR through retrospective and concurrent studies, to discuss advantages/disadvantages of various organizational and management principles or to evaluate the implementation of operational or management systems. In addition to the three purposes references fell under, references consistently fell under two general headings, scheduling and computerization and OR utilization and efficiency.

Evaluations of ORs

A relatively small amount of the literature actually included formal evaluation of operational or management systems once they have been implemented in the OR. Lowery and Przasnyski in their literature reviews discussed the dearth of research that evaluates new scheduling methods. Lowery and Martin (1989) set out not only to evaluate a system but to demonstrate the importance of rigorous evaluation methods. Their study, however, did not cite a confidence or alpha level. Przasnyski (1986) suggests that perhaps the lack of successful implementation of scheduling systems is a result of the complex behavioral and political factors of the hospital environment. Magerlein and Martin (1978) suggest that many systems are not implemented because the proposed systems failed to satisfy the medical staff, failed to comprehensively consider the unique aspects of the hospital and/or failed to estimate associated implementation costs.

Organizational and Management Principles

Articles on application of management and organizational principles are nontechnical in nature. They recommend practices and describe situations in the OR. Many of these articles support a participatory type of management in the OR (V. Maras, 1992; M. E. Pitzer, 1987). Authors focus attention on the unusual environment of the OR. Johnson-Van Epps (1987) discusses the characteristics unique to the OR and how they pose a special challenge to OR administrators and managers. Physical separation of the department by floors, sanitation barriers, and special dress isolates the staff from other hospital staff. Another characteristic that tends to isolate the OR staff is the highly technical and idiosyncratic nature of the communication that experienced OR personnel use with each other. Very few outsiders of the OR can understand this technical jargon.

Retrospective and Concurrent Studies

Considering the focus of this research, literature regarding retrospective and concurrent studies of the activities of the OR primarily apply. Pirnke (1989),

Grudich (1991) and Dilinski (1991) performed concurrent studies on OR use. They recommended that ORs keep a database of their surgical records in order to provide a regular supply of information on OR activities to aid in making scheduling and staffing decisions. OR personnel at SBHACH complete a DA Form 4107, Operation Request and Worksheet on every surgical case. This form identifies the surgeon, OR techs, anesthesiologist or anesthetist, the type of surgery, starting and ending times, etc. Unfortunately, this form is not automated so the information it contains could not be easily abstracted and analyzed. Neither does this form, by itself, give adequate insight into the various causes of inefficiency in the OR.

Much of the literature identified data items to collect. Dilinski (1991) collected data on case times, cancellations, delays, surgeons' names, the number of OR personnel used per case, etc.. Lowery and Martin (1989) collected data on factors such as the average case duration, surgery bed occupancy rate or demand for surgery, the number of overtime cases (cases that start before their scheduled time and end at their scheduled

time), the number of canceled cases, and the number of add-on cases (cases added on after the final schedule for that day has been prepared).

Scheduling and Computerization

Pirnke (1989), Voss (1986), Hancock, Walter, More, and Glick (1988) and Gordon et al. (1988) maintain that efficient and effective OR scheduling is essential to proper OR time management. Pirnke (1989) suggests that inaccurate surgical scheduling caused increased idle and over time, surgical delays, unplanned staffing expenses and nurse dissatisfaction. Pirnke (1989), Magerlein and Martin (1978), and Gordon, et al. (1988) emphasize that accurate time estimates are the key component of an efficient and effective OR surgical scheduling system.

Kelley, Eastham, and Bowling (1985) conducted a study to assess the high cancellation rate of operative procedures and the reasons for cancellations of surgery. The authors used three months of previous records to calculate time estimates for each type of surgery performed. They further classified time estimates by physicians. Identical to the revised

scheduling procedure at SBHACH, in this study, the control of scheduling was placed with the OR nurse supervisor. The nurse used the time estimates to schedule surgeries. Cancellation rates decreased 16% and the total number of cases performed increased slightly. Gordon, Lyles, and Fountain (1988) had similar improvements in OR utilization after automating the scheduling process. The authors planned to automate the data collection process so that accurate time estimates would be readily available in the future. They deemed accurate time estimates as vital to an efficient OR scheduling system.

Magerlein and Martin (1978) discussed the advantages and disadvantages of unblocked versus blocked scheduling systems. Unblocked scheduling is scheduling on a first-come-first-serve basis. A majority of hospitals use this system (Magerlein and Martin, 1978). Its advantages are flexibility and the potentially high OR utilization rates it can produce. Its disadvantages are high cancellation rates due to

overbooking, disparity among OR utilization rates and competition between surgeons for OR time (Magerlein and Martin, 1978).

The advantages of a blocked system, the type implemented at SBHACH, are high OR utilization rates and reduced competition between physicians for OR time. Disadvantages include the potential for unfilled blocks of time to remain idle and increased length of patient stays because physicians put off surgery until their scheduled block time rolls around again (Magerlein and Martin, 1978).

The use of computers in the OR was unanimously hailed by all who discussed automation as a way for OR personnel to reduce time on administrative tasks and a way to provide easy access to a wide array of OR statistics that could help improve scheduling, quality of care and efficient use of resources (Pirnke, 1986; Slezak, 1986; Magerlein, 1978; Zotter & Radziewiecz, 1986; Gellman, 1987; Gordon, et al., 1988).

OR Utilization and Efficiency

Wilson (1984) provides a good overview of the elements of the OR that are controllable, semi-

controllable and uncontrollable. Controllable elements can be manipulated to improve OR utilization. Controllable elements are the environment or floor plan of the OR, scheduling systems, supply systems and personnel. Semi-controllable elements are case or surgery lengths and responsiveness of support departments (lab, X-ray, etc.) in the hospital. Uncontrollable elements cannot be altered and consist of emergency cases and OR cardiac arrests (Wilson, 1984).

Several studies indirectly addressed a controllable element, scheduling, via data collection and creation of OR use charts (Dulinski, 1991; Swanberg and Fahey, 1983; Phillips, 1985). These charts graphically depicted the hours ORs were in use, turnover times (time between surgeries) and percentage of hours used. The information the researchers used in these charts and the charts themselves could be made readily available if the OR scheduling process were automated.

Swanberg and Fahey (1983) discuss surveying OR users. Differing perceptions among occupational

specialties are common. In general, physicians reported on perceived problems. OR staff generally reported reasons for inefficiency and suggested changes in operations. They also discuss the importance of supply systems. Failure to maintain effective supply systems can cause surgical delays and frustrate staff. Some of the key considerations Swanberg and Fahey (1983) list regarding supply systems are adequate supply levels, condition of equipment, current physician preference cards, timely response of logistics division to fulfill equipment and supply requests and the manner in which supplies are delivered to the OR.

Grudich (1991) supported Swanberg and Fahey's (1983) assertion regarding the difference in perceptions based on OR occupational specialty. He surveyed hospital OR staff. The surgeons reported that prior cases running overtime, unprepared patients and anesthesia delays caused surgical delays. Other OR staff reported that unprepared patients, absence of history or physical in the patient chart and incomplete lab work and tests caused surgical delays. Grudich

(1991) discovered that the actual causes of delays were tardy surgeons and anesthesiologists.

