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## Operating Room Benchmarking: The Kaiser Permanente Experience

***In 1994, a Kaiser Permanente (KP) Interdivisional Task Force—comprising 30 surgeons, anesthesiologists, perioperative managers, and technical staff—completed a comprehensive, internal Operating Room (OR) Benchmarking Study. The study used 11 metrics in three categories—OR Productivity, OR Costs, and Satisfaction—and set operational targets, or benchmarks, for many of the metrics. The resulting Operating Room Best Practices (ORBP) report describes many business and clinical Best Practices that may be expected to produce substantial performance improvements. The 1994 study estimated potential organizational savings of \$72.6 million. In a 1996 follow-up study, the KP-California Division demonstrated actual savings of \$10.1 million for three of the metrics combined. By showing the clinical and economic benefits of collaboration among surgeons, anesthesia personnel, and other OR staff, our study has also led ORs throughout KP to use a multidisciplinary problem-solving approach instead of giving perioperative managers sole responsibility for improving OR efficiency.***

### Introduction

As an established and leading health maintenance organization in terms of reputation, longevity (50 years), and membership (more than nine million), the primary focus of Kaiser Permanente (KP) is our members. Our greatest challenge is to maintain a high-quality standard of care that fosters wellness, appropriately treats illness, and accomplishes both of these functions at a reasonable cost to health plan members. Consequently, acting neither in a crisis mode nor from any sense of urgency, KP in 1991 began to scrutinize its business and clinical practices to explore how we could improve the way we do things. This exploration reflected senior management's anticipation of the competitive health care market which was developing.

Specifically, other health care organizations were offering lower rates, promised better access to ambulatory services, and appeared to design more flexibility into their health plans. Our leading edge was especially at risk in the three KP Divisions that main-

tained hospitals in addition to medical offices—California, the Northwest, and Hawaii.

To address these business challenges, the Operating Room (OR) Benchmarking Study was conducted. Benchmarks are operational targets that are set for each of several cost and productivity metrics and that are determined from a combination of information in the literature, results of data analysis, professional experience, and operational expertise. The OR was chosen as the focus of the study because of the high level of expenditures in this complex environment and because of its interdependence with other departments and hospital systems.

The goal of the study was fourfold: to learn what makes a good operating room; to identify Best (Business) Practices; to identify potential cost savings; and to provide a model for KP interdivisional cooperation.

### Methods

#### Scope of Study

The study examined hospital-based ORs (ie, main ORs and ambulatory surgical units [ASUs]); scheduling and preoperative processes used for surgical patients; anesthesia staffing practices; management of OR supplies; OR nursing staffing practices for direct caregivers (ie, persons who provide care to patients) and indirect caregivers (ie, managers, coordinators, housekeepers, clerical staff, other ancillary personnel); and utilization of OR time (ie, by nursing, anesthesia, and surgical staff).

The scope of the study did not include minor and special procedure rooms outside the OR "boundaries" or ORs within the labor and delivery units; staffing practices in areas or departments other than described above (ie, scheduling office, housekeeping); reusable items (eg, instruments, capital equipment); staff who process surgical instruments, engage in general handling of materials, or who do not work in the OR.

Even though the scope of the study did not cover these departments or functional areas, relevant issues were discussed and anecdotally documented in interviews and site visits of candidate high-performing facilities.

#### Participant Selection

A team of >30 surgeons, anesthesiologists, perioperative managers, and technical staff—supported by a consultant from the Juran Institute, a

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*“To evaluate productivity, the team used four metrics: OR performance, OR utilization, room turnaround time, and surgeon turnaround time.”*

quality management consulting firm—was selected by an Executive Steering Committee of senior management to participate in the study. The three hospital-based KP Divisions (California, Northwest, and Hawaii) were selected for internal benchmarking. This methodology was chosen primarily because we wished to further investigate our own environment and because we anticipated difficulty in obtaining comparable data from non-KP organizations. From within these three KP Divisions, data were collected from 42 sites, including 30 main ORs and 12 ASUs.