D. Purpose of the Study

The purpose of this study was to provide the executive and OR staff with objective data in order to aid them in instituting effective policies which reduce surgical delays and improve staff satisfaction in the OR. By analyzing the qualitative and quantitative data derived from responses to the survey instrument and the observations, the hypotheses can be rejected or accepted consequently fulfilling the primary objective of the study. The general hypotheses are: broad discontent among nursing and OR technicians with the level of staffing in the OR, frequent occurrence of problems with room and instrument set preparation and supply, a pattern of causes for frequent surgical delays, if they exist, and a lack of effective communication between staff.

II. Methods and Procedures

A. Study Design

A case study exploratory research design was employed to investigate delays in the OR. Yin recommends a case study design when 1) The research is exploratory in nature, when 2) Control over behavioral events is not necessary and when 3) The research focuses on contemporary events. The population for this study was all staff (OR nurses, OR techs, surgeons, nurse anesthetists (CRNAs) and anesthesiologists) surveyed during February 1993.

The OR at SBHACH has seven surgical suites, only three to four are utilized. The OR was built along with the rest of the hospital in 1972 and has had very little physical updating since then. The OR is on the fourth floor of the hospital along with the surgical patient ward. Its medical equipment supplier, central material supply (CMS) is located in the basement.

The OR staff is composed of five registered nurses (RNs), one of whom is the OR supervisor, and 8 to 10 enlisted OR technicians (techs), and 1-2 contract personnel. These personnel are augmented with student

OR techs. The average number of full time equivalents available during the previous year, January 1992 to January 1993, was approximately 13. The average number of cases or surgeries performed in the OR between November 1991 and October 1992 was 230. The trend of the workload in the OR, likewise in the rest of the hospital, is down because of impending closure of the hospital in 1994 and deactivation of the 7th Infantry Division which is currently underway.

Prior to the a change in scheduling procedures, scheduling was decentralized and done by each surgical clinic in the hospital. These clinics simply filled or sometimes left empty their allotted blocks of OR time. The QI PAT recommended centralizing control of scheduling with the OR nurse supervisor who would use time estimates and fill empty blocks of surgical time. The OR adopted the QI PAT's scheduling recommendations.

The study included observations made by the researcher in the OR from the 1st of February to the 9th of February. The researcher gathered information by attending the OR's Process Action Team meetings.

Observations in the OR were conducted on different week days and a weekend day to decrease bias.

The main data source for this study was the completed OR Quality Improvement Survey. Staff members were consulted during the construction of the survey. The survey was pretested on a small representative sample of the OR staff. Specific study variables consisted of membership in one of five professional categories, as well as group membership defined by the staff's responses to questions in the survey requiring quantitative responses. Membership in these groups were determined by factors such as the degree of frequency staff subgroups perceive that the events specified in the survey occur. The reproducible survey provides reliability.

The questions in the survey fell into seven major categories: OR staffing, the OR staff's historical performance in stocking the OR, the Logistics staff's response to providing supplies to the OR staff, equipment repair, surgical delays by non-OR staff personnel (anesthesia, surgical and ward personnel), surgical delays by OR staff and communication between

departments. An analysis of the staff's responses to the survey was conducted. Counts of each type of response in each occupational specialty, the percents of each response by occupational specialty and the mean scores for each question by occupational specialty was calculated. The occupational specialties were OR nurse, OR tech, nurse anesthetist, anesthesiologist and surgeon. A cover letter signed by the Deputy Commander for Clinical Services explaining the purpose of the survey and the required response date was attached to the survey. The cover letter and surveys were passed out to the staff who were given two weeks to fill out the surveys.

Reliability and validity were considered in the construction of the data set. Construct validity was ensured by using multiple sources of evidence and building a consensus from among OR staff. First, evidence was compiled by discussing issues in the OR with OR and support staff. Second, evidence was collected by observing activities in the OR. Third, a survey was prepared and pre-tested on a small sample of OR personnel. Their suggestions and comments were

included and the survey was finalized. The finalized survey was then disseminated to all staff for completion. External validity as discussed by Yin, has not been tested. The results of this single case study may not be generalizable.

B. Data Collection

The researcher attended meetings of the OR Process Action Team. The team discussed problems and issues concerning the OR. This multi-disciplinary team included supply, nursing, anesthesiology and surgical staff. Staff comments and decisions were noted and a copy of the team's minutes reviewed.

Observations of the OR and 64 surgeries were conducted on 1, 2, 4, 5, 6, 9, 10 and 11 February. Delays, unscheduled events, cancellations, beginning and ending times for nursing, anesthesiology and surgery and the researcher's general impressions were noted.

The finalized surveys were given to the staff. The overall return rate for all professions surveyed was 61%. The data collection process involved reviewing each survey. Responses were coded with point

values 1 through five: always = 1, usually = 2, seldom = 3, never = 4, N/A, don't know = 5. The coded responses were loaded into a statistical software package.

III. Results

A. Process Action Team

Attendance of the OR Process Action Team meetings provided objective data on the OR and subjective data from the staff. The team listed the following major problems they believed plagued the OR: inadequate OR staffing, decentralized scheduling of the OR, poor physical condition of the OR and poor radiology support.

The team supported their contention that staffing levels were inadequate by noting the absence of a free roaming nurse in the OR. They contended that this nurse should be available to help with emergency cases, to perform administrative duties and to relieve personnel for breaks. At this time, the OR only had seven OR techs assigned. The Table of Distribution and Allowances, a manpower document that identifies the

number of personnel required to support the workload at the hospital, called for eleven OR techs.

The scheduling system in the OR was decentralized. Each surgical clinic was given a certain block and could fill those blocks as they saw fit. They then turned these completed blocks over to the OR room who had little or no control over the number or type of procedures the surgical clinics scheduled. The OR also had little or no time to arrange their schedule to meet any unanticipated demand by clinics. The clinics did not provide time estimates for the surgeries they scheduled. Without OR time estimates, surgical delays were common. Most of a particular day's patients were brought in at 0630 and waited several hours before their surgery was performed. Surgeries often ran into the early evening hours, keeping the OR staff working overtime.

Poor physical condition of the OR was described as a problem caused by: 1) lack of cleanliness-- whose responsibility was it to clean?, 2) lapse in work orders and supply ordering -- the members of the QI PAT felt that a lack of OR manpower caused this.

During add-on or emergency surgeries, the staff noted the difficulty of getting adequate radiology support. They often had to wait up to one hour for an X-ray technician while the patient waited under anesthesia. The surgeons and the OR nurses often found themselves operating the fluoroscopy unit during elective-emergency surgery.

The Process Action Team proposed that to improve the staffing problem, the OR should decrease the number of rooms it runs from four to three and get additional personnel from the evacuation hospital on Fort Ord. To alleviate the scheduling problem they recommended: 1) centralizing the control of scheduling surgeries with the OR staff, 2) providing time estimates for OR surgical schedules, 3) maintaining a closer working relationship between the OR, logistics and CMS to improve cleanliness and equipment repair and 4) Improving coordination between the OR and radiology to alleviate the waits for X-ray techs after duty hours.

B. Observations of the OR

The researcher's observations in the OR in February produced some insight into the every day

operations in the OR. Because there was only one researcher, not all activities could be noted. The OR had gone to centralized scheduling. The OR nursing supervisor scheduled surgeries manually and used her own time estimates. The only surgeries with a starting time on the daily schedule were those that were the first one to take place in each room. This made it difficult to determine if the following surgeries in each room were off schedule. Eighty-five percent of the first surgeries scheduled for each room were started before or by their designated start times. Surgeries that started late exceeded their start times by no more than 45 minutes.