**Study Metrics**

The team chose 11 metrics for comparison to evaluate OR productivity, cost, and satisfaction. To evaluate productivity, the team used four metrics: OR performance (effective use of surgical time), OR utilization (percentage of allocated OR time used), room turnaround time (time interval between one patient leaving and next patient entering the OR), and surgeon turnaround time (time interval between end of surgery for one patient and making an incision on the next patient).

To measure cost, the team used three metrics: cost of OR labor, cost of anesthesia labor, and cost of materials.

To measure satisfaction, the team used four metrics: patient satisfaction, OR staff satisfaction, physician satisfaction, and CRNA satisfaction.

**Formation of Benchmarking Teams**

Using a team of more than 30 members to conduct benchmarking was not a practical approach. Consequently, a Core Team was derived from the original Task Force to conduct the benchmark analysis and site visits and to generate recommendations. The Core Team included representatives from OR nursing disciplines, medicine, and anesthesiology, with support from technical staff.

**Equalizing Comparability of Facilities**

Each site studied had unique features with respect to types of patients (inpatients/outpatients), mix and severity of surgical cases, business schedule (24-hour versus daytime-only), physical layout of facility, and staffing composition (ie, variable use of support staff among facilities or among departments of the same hospital). Therefore, to equalize comparability of facilities in preparation for data collection, we designed analytical tools that would both screen variables and provide sufficient detail to detect differences in them. For example, selected positions (eg, OR registered nurse, surgical technician) were designated for comparison. In addition, a methodology was created for comparing OR effectiveness as well as for comparing each facility’s cost of surgical materials that also accounted for mix or acuity of procedures at that facility. A staff model and methodology were developed to compare diverse staff compositions and tasks.

Differences in labor costs (eg, geographic, union-related) were also considered when comparing operational costs. For example, the staffing analysis used full-time equivalents (FTEs) instead of payroll dollars, and the materials cost analysis used a standardized unit cost per procedure. In addition, main ORs and ASUs were compared and benchmarked separately because as different types of facilities (ie, inpatient versus outpatient), they differed in type and case-mix of patients, scheduling practices, facility layout, and hours of operations. To ensure that information was sufficiently uniform for comparison among all facilities, existing data bases were used for workload statistics (although some data had to be reentered in a standardized format).

**The Benchmarking Process**

Our benchmarking process generally matched traditional benchmarking processes and consisted of four phases: data collection and analysis; identifying Best Practices and any performance gaps; implementation; and

**Operating Room Best Practices (ORBP) Study Timeline**

Dec 1991	OR Best Practices (Benchmarking) Project Interdivisional Task Force created
Jan 1992 - Feb 1993	ORBP ongoing analysis
Feb 1993 - Nov 1993	Site visits and data collection
Feb 1994	Results presented at KP national teleconference; ORBP report published and disseminated within KP
Apr 1994 & Apr 1997	ORBP results reported at AORN national conferences
Nov 1996	ORBP results reported at Juran Institute Quality Conference
May 1997	Follow-up study identified potential cost savings
Sep 1997	ORBP Update Memo to California Division Directors, TPMG & KFHP/H Administration
Sep 1998	Updated ORBP results reported at IIE Conference



recalibration (ie, monitoring and evaluation).

**Phase 1: Data collection**

In the first phase—data collection and analysis—we identified high-performing facilities; medical facility performance gaps and major contributors to these gaps; estimates of potential savings; emerging themes related to cost and productivity; and predictors of overall satisfaction.

To collect information about these operational processes, detailed survey questionnaires were designed. The survey data as well as information obtained from standard payroll and nonpayroll reports enabled us to identify candidate high-performing facilities. To ensure that these survey data were reliable despite the length and complexity of the survey tool, the technical staff held individual meetings with each major stakeholder in the OR (eg, the perioperative manager and chief or manager of anesthesiology).

To evaluate patient satisfaction, a questionnaire was given to each surgical patient during a specific timeframe before discharge. (The patient satisfaction survey was also designed to help us identify major predictors of surgical patients' overall satisfaction.) Patients were requested to complete the form and return it by mail in the stamped envelope provided. To evaluate satisfaction of the OR personnel, we mailed surveys to the anesthesiologists, surgeons, and nurse anesthetists at their home addresses; OR staff received their surveys at the workplace.

**Phase 2: Identifying Best Practices.**

The Business and Clinical Best Practices identified with each metric were defined as actual standards, policies, procedures, and practices found during initial data collection or, most frequently, during site visits.

Two-day site visits to 11 candidate high-performing facilities were conducted to validate the information received, to determine the practices that made the site a high performer, and to identify the Best Practices. Best Practices included processes that promote high performance as well as standards that are realistically achievable by other facilities.

During our survey of these high-performing facilities, we reviewed clinical outcomes to ensure that the Best Practices identified were not likely to have adverse impact on patients. (Best Practices were explored further if any resulting outcome fell outside the acceptable range.) This approach was taken so that clinical outcomes would be compared among all facilities and measured against industry standards instead of being statistically correlated with Best Practices.

During the site visits, clinical staff interviewed the managers and supervisors responsible for clinical out-

comes to verify that the facility was not having problems with this issue. Facilities that were high-performing in the satisfaction category participated in facilitated interview sessions with Core Team members. Perioperative managers and the chiefs and managers of anesthesiology were interviewed to discover more detail of the specific operational and cultural features of these high-performing facilities. At the conclusion of the review, a report of summary findings was presented to administrative and key personnel of the OR. The report included verification (or lack thereof) that the facility was high-performing in the specific metric(s). The report also reviewed the potential Best Practices identified.

At facilities with a low return rate for patient satisfaction surveys, patient satisfaction was restudied to increase the statistical significance of the sample.

**Phase 3: Implementation**

To enable OR stakeholders to successfully implement the Best Practices identified by our benchmarking project, we formulated a communication plan that addressed the logistics—ie, how, when, what, and with whom to communicate the results of the study.

To communicate with all concerned parties simultaneously while addressing the concerns of first-line managers (who might need the information to explain results to their managers), we used meetings, presentations, and publications as part of our communication strategy.

Specifically, information constantly flowed throughout the project to and from all perioperative managers, chiefs, and managers of the anesthesiology departments via our meetings with them during the initial survey. This information flow was achieved by soliciting input from these personnel, by conducting group meetings to discuss preliminary results, and by keeping personnel informed of results by mail. In addition, meetings with the Interdivisional OR Task Force were held about every six months to obtain input and feedback regarding progress.

After the results of the study were prepared, the Steering Committee was contacted to inform them of the findings, implications, and potential issues. The study report was distributed to all parties concerned: perioperative managers, directors of nursing, administrators, chiefs of surgical services, and chiefs of anesthesiology. Results were also presented to the Medical Group administrators and hospital administrative personnel in each Division as well as at group presentations for the chiefs of surgical specialties as requested.

We also organized a teleconference with all 42 sites and invited key stakeholders, administrators, and se-

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*"Best Practices in OR productivity (OR Utilization and OR Performance) included use of all-day blocks of time, on-time start for first case of the day, physician serving as OR director, effective OR Committee, streamlined preoperative processes, overlapping turnaround processes, accurate procedure cards, scheduling guidelines, and routine block reallocation..."*