Excluding emergency surgeries, of the seven days that had scheduled surgeries, six out of the seven days or 86% were completed with their schedules by 1615 hours. One day's schedule ran on to 1740 hours.

The OR appeared to have a continuous flow of patients arriving on time in the waiting room. The staff appeared relatively busy, but had adequate time to take breaks and lunches as demonstrated by the

regular flow of personnel to take breaks and lunches in the break room.

The OR nurse supervisor during these observations and other visits was extremely busy providing nursing support in the rooms, scheduling surgeries and performing various management tasks.

C. Survey

A copy of the survey used is provided in appendix A. An analysis of variance was attempted on the survey data, but no statistical significance could be ascertained among the various occupational groups because of their small group numbers. However, a straight count of responses from the total population and by occupation provided mean scores for each response by occupation. These results are included in Appendix B.

The survey was analyzed two ways: by mean scores of each occupational category and by count and percent of each occupational category. Questions 9, 10 and 11 inquired about the logistic division's ability to stock the OR. The response from the five occupational groups was fairly positive. On average, 90% of those

questioned felt that the logistics division was responsive.

Questions 3, 6, 7 and 9 measured the OR staff's response to stocking the OR and preparing the surgical kits for the surgeons. The surgeons were the most critical. Replying to question number 6, 40% of the surgeons felt that their instrument sets were seldom or never assembled accurately. To question number 9, 31% of the surgeons felt that rarely were supplies available from the OR stock. To question 3 and 7 respectively, however, most of the surgeons (86.7%) were happy with the help they got in the OR regarding supplies and with the condition of the ORs in the morning (83.3%).

Question eight dealt with the repair of equipment. This survey question was not as specific as it should have been. The speed in which equipment is repaired and maintained is a function two separate entities, those requesting equipment repair, i.e., the OR staff and those actually doing the repairs, the logistics division. Therefore, it is impossible to know which of the two entities the survey respondents are rating.

Overall, the responses in all occupational categories to this question were negative. Most occupational specialty groups indicated that repairs were seldom or never completed in a timely manner. The surgeons were the most critical with 78.6% of their responses in the negative. Forty-three percent of the OR techs responded negatively and only 33.3% of the OR nurses responded negatively.

Questions 1, 5, 12, 13 and 14 measured the adequacy of staffing as indicated by time to take breaks and the ability of the staff to support the workload. As expected, each occupational group responded less positively when asked whether there were enough of their own occupation staffed to support the work load, but the overall response to staffing was positive. A majority of all the occupational categories thought that staffing in the OR was adequate.

Questions 21 and 22 asked about surgical delays. Question 21 was a general statement querying whether surgeries are often delayed. Question 22 asks specifically if the first case of the day is often

delayed. The two most critical groups were OR techs and surgeons. Fifty percent of the surgeons and 75% of OR techs felt that usually or always were surgeries delayed or off schedule. The surgeons were even more critical in their response to question 22 (first case of the day delays). To question number 22, 60% of the surgeons, 62.5% of the OR techs and 100% of the nurse anesthetists felt the first cases of the day were always or usually delayed. The least critical response to both these questions were OR nurses. To both questions, only 33.3% of the nurses felt that cases were always or usually delayed.

Questions 4, 23, 24, 25, 28, 29, 30, 31, 33 and 34 point to surgical delays that are not necessarily the OR staff's responsibility. Question four is different from the others which ask survey respondents to indicate the frequency with which these problems cause delays. Question four asks how frequently last minute requests for supply and equipment occur. Sixty-six percent of the RNs and 77% of the OR techs felt this was a fairly common occurrence, however, in their response to question 29 which asked how often this

occurrence caused delays, the answer was mixed. Only 10% of the OR techs and 26% of the surgeons admitted that last minute requests caused frequent delays while 100% of the nurses thought they did.

With a few notable exceptions, a majority of the staff responded to questions 23, 24, 25, 28, 30, 31, 33 and 34 that non-OR staff causes of surgical delays were not frequent causes of delays. Thirty-eight percent of the surgeons, however, responded that equipment malfunctions always or usually caused delays. Another exception was thirty-three percent of OR nurses felt that the lack of Central Material Supply's ability to provide supplies and instruments caused delays. Sixty percent of the OR techs felt that the ward's tardiness in having the patient available for transport to the OR caused delays. Forty percent of the OR techs believed that tardy anesthesiology staff was a frequent cause of delays and 62.5% of the techs believed tardy surgeons were a problem.

Questions 26, 27 and 32 queried the staff as to the frequency that OR staff caused delays. Again, the majority of the staff felt that the OR staff did not

cause a majority of the delays. The two questions that received the highest number of responses indicating the OR staff was responsible for delays were questions 26 and 27. The two occupational groups most critical were OR techs and the surgeons. Question 26 asked how frequently incomplete instrument sets were a cause of delays. Thirty percent of the OR techs felt that this was a frequent cause of delays while only 20% of the surgeons thought so. Question 27 asked about missing supplies. Eleven and 21 percent of the OR techs and surgeons respectively believed this was a cause of frequent delays.

Questions 15 through 20 asked about the OR's ability to communicate with various departments in the hospital. Most responses were favorable, the OR always or usually communicated effectively with other departments. The most critical group was the surgeons. The two departments they believed the OR could improve communications with were Central Material Supply and Medical Material (logistics).

IV. Discussion

A. OR Staffing

Much of the complaints the OR staff had about staffing in the PAT meetings were not substantiated by the survey and the observations made by this researcher. This could be due to the change of personnel staffing over time. The PAT met in November and the survey and observations were made in February. However, according to MEPRS data, during November when the PAT met, the OR had a total of 13 military assigned. In December and January the total was 13 and 14 respectively, not a significant change. The number of OR nurses remained the same (5), but by February when the survey was filled out, a semi-free nurse was available in the OR.

B. Scheduling and Surgical Delays

The OR and the surgical clinics changed the way scheduling was performed. The control of surgery scheduling was placed in the hands of the OR nurse supervisor. The OR staff appeared much happier with their increased control over the schedule. The OR supervisor's goal to have surgeries completed by 1530

hours was met on a majority of the days this researcher observed activities in the OR. She could also fill blocks of OR time that previously were left empty under the old system.

The OR nurse supervisor scheduled all the surgeries manually. In fact, all record keeping in the OR was performed manually. This not only makes scheduling and record keeping more time consuming, but makes it much more difficult to monitor the OR using statistics derived from these records. Many authors cite the benefits of automation in the OR (Garrett-1986; Hancock, Walter, More & Glick, 1988; Zotter, Radziewicz, 1986, Gellman, 1987). During a recent visit to a nearby hospital in the area by the researcher, that hospital's OR supervisor demonstrated their automated OR scheduling system. It provided much of the information our busy OR supervisor was providing manually with a few keystrokes.

Automating would also provide the OR nurse supervisor with time estimates for all surgeries by physician. Using this information, she or someone trained on the system could more accurately fill OR

time based on type of surgery and the physician performing it. For example, if a physician consistently finished in 45 minutes when an hour was scheduled for him/her, then the times could be adjusted to allow for more surgeries to be scheduled in that same block of time for that physician.