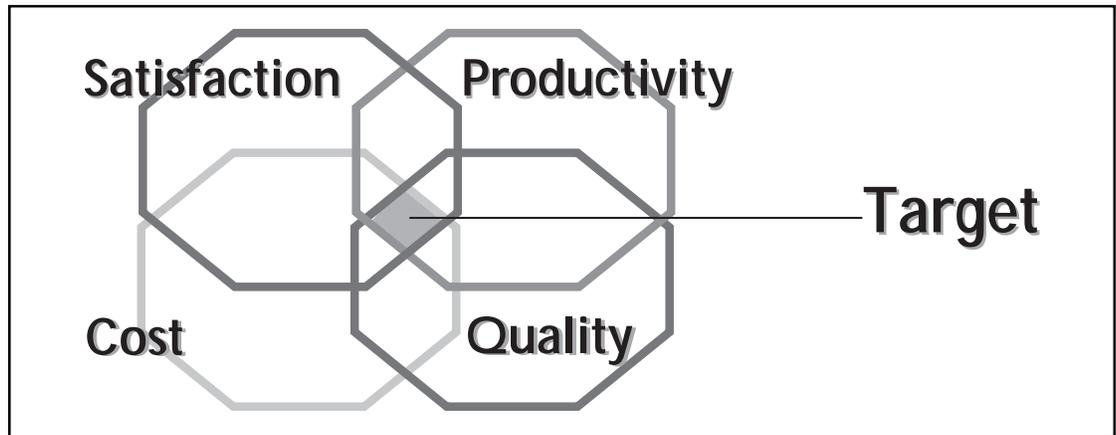


Fig. 1. Schematic diagram shows overlapping areas for which benchmarks have been set.

nior corporate managers to participate. The program included an interactive question-and-answer session.

#### **Phase 4: Recalibration**

To ensure ongoing monitoring and evaluation of the effort, to share new Best Practices, and to encourage continued focus on the major issues of the project, we published a *Best Practices Newsletter* containing information from each of the facilities regarding their successes. (Ongoing individual Divisional work is also being conducted to expand and improve the original communication product.)

#### **Estimating Savings**

The 1994 study identified potential cost savings for five of the 11 metrics. In 1996, two years after completion of the initial report, a follow-up study was performed to measure how much could be saved with the goals of the original study modified for selected metrics. That follow-up study compared three of the five cost metrics in California facilities only. The metrics compared were OR Labor, OR Utilization, and OR Performance.

#### **Results**

##### **Benchmarks Identified by the Study**

Benchmarks were created for the areas shown in Figure 1. The benchmark for OR Utilization was set at 80% for ASUs and was set at 85% for main ORs. These targets were set in accordance with observed Best Practices to achieve optimal balance between efficient use of ORs and ability to provide the flexibility to add urgent cases. For main ORs, the benchmark for OR Performance (effective use of surgical time) was set at 5% below the mean length of procedure; for ASUs, the benchmark was set at 10% below the mean length of procedure.

To calculate the benchmark for OR Labor Cost, the

cost for all ORs was compared with an "optimal" staffing model developed for different-sized ORs. Similarly, to calculate the benchmark for Anesthesia Labor Cost, the cost for all ORs was compared with an "optimal" staffing model developed for different-sized ORs. The benchmark for OR Material Cost was set to the 10th-lowest cost of materials observed among the 42 facilities studied. Also included in this target was the case-mix acuity at each facility.

##### **Best Practices Identified by the Study**

In the satisfaction category, Best Practices were identified as factors which have a positive influence on overall satisfaction for the group being studied. The results of the satisfaction survey identified these specific factors predicting member satisfaction.

Eight Best Practices contributed most toward positive change: OR productivity, labor, and materials; anesthesia labor; and satisfaction of patients, OR staff, physicians, and CRNAs. (For a complete list of these Best Practices, please contact the authors.)

Best Practices in OR productivity (OR Utilization and OR Performance) included use of all-day blocks of time, on-time start for first case of the day, physician serving as OR director, effective OR Committee, streamlined preoperative processes, overlapping turnaround processes, accurate procedure cards, scheduling guidelines, and routine block reallocation.

Best Practices for OR labor included use of two staff members per OR; RN-to-ORT ratio of 65:35 (now set at 60:40 throughout KP); use of 2.4 to 2.5 staff members per OR (in electively scheduled blocks); use of short shifts; staffing to demand; and use of part-time staff, per diem staff, or both.

Best Practices for OR materials included standardization of materials with compliance monitoring; move



from surgeon preference cards to procedure cards; presence of an OR materials coordinator and an OR Cost Awareness Committee; use of "reusable" instead of "disposable" materials; and designation of supplies as "available" instead of "open."

Best Practices for anesthesia labor included assignment of anesthesiologists to OR as primary care provider for high-risk patients; Anesthesia Care Plan formulated by anesthesiologist with assistance of CRNA; CRNA participation in preoperative evaluation of all but high-risk patients and patients who require complex care; and appropriate CRNA education and credentials in regional anesthesia if opportunities are provided to practice in this area.

Anesthesia care received and confidence of patients with OR staff were predictors of high overall patient satisfaction. Quality of staff, quality of instrumentation, and level of responsibility in job predicted high overall OR staff satisfaction. Performance of OR nursing staff, physical characteristics of OR suite, and availability of equipment and supplies in the OR predicted high overall physician satisfaction. Quality of OR staff service, relationships and communication with other hospital staff, and quality of service provided by surgeons predicted high overall CRNA satisfaction.

### Potential and Actual Organizational Savings Identified by the Study

For the 1994 operating year, overall potential savings of \$72.6 million were identified for the organization. Grouped by study metric, potential savings (in millions) were identified for OR Materials (\$21.7), OR Labor (\$5.2), Anesthesia Labor (\$10.9), OR Utilization (\$14.5), and OR Performance (\$20.3). All potential savings were thought to be achievable without causing any adverse clinical outcome (Figure 2).

In the 1996 follow-up study of three of the metrics—OR Labor, OR Utilization, and OR Performance—at California facilities, realistic potential savings were calculated as \$18.7 million (ie, a figure equivalent to two-thirds of total theoretical potential savings, as explained in **Discussion**).

Of this \$18.7 million in potential savings, the 1996 follow-up study showed that an actual savings of \$10.1 million was realized (Figure 3). The major areas of savings were OR Utilization (which increased from 81% to 86%), OR Performance (which improved in main and ASU ORs), and RN-to-ORT ratio (which changed from 71% RNs to 67% NRs). Total savings identified by these three metrics were equivalent to 54% of the savings originally projected and were believed to constitute a major accomplishment, con-

sidering that no formal implementation project efforts were conducted after publication of the original study results.

### Discussion

Our ORs had all been studied frequently in the past. Perioperative managers and physicians had various levels of skepticism and criticism of previous cost analyses studies, which were usually very broad in nature, included little input from key stakeholders, and were performed by Divisional support staff or external consultants. For this reason, we determined it necessary to allocate a substantial amount of time to maintaining direct contact with individual managers. We also determined it necessary to work with groups personally to build credibility, to gain confidence in our benchmarking process, and to obtain early "buy-in" for the results.

Partly as a consequence of this extensive contact, the project took nearly three years to complete. This duration was longer than originally intended, but it is vindicating.

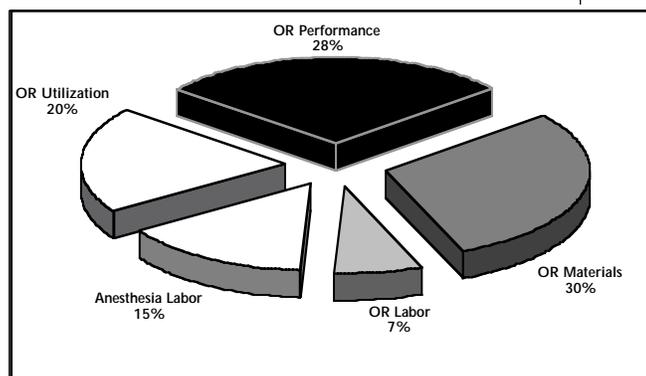


Fig. 2. Pie chart shows potential cost savings identified for 1994.

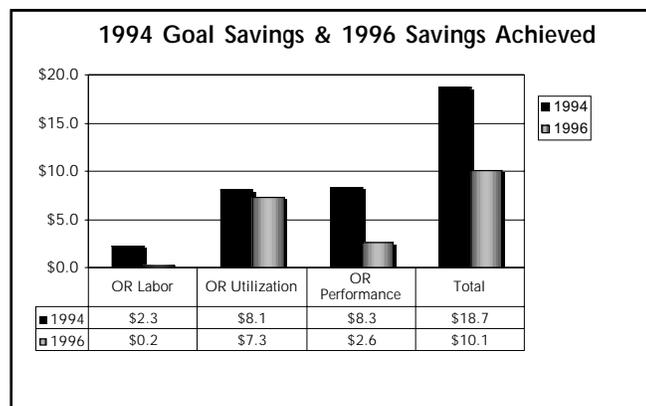


Fig. 3. For three cost metrics in California facilities, bar graph compares potential cost savings identified for 1994 and cost savings achieved in 1996.