The results of the survey indicated that the staff felt that cases were often delayed especially first cases of the day. The researchers' limited observations did not support the survey finding. The survey found that supply stock, instrument set assembly, last minute requests by surgeons, first case of the day delay and coordination of patient transport from the ward to the OR were frequent causes of delay. The difference in the responses according to occupational specialty demonstrated the necessity of querying all involved and in a format that provided the respondents some anonymity. The unique perspective of the OR techs brought the issue of patient transport, and last minute requests for supplies to the front.

The survey brought out the unique perspective of all the various professions and supported Swanberg and

Fahey's (1983) and Grudich's (1991) findings regarding varying responses for occupational specialties. The most critical group of all OR activities were its users, the surgeons. The OR techs were also fairly critical, even of themselves regarding instrument set preparation. These two groups were also the most numerous. The OR nurses, anesthesiologists and nurse anesthetists were relatively small groups in comparison. Their responses and the mean scores might have been different if the number of respondents in these groups were higher.

C. OR Cleanliness & Equipment

Most of the staff reacted positively to questions about the conditions of OR rooms in the morning. Few thought it a problem. The OR PAT team had cited cleanliness as a problem and noted that there was confusion as to whose responsibility it was. Survey question number six was poorly worded. It lead respondents to comment specifically on the condition of ORs in the morning instead of on the overall cleanliness of the entire OR area. The QI PAT

complained about overall cleanliness when they brought this issue up.

The problem of who the responsible party is for ensuring equipment is maintained, repaired, ordered, etc. came up during the OR PAT meetings and in responses to the surveys. The staff was generally happy with the help the logistics division provided but still overwhelmingly agreed that response times to requests for equipment repair and maintenance were much too long. It is widely perceived that the Army procurement and repair system is a slow, complicated and fairly unresponsive system. In order to get the best response possible from this system, each department must dedicate personnel who are responsible for constantly prodding and pushing the system so that it responds along. Through personal observations and discussions with OR personnel, it was apparent that no one was doing this.

D. Limitations of the Study

This study is limited by common limitations of most surveys. Problems could have been overstated in the responses to the survey simply because they were

solicited. The integrity of the respondents is always an issue to be considered when analyzing survey results. The survey was pre-tested once and then administered to the entire OR staff. The time of day, year and surrounding circumstances could have biased responses. The well known Halo Effect could have been a potentially misleading factor in the survey. Respondents could have tended to answer specific questions based on general impressions which tend to be more favorable. Wording of the survey and its design affected the quality and integrity of responses also.

The observations are limited by the short time span they were conducted over and by the limitations or bias of the researcher. The Hawthorne effect could have biased observations. The staff, knowing they were being studied and watched, could have temporarily changed their behavior and work habits.

This study is also limited by the lack of comparison with another hospital. The case study was limited only to SBHACH.

Conclusions and Recommendations

The executive staff at SBHACH now has objective data on the OR and some of the problems confronting this problem area. The problems affecting staff satisfaction and OR delays were highlighted by the three data collection methods: the PAT meetings, the OR staff survey and the researcher's observations.

The PAT brought about a change in the OR scheduling process, a controllable element as defined by Wilson (1981). The OR nurse supervisor was given control of the scheduling and used informal time estimates. As supported by Pirnke (1989), the previous lack of control over scheduling probably led to the initial staff discontent prompting the QI PAT meetings.

The scheduling process should be automated. This would relieve the OR supervisor from the time consuming task of scheduling and calculating time estimates. It would also make this information readily available via computer for further studies. Automation will also provide the person responsible for scheduling with time estimates for each surgery by physician. This information can improve time use in the OR and reduce

delays, can be used as a monitor for quality of care and can be used to improve OR utilization (Pirnke, 1986; Slezak, 1986; Magerlein, 1978; Zotter and Radziewicz, 1986).

Equipment maintenance and repair, another controllable element (Wilson, 1986) and a major source of staff discontent, needs to be proactively pursued by the OR staff if they wish to get timely responses. This may also help improve instrument set assembly because more equipment will be available to the techs. A responsible Non-Commissioned Officer should be designated with this important job. This person should be required to meet regularly with logistics and central material supply personnel and to provide continuous updates on equipment maintenance and repair to the OR management and surgical staff.

The survey demonstrated differing responses based on occupational categories. This supports the need for the interdisciplinary PATs now being used to improve quality in the OR and other parts of the hospital. The survey also provided a means of obtaining information from the various groups while providing some anonymity

to the respondents. This resulted in a more complete picture of the problems in the OR.

The OR staff should work out the issue of patient transport from the wards to decrease delays caused by late patient arrival from the ward to the OR.

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DEFINITIONS

Total Quality Management--- A philosophy of management which promotes continuous quality improvement through a variety of statistical methods. Fourteen points serve as guidelines for the philosophy.

Quality Improvement Process Action Team--- In accordance with Total Quality Management philosophy, this team is an interdisciplinary group that meets to determine causes of problems and gather data.

Central Material Supply---A department in a military hospital that is responsible for sterilization of surgical equipment and supplies.

Unblocked Scheduling--- A method of scheduling in which physicians and/or clinics schedule surgeries on a first-come-first-serve basis.

Blocked Scheduling--- A method of scheduling in which physicians and/or clinics are guaranteed blocks of time during which they can schedule surgeries.

Table of Distribution and Allowances--- A DoD document that lists the requirements and authorizations for the manpower and equipment of a TDA organization.

Fluoroscopy Unit--- A device used for examining deep structures by means of roentgen rays.

APPENDIX A

OR Quality Improvement Survey

Please indicate your profession:

OR nurse OR Technician CRNA Anesthesiologist Surgeon

Please indicate the frequency with which the following occurs. If a statement does not apply to you or you don't have any knowledge about it,

indicate so by circling response number five.

1. There is time to take breaks and lunches

Always	Usually	Seldom	Never	N/A Don't Know
1	2	3	4	5

Comments: _____

2. Supplies and equipment necessary for scheduled cases can be easily obtained from Medical Material Branch

1	2	3	4	5
---	---	---	---	---

Comments: _____

3. When a problem or question on supplies, equipment, and/or instrument set assembly arises, help is readily available in the OR

1	2	3	4	5
---	---	---	---	---

Comments: _____

4. How frequently are last minute requests for additional supplies or equipment made?

1	2	3	4	5
---	---	---	---	---

Comments: _____

5. Currently, the OR staff comfortably supports the workload

1	2	3	4	5
---	---	---	---	---

Comments: _____

6. Instrument sets are assembled accurately

1	2	3	4	5
---	---	---	---	---

Comments: _____

7. Rooms are adequately prepared the night before for the next day (There is no wait for room preparation early in the morning)

1	2	3	4	5
---	---	---	---	---

Comments: _____

8. Equipment is repaired in a timely manner

1	2	3	4	5
---	---	---	---	---

Comments: _____

9. The supplies I need are readily available from the OR stock

1	2	3	4	5
---	---	---	---	---

Comments: _____

10. Supplies not available in the OR are readily available from Medical Material

1	2	3	4	5
---	---	---	---	---

Comments: _____

Continued on Next Page

	Always	Usually	Seldom	Never	N/A Don't Know
11. Logistics/supply personnel are responsive to our needs Comments: _____	1	2	3	4	5
12. There is a sufficient number of RNs scheduled to support the surgical workload Comments: _____	1	2	3	4	5
13. There is a sufficient number of OR techs scheduled to support the surgical workload Comments: _____	1	2	3	4	5
14. There is a sufficient number of anesthetists/siologists scheduled to support the surgical workload Comments: _____	1	2	3	4	5

The OR communicates effectively with the following Depts:	Always	Usually	Seldom	Never	N/A Don't Know
15. The Dept of Nursing	1	2	3	4	5
16. Biomedical Maintenance	1	2	3	4	5
17. Dept of Surgery	1	2	3	4	5
18. CHS	1	2	3	4	5
19. Dept of Anesthesia	1	2	3	4	5
20. Logistics/Medical Materials	1	2	3	4	5
21. Surgeries are delayed or off schedule	1	2	3	4	5

Please indicate the frequency of each cause of delays:

	Always	Usually	Seldom	Never	N/A Don't Know
First case of the day is delayed	1	2	3	4	5
surgeon late	1	2	3	4	5
nursing personnel not available	1	2	3	4	5
missing equipment	1	2	3	4	5
incomplete instrument set	1	2	3	4	5
missing supplies	1	2	3	4	5
equipment malfunction	1	2	3	4	5
Needed equipment not previously requested/ (last minute requests)	1	2	3	4	5
supplies/instrumentation not available from CHS	1	2	3	4	5
Ward does not have patient ready for transport	1	2	3	4	5
OR is late picking up patients from the ward	1	2	3	4	5
anesthetist/siologist late	1	2	3	4	5
anesthesia delay	1	2	3	4	5

Comments/Suggestions:

APPENDIX B
OR Quality Improvement Survey
Questions 2, 10, and 11 by Ascending Rank
Mean Score of Respondents

Q U E S T I O N	TYPE												TOTAL		
	OR NURSE			OR TECH		CRNA		Anesthesiologist		Surgeon			No Ans Or N/A	Response	
	Response		No Ans Or N/A	Response		Response		Response		No Ans Or N/A	Response		Valid n	Mean	Valid/ n
	Valid n	Mean	Valid n	Mean	Valid n	Mean	Valid n	Mean	Valid n	Mean	Valid n	Mean	Valid n	Mean	Valid/ n
11		2.00	3	5	1.80	5	2.00	1	2.00	1	2.18	11	10	2.05	21
2	1	2.00	2	1	2.22	9	2.00	1	2.00	1	2.27	15	3	2.21	28
10		2.00	3		2.00	10	3.00	1	2.00	1	2.54	13	3	2.29	28

OR Quality Improvement Survey
Questions 2, 10, and 11 Count and Percent
OR Nurse Population

Question	Response		Total	
	No Ans Or N/A	Count	No Ans Or N/A	Response
	Count	Percent	Count	Percent
2	1	2	1	2
10		3		3
11		3		3
		100.0		100.0
		100.0		100.0
		100.0		100.0

APPENDIX B
OR Quality Improvement Survey
Questions 2, 10, and 11 Count and Percent
OR Tech Population

Questions	No Answer Or N/A	Response						Total	
		Always		Usually		Seldom		Response	
		Count	Pct%	Count	Pct%	Count	Pct%	Count	Pct%
2	1				77.8		22.2	1	100.0
10	2	20.0		6	60.0	2	20.0	10	100.0
11	5	40.0		2	40.0	1	20.0	5	100.0

OR Quality Improvement Survey
Questions 2, 10, and 11 Count and Percent
CRNA Population

Questions	Response						Total	
	Usually		Seldom		Response		Response	
	Count	Pct%	Count	Pct%	Count	Pct%	Count	Pct%
2	1	100.0					1	100.0
10					1	100.0	1	100.0
11	1	100.0					1	100.0

APPENDIX B
OR Quality Improvement Survey
Questions 2, 10, and 11 Count and Percent
Anesthesiologist Population

Question	Response		Total	
	Usually		Response	
	Count	Row %	Count	Row %
2	1	100.0	1	100.0
10	1	100.0	1	100.0
11	1	100.0	1	100.0

OR Quality Improvement Survey
Questions 2, 10, and 11 Count and Percent
Surgeon Population

Question	No Answer Or N/A	Response								Total	
		Always		Usually		Seldom		Never			Response
		Count	Row-%	Count	Row-%	Count	Row-%	Count	Row-%		
2 10 11	1		11	73.3%	4	26.7%			1	15	100.0%
	3		7	53.8%	5	38.5%			3	13	100.0%
	5	1	9.1%	7	63.6%	3	27.3%			5	11

APPENDIX B
OR Quality Improvement Survey
Questions 3, 6, 7, and 9 Sorted by Ascending Rank
Mean Score of Respondents

Q U E S T I O N		TOTAL																							
		OR Nurse				OR TECH				CRNA				Anesthesiologist				Surgeon				No Ans Or N/A		Response	
		Response		Valid n	Mean	Valid n	Response	Valid n	Mean	Response	Valid n	Mean	Response	Valid n	Mean	Response	Valid n	Mean							
3	1.67	3		1.60	10		3.00	1		3.00	1		2.20	15	1	2.00	1	30							
7	2.00	3		2.00	10		2.00	1		2.00	1		2.25	12	4	2.11	4	27							
9	2.00	3	1	1.89	9		3.00	1		2.00	1		2.38	16	1	2.20	1	30							
6	2.00	3		2.00	10		2.00	1	1			1	2.47	15	2	2.24	2	29							

OR Quality Improvement Survey
Questions 3, 6, 7, and 9 Count and Percent
OR Nurse Population

Question	Response						Total	
	Always			Usually			Response	
			Count			Count		
	Count	Percent		Count	Percent		Count	Percent
3	1	33.3%		2	66.7%	3	3	100.0%
6				3	100.0%	3	3	100.0%
7				3	100.0%	3	3	100.0%
9				3	100.0%	3	3	100.0%

CLINICAL
OR Quality Improvement Survey
Questions 3, 6, 7, and 9 Count and Percent
OR Tech Population

Question	No Answer Or N/A	Response						Total	
		Always		Usually		Seldom		No Answer Or N/A	Response
		Count	Percent	Count	Percent	Count	Percent		
3		4	40.0%	6	60.0%				10
6				10	100.0%				10
7		1	10.0%	8	80.0%				10
9	1	1	11.1%	8	88.9%	1	10.0%	1	9
									100.0%
									100.0%
									100.0%
									100.0%

OR Quality Improvement Survey
Questions 3, 6, 7, and 9 Count and Percent
CRNA Population

Question	Response						Total	
	Usually		Seldom		Response		Count	Percent
	Count	Percent	Count	Percent	Count	Percent		
3			1	100.0%	1	100.0%	1	100.0%
6	1	100.0%			1	100.0%	1	100.0%
7	1	100.0%			1	100.0%	1	100.0%
9			1	100.0%	1	100.0%	1	100.0%

Questions 3, 6, 7, and 9 Count and Percent
Anesthesiologist Population

Question	No Ans Or N/A	Response				Total	
		Usually		Seldom		Response	
		Count	Row %	Count	Row %	Count	Row %
3	1			1	100.0%	1	100.0%
6		1	100.0%			1	100.0%
7		1	100.0%			1	100.0%
9							

OR Quality Improvement Survey
Questions 3, 6, 7, and 9 Count and Percent
Surgeon Population

Question	No Ans Or N/A	Response								Total	
		Always		Usually		Seldom		Never		Response	
		Count	Row %	Count	Row %	Count	Row %	Count	Row %	Count	Row %
3	1			13	86.7%	1	6.7%	1	6.7%	15	100.0%
6	1			9	60.0%	5	33.3%	1	6.7%	15	100.0%
7	4	1	8.3%	9	75.0%			2	16.7%	12	100.0%
9				11	68.8%	4	25.0%	1	6.3%	16	100.0%