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cated by the final study report’s attention to detail, credibility, reliability, expansiveness, reality of operational understanding, the acceptance it has garnered from most key stakeholders, and its vision for future development of benchmarks.

#### Challenges

Medical specialties differ in their physical and organizational structures. For example, coordinating and performing surgeries in a KP OR is achieved by a large assortment of equipment, supplies, and implantable devices as well as by a multitude of people—nursing staff, surgeons, anesthesiologists, certified nurse anesthetists (CRNAs), and ancillary personnel. In addition to giving the OR its own personality, this complexity of the OR environment makes it difficult to conduct comparative measurements of services and costs. The complex environment of the OR and the structural and operational differences among the sites and Divisions thus presented challenges that tested our innovativeness, perseverance, endurance, commitment, and ultimately the quality and credibility of our results. In addition, member satisfaction with OR-related care is not easily evaluated because most surgical patients treated in the OR receive some form of anesthesia or sedation and therefore do not fully recall their surgical experience.

#### Learnings

Having undertaken a project of this magnitude, we learned many lessons, including some that were very positive. One of the most significant positive learnings was the importance of reviewing the 11 facilities. The subjective information observed and obtained by the Core Team was invaluable for the identification of Best Practices and the quality of the final report. The process for validating the previous computer and questionnaire data was also very important. Some of what seemed to be high-performing facilities “on paper” were not validated as being so when specific practice details were evaluated.

Another positive learning involved the high level of knowledge and clinical expertise of the Core Team. Indeed, the importance of high-level clinical and technical expertise of the Core Team personnel was invaluable to the success of this project. During the site visits, the Core Team was able to identify many Best Practices because of its knowledge in the relevant areas and because of the opportunity afforded the Core Team to compare with other facilities visited. Staff at the facilities were often not aware that their practice was unique or different from that of other ORs. The Core Team’s level of expertise was

important also for the acceptance it brought the report and for the “buy-in” for implementation obtained from most key stakeholders.

A third—and major—positive learning resulted from issuing a practical report, the *Operating Room Best Practices (ORBP)* report. This report is a practical, “user-friendly” document, not merely theoretical or conceptual: To implement changes in practice, a manager needs only to identify the area for potential improvement, look up the Best Practices associated with the area, and develop an action plan. The Best Practices are concrete suggestions found in high-performing (Best Performer) facilities and are transferable to ORs and ASUs at most KP locations.

#### Other Learnings

In addition to these major, positive learnings, results of the project taught us about allocating resources, setting project scope, reporting potential savings realistically, obtaining acceptance of the report, and integrating the data that were obtained in the course of conducting the project.

#### *Need for Allocating Resources*

Although the need for project-specific personnel was identified early in the study, the issue was never pursued long or diligently enough to become a reality, and all members of the Task Force continued to maintain other full-time employment. In retrospect, we believe that the project’s value must be identified at the onset and that resources (ie, people, time, and dollars) must be assigned accordingly. Had this project been approached from a more organized, project management perspective, it could have been completed in less time.

The project was expensive with regard to the people, time, and travel required. A budget was not prepared at the beginning of the project, and we do not know the actual cost to the organization to produce this study. For future projects of this magnitude, we would recommend that a formal budget be prepared so that cost-benefit decisions can be made.

#### *Need for Narrowed Scope*

Our first challenge in designing the study was to define the scope of the project to include only the most essential areas, departments, and processes that would lend themselves to comparison. The original Task Force specifically attempted to narrow the scope to include ORs only, but we now believe that the project probably would have benefited from division into smaller segments. The complexity and interrelation of the metrics would have made this seg-



mentation difficult but might have resulted in quicker turnaround time. Main ORs could also have been studied separately from ASUs.

**Considerations in Reporting Potential Savings**

Although our study reported potential overall organizational savings of \$72.6 million, the Core Team did not believe this amount could be actually attainable within a short time (ie, within three years). Indeed, the percentage of potential savings that was realistically achievable was difficult, if not impossible, to