APPENDIX B
OR Quality Improvement Survey
Question 8
Mean Score of Respondents

Q U E S T I O N	TOTAL									
	OR Nurse			OR TECH			CRNA		Anesthesiologist	
	Response			Response			Response		Response	
	Mean	Valid n	No Ans Or N/A	Mean	Valid n	Mean	Mean	Valid n	Mean	Valid n
8	2.33	3	3	2.57	7	3.00	3.00	1	3.00	1
									3.07	14
									2.85	5
										26

OR Quality Improvement Survey
Question 8 Count and Percent
OR Nurse Population

Question	Response				Total	
	Usually		Seldom		Response	
	Count	Row-%	Count	Row-%	Count	Row-%
	8	2	66.7%	1	33.3%	100.0%

APPENDIX B

OR Quality Improvement Survey Question 8 Count and Percent OR Tech Population

Question	No Ans Or N/A	Response								Total	
		Usually		Sometimes		Never		No Ans Or N/A	Response		
		Count	Row%	Count	Row%	Count	Row%				
										Count	Row%
8	3	4	57.1%	2	28.6%	1	14.3%	3	7	100.0%	

OR Quality Improvement Survey Question 8 Count and Percent CRNA Population

Question	Response		Total	
	Seldom			
	Count	Row %	Count	Row %
	Count	Row %	Count	Row %
8	1	100.0 %	1	100.0 %

APPENDIX B

**OR Quality Improvement Survey
Question 8 Count and Percent
Anesthesiologist Population**

Question	Response		Total	
	Soldiers		Response	
	Count	Row %	Count	Row %
8	1	100.0%	1	100.0%

**OR Quality Improvement Survey
Question 8
Count and Percent
Surgeon Population**

Question	No Answer Or N/A Count	Response						Total	
		Usually		Soldiers		Never		No Answer Or N/A Count	Response
		Count	Row %	Count	Row %	Count	Row %		
		3	21.4%	7	50.0%	4	28.6%	2	100.0%

APPENDIX B

OR Quality Improvement Survey Questions 1, 5, 12, 13 and 14 Assorted by Ascending Rank Mean Score of Respondents

Q U E S T I O N	TYPE																TOTAL		
	OR NURSE				OR TECH				CRNA		Anesthesiologist		Surgeon				No Ans Or N/A	Response	
	NO ANS OR N/A	Response		No Ans Or N/A	Response		Response		No Ans Or N/A	Response		No Ans Or N/A	Response						
		Valid n	Mean		Valid n	Mean	Valid n	Mean		Valid n	Mean		Valid n	Mean					
5		3	2.00		10	2.00	1	2.00	1	2.00	1	2.13	16	1.97	31				
14	1	2	2.00	2	8	3.00	1	3.00	1	2.00	1	2.06	16	2.04	28				
1		3	1.67		10	3.00	1	3.00	1	2.00	1	2.00	9	2.04	24				
13		3	1.67	1	9	2.00	1	2.00	1	2.00	1	2.13	15	2.07	29				
12		3	2.00	1	9	3.00	1	3.00	1	2.00	1	2.14	14	2.14	28				

OR Quality Improvement Survey Questions 1, 5, 12, 13 and 14 Count and Percent OR Nurse Population

Question	No Ans Or N/A	Response								Total	
		Always		Usually		Seldom		No Ans Or N/A	Response		
		Count		Count		Count					
		Count	Row-%	Count	Row-%	Count	Row-%				
1		1	33.3%	2	66.7%					3	100.0%
5		1	33.3%	1	33.3%	1	33.3%			3	100.0%
12		1	33.3%	1	33.3%	1	33.3%			3	100.0%
13		1	33.3%	2	66.7%					3	100.0%
14	1			2	100.0%					2	100.0%
									1		

APPENDIX B

OR Quality Improvement Survey Questions 1, 5, 12, 13 and 14 Count and Percent OR Tech Population

Question	No Ans Or N/A	Response						Total	
		Always		Usually		Seldom		No Ans Or N/A	
	Count							Count	Response
		Count	Row%	Count	Row%	Count	Row%		
1		1	10.0%	7	70.0%	2	20.0%	10	100.0%
5		4	40.0%	5	50.0%	1	10.0%	10	100.0%
12	1			8	88.9%	1	11.1%	1	100.0%
13	1	1	11.1%	6	66.7%	2	22.2%	1	100.0%
14	2	1	12.5%	7	87.5%			2	100.0%

OR Quality Improvement Survey Questions 1, 5, 12, 13 and 14 Count and Percent CRNA Population

Question	Response						Total
	Usually		Seldom		Response		
	Count	Row %	Count	Row %	Count	Row %	
1			1	100.0%	1	100.0%	
5	1	100.0%			1	100.0%	
12			1	100.0%	1	100.0%	
13	1	100.0%			1	100.0%	
14			1	100.0%	1	100.0%	

APPENDIX B

OR Quality Improvement Survey Questions 1, 5, 12, 13 and 14 Count and Percent Anesthesiologist Population

Question	Response		Total	
	Usually		Response	
	Count	Row%	Count	Row%
1	1	100.0%	1	100.0%
5	1	100.0%	1	100.0%
12	1	100.0%	1	100.0%
13	1	100.0%	1	100.0%
14	1	100.0%	1	100.0%

OR Quality Improvement Survey Questions 1, 5, 12, 13 and 14 Count and Percent Surgeon Population

Question	Response										Total		
	No Answer Or N/A		Always		Usually		Sometimes		Never			No Answer Or N/A	
	Count	Row%	Count	Row%	Count	Row%	Count	Row%	Count	Row%		Count	Row%
1	7	22.2%	2	55.6%	2	22.2%			7	9	100.0%		
5		6.3%	1	75.0%	3	18.8%				16	100.0%		
12	2			12	2	14.3%			2	14	100.0%		
13	1	6.7%	1	80.0%	1	6.7%		1	1	15	100.0%		
14				15	1	6.3%				16	100.0%		

APPENDIX B
OR Quality Improvement Survey
Questions 21 and 22 Assorted by Ascending Rank
Mean Score of Respondents

Q U E S T I O N	Type												TOTAL	
	OR NURSE		OR TECH		CRNA		Anesthesiologist		Surgeon				No Ans Or N/A	Response
	Response		Response		Response		Response		Response		Response		Valid n	Mean
	Mean	Valid n	Mean	Valid n	Mean	Valid n	Mean	Valid n	Mean	Valid n	Mean	Valid n		
22	2.67	3	2	2.13	8	3.00	1		3.00	1	2.40	15	2.39	28
21	2.67	3	6	2.25	4	3.00	1		3.00	1	2.42	12	2.48	21

OR Quality Improvement Survey
Questions 21 and 22 Count and Percent
OR Nurse Population

Question	Response						Total	
	Usually			Seldom			Response	
	Count	Row%	Count	Row%	Count	Row%	Count	Row%
	21	1	33.3%	2	66.7%	3	100.0%	
22	1	33.3%	2	66.7%	3	100.0%		

APPENDIX B
OR Quality Improvement Survey
Questions 21 and 22 Count and Percent
OR Tech Population

Questions	No Answer Or N/A	Response						Total	
		Always		Usually		Seldom		No Answer Or N/A	
		Count	Percent	Count	Percent	Count	Percent	Count	Percent
21	6			3	75.0%	1	25.0%	6	100.0%
22	2		25.0%	3	37.5%	3	37.5%	2	100.0%

OR Quality Improvement Survey
Questions 21 and 22 Count and Percent
CRNA Population

Questions	Response		Total	
	Seldom		Response	
	Count	Percent	Count	Percent
21	1	100.0%	1	100.0%
22	1	100.0%	1	100.0%

APPENDIX

OR Quality Improvement Survey Questions 21 and 22 Count and Percent Anesthesiologist Population

Question	Response		Total	
	Seldom		Response	
	Count	Percent	Count	Percent
21	1	100.0%	1	100.0%
22	1	100.0%	1	100.0%

OR Quality Improvement Survey Questions 21 and 22 Count and Percent Surgeon Population

Question	No Answer Or N/A	Response						Total	
		Always		Usually		Seldom		Response	
		Count	Percent	Count	Percent	Count	Percent	Count	Percent
21	4	1	8.3%	5	41.7%	6	50.0%	4	100.0%
22	1			9	60.0%	6	40.0%	1	100.0%

APPENDIX B
OR Quality Improvement Survey
Questions 4, 23, 24, 25, 28, 29, 30, 31, 33 and 34
Sorted by Ascending Rank
Mean Score of Respondents

Q U E S T I O N	TYPE															TOTAL												
	OR NURSE				OR TECH				CRNA		Anesthesiologist				Surgeon				No Ans Or N/A	Response								
	Response		Valid n	Response		Valid n	Response		Valid n	Mean	Valid n	Mean	Valid n	Mean	Valid n	Mean	Valid n	Mean	Valid n	Mean								
	Valid n	Mean		Valid n	Mean		Valid n	Mean													Valid n	Mean	Valid n	Mean	Valid n	Mean	Valid n	Mean
	Valid n	Mean	Valid n	Mean	Valid n	Mean	Valid n	Mean	Valid n	Mean	Valid n	Mean	Valid n	Mean	Valid n	Mean	Valid n	Mean	Valid n	Mean								
4		2.33	3	1	2.00	9	3.00	1	1						1	2.93	15	3	2.57	28								
28		3.00	3		3.00	10	3.00	1	1						3	2.62	13	4	2.81	27								
31	1	3.00	2		2.40	10	3.00	1	1			3.00	1	1	3	3.08	13	4	2.81	27								
30		2.67	3		2.90	10	2.00	1	1			3.00	1	1	2	2.86	14	2	2.83	29								
29		3.00	3		2.90	10	3.00	1	1			3.00	1	1	1	2.80	15	1	2.87	30								
23	1	3.00	2		2.20	10	2.00	1	1			3.00	1	1	2	3.50	14	3	2.93	28								
24		3.00	3	1	2.89	9	3.00	1	1			3.00	1	1	3	3.00	13	4	2.96	27								
33	1	3.00	2		2.60	10	3.00	1	1			3.00	1	1	2	3.21	14	3	2.96	28								
34		3.00	3	1	3.22	9	3.00	1	1			3.00	1	1	3	2.92	13	4	3.04	27								
25		3.33	3		3.10	10	3.00	1	1			3.00	1	1	4	3.17	12	4	3.15	27								

APPENDIX B
OR Quality Improvement Survey
Questions 4, 23, 24, 25, 26, 29, 30, 31, 33 and 34
Count and Percent
OR Nurse Population

Question	No Answer Or N/A	Response								Total	
		Usually		Seldom		Never		No Answer Or N/A			
		Count	Percent	Count	Percent	Count	Percent	Count	Percent		
4	1	2	66.7%	1	33.3%					3	100.0%
23				2	100.0%					2	100.0%
24				3	100.0%					3	100.0%
25				2	66.7%	1	33.3%			3	100.0%
28				3	100.0%					3	100.0%
29				3	100.0%					3	100.0%
30		1	33.3%	2	66.7%					3	100.0%
31	1			2	100.0%					2	100.0%
33	1			2	100.0%				1	2	100.0%
34				3	100.0%				1	3	100.0%

APPENDIX B
OR Quality Improvement Survey
Questions 4, 23, 24, 25, 28, 29, 30, 31, 33 and 34
Count and Percent
OR Tech Population

Question	No Answer Or N/A	Response								Total	
		Always		Usually		Seldom		Never		No Answer Or N/A	Response
		Count	Percent	Count	Percent	Count	Percent	Count	Percent		
4	1	2	22.2%	5	55.6%	2	22.2%			1	9
23				8	80.0%	2	20.0%				10
24	1			1	11.1%	8	88.9%			1	9
25				1	10.0%	7	70.0%	2	20.0%		10
28						10	100.0%				10
29				1	10.0%	9	90.0%				10
30				1	10.0%	9	90.0%				10
31				6	60.0%	4	40.0%				10
33				4	40.0%	6	60.0%				10
34	1					7	77.8%	2	22.2%	1	9

APPENDIX B
OR Quality Improvement Survey
Questions 4, 23, 24, 25, 28, 29, 30, 31, 33 and 34
Count and Percent
CRNA Population

Question	Response				Total	
	Usualty		Seldom		Response	
	Count	Percent	Count	Percent	Count	Percent
4	1	100.0%	1	100.0%	1	100.0%
23					1	100.0%
24			1	100.0%	1	100.0%
25			1	100.0%	1	100.0%
28			1	100.0%	1	100.0%
29			1	100.0%	1	100.0%
30	1	100.0%			1	100.0%
31			1	100.0%	1	100.0%
33			1	100.0%	1	100.0%
34			1	100.0%	1	100.0%

OR Quality Improvement Survey
Question 4, 23, 24, 25, 28, 29, 30, 31, 33 and 34
Count and Percent

Anesthesiologist Population

Question	No Ans Or N/A	Response				Total	
		Count	Solved		No Ans Or N/A	Response	
			Count	Pct%		Count	Pct%
4		1					
23			1	100.0%	1	1	100.0%
24			1	100.0%		1	100.0%
25			1	100.0%		1	100.0%
28		1			1		
29			1	100.0%		1	100.0%
30			1	100.0%		1	100.0%
31			1	100.0%		1	100.0%
33			1	100.0%		1	100.0%
34			1	100.0%		1	100.0%

APPENDIX B
OR Quality Improvement Survey
Question 4, 23, 24, 25, 28, 29, 30, 31, 33 and 34
Count and Percent
Surgeon Population

Question	No Ans Or N/A	Response								Total	
		Usually		Seldom		Never		No Ans Or N/A	Response		
		Count	Row%	Count	Row%	Count	Row%				
										Count	Row%
4		1	13.3%	12	80.0%	1	6.7%	1	15	100.0%	
23		2		7	50.0%	7	50.0%	2	14	100.0%	
24		3		13	100.0%			3	13	100.0%	
25		4		10	83.3%	2	16.7%	4	12	100.0%	
28		3	38.5%	8	61.5%			3	13	100.0%	
29		1	26.7%	10	66.7%	1	6.7%	1	15	100.0%	
30		2	14.3%	12	85.7%			2	14	100.0%	
31		3		12	92.3%	1	7.7%	3	13	100.0%	
33		2	7.1%	9	64.3%	4	28.6%	2	14	100.0%	
34		3	15.4%	10	76.9%	1	7.7%	3	13	100.0%	

**OR Quality Improvement Survey
Questions 26, 27 and 32 Asorted by Ascending Rank
Mean Score of Respondents**

Q U E S T I O N	TOTAL																		
	OR NURSE			OR TECH			CRNA		Anesthesiologist			Surgeon			Response				
	Response		No Ans Or N/A	Response		No Ans Or N/A	Response	No Ans Or N/A	Response		No Ans Or N/A	Response		No Ans Or N/A	Response				
	Mean	Valid n		Mean	Valid n				Mean	Valid n		Mean	Valid n			Mean	Valid n		
	Mean	Valid n	Mean	Valid n	Mean	Valid n	Mean	Valid n	Mean	Valid n	Mean	Valid n	Mean	Valid n	Mean	Valid n			
27	3.00	3		2.89	9		3.00	1				3.00	1	2	2.71	14	2	2.82	28
26	3.00	3		2.70	10		3.00	1				3.00	1	1	2.93	15	1	2.87	30
32	3.00	3	1	3.11	9		3.00	1		1				2	2.86	14	4	2.96	27

**OR Quality Improvement Survey
Questions 26, 27, and 32 Count and Percent
OR Nurse Population**

Question	Response		Total	
	Solidum		Response	
	Count	Row %	Count	Row %
26	3	100.0%	3	100.0%
27	3	100.0%	3	100.0%
32	3	100.0%	3	100.0%

APPENDIX B
OR Quality Improvement Survey
Questions 26, 27, and 32
Count and Percent
OR Tech Population

Question	No Answer Or N/A	Response						Total		
		Usually		Seldom		Never			No Answer Or N/A	Response
		Count	Row-%	Count	Row-%	Count	Row-%			
26		3	30.0%	7	70.0%			10	100.0%	
27		1	11.1%	8	88.9%			9	100.0%	
32	1			8	88.9%	1	11.1%	9	100.0%	

OR Quality Improvement Survey
Questions 26, 27, and 32 Count and Percent
CRNA Population

Question	Response		Total	
	Seldom		Response	
	Count	Row-%	Count	Row-%
26	1	100.0%	1	100.0%
27	1	100.0%	1	100.0%
32	1	100.0%	1	100.0%

APPENDIX B

**OR Quality Improvement Survey
Questions 26, 27, and 32 Count and Percent
Anesthesiologist Population**

Question	Response		Total	
	No Ans Or N/A	Count	Response	
			Seldom	Response
			Count	Row %
26		1	100.0%	100.0%
27		1	100.0%	100.0%
32	1		1	100.0%

**OR Quality Improvement Survey
Questions 26, 27, and 32 Count and Percent
Surgeon Population**

Question	Response										Total	
	No Ans Or N/A	Always		Usually		Seldom		Never		No Ans Or N/A	Response	
	Count	Count	Row %	Count	Row %	Count	Row %	Count	Row %	Count	Count	Row %
26	1			3	20.0%	10	66.7%	2	13.3%	1	15	100.0%
27	2	1	7.1%	2	14.3%	11	78.6%			2	14	100.0%
32	2			2	14.3%	12	85.7%			2	14	100.0%

APPENDIX B

OR Quality Improvement Survey
Questions 15, 16, 17, 18, 19 and 20 Assorted by Ascending Rank
Mean Score of Respondents

Q U E S T I O N	TYPE																	TOTAL						
	OR NURSE			OR TECH			CRNA		Anesthesiologist			Surgeon				No Ans Or N/A				Response				
	NO ANS OR N/A	Response		No Ans Or N/A	Response		Mean	Valid n	Response	Valid n	Mean	Valid n	Response	Mean	Valid n	Response	Mean	Valid n						
		Mean	Valid n		Mean	Valid n													Mean	Valid n	Mean	Valid n	Mean	Valid n
19		1.33	3	4	1.50	6	2.00	1	1.00	1	8	1.50	8	12	1.47	19								
15		1.33	3	7	2.00	3	2.00	1	2.00	1	13	2.00	3	20	1.82	11								
18		1.67	3	2	1.63	8	2.00	1	2.00	1	11	2.20	5	13	1.83	18								
17		1.67	3	6	2.00	4	3.00	1	2.00	1	7	1.89	9	13	1.94	18								
16		2.00	3	5	2.00	5	2.00	1	2.00	1	13	2.00	3	18	2.00	13								
20	1	1.50	2	5	2.00	5	2.00	1	2.00	1	12	2.25	4	18	2.00	13								

APPENDIX B
OR Quality Improvement Survey
Questions 15, 16, 17, 18, 19 and 20 Count and Percent
OR Nurse Population

Question	No Answer Or N/A	Response						Total	
		Always		Usually		No Answer Or N/A		Response	
		Count	Percent	Count	Percent	Count	Percent	Count	Percent
15		2	66.7%	1	33.3%			3	100.0%
16				3	100.0%			3	100.0%
17		1	33.3%	2	66.7%			3	100.0%
18		1	33.3%	2	66.7%			3	100.0%
19		2	66.7%	1	33.3%			3	100.0%
20	1	1	50.0%	1	50.0%	1		2	100.0%

APPENDIX B
OR Quality Improvement Survey
Questions 15, 16, 17, 18, 19, and 20
Count and Percent
OR Tech Population

Question	No Ans Or N/A	Response				Total	
		Always		Usually		Response	
		Count	Percent	Count	Percent	Count	Percent
15	7			3	100.0%	7	100.0%
16	5			5	100.0%	5	100.0%
17	6			4	100.0%	6	100.0%
18	2	3	37.5%	5	62.5%	2	100.0%
19	4	3	50.0%	3	50.0%	4	100.0%
20	5			5	100.0%	5	100.0%

APPENDIX B
OR Quality Improvement Survey
Questions 15, 16, 17, 18, 19, and 20
Count and Percent
CRNA Population

Question	Response				Total	
	Usually		Seldom		Response	
	Count	Row%	Count	Row%	Count	Row%
15	1	100.0%			1	100.0%
16	1	100.0%			1	100.0%
17			1	100.0%	1	100.0%
18	1	100.0%			1	100.0%
19	1	100.0%			1	100.0%
20	1	100.0%			1	100.0%

OR Quality Improvement Survey
Questions 15, 16, 17, 18, 19, and 20
Count and Percent
Anesthesiologist Population

Question	Response				Total	
	Always		Usually		Response	
	Count	Row%	Count	Row%	Count	Row%
15			1	100.0%	1	100.0%
16			1	100.0%	1	100.0%
17			1	100.0%	1	100.0%
18			1	100.0%	1	100.0%
19	1	100.0%			1	100.0%
20			1	100.0%	1	100.0%

APPENDIX B

OR Quality Improvement Survey

Questions 15, 16, 17, 18, 19, and 20

Count and Percent

Surgeon Population

Question	No Answer Or N/A	Response								Total	
		Count	Always		Usually		Sometimes		No Answer Or N/A	Response	
			Count	Row %	Count	Row %	Count	Row %			Count
15	13			3	100.0%			13	3	100.0%	
16	13			3	100.0%			13	3	100.0%	
17	7	1	11.1%	8	88.9%			7	9	100.0%	
18	11			4	80.0%	1	20.0%	11	5	100.0%	
19	8	4	50.0%	4	50.0%			8	8	100.0%	
20	12			3	75.0%	1	25.0%	12	4	100.0%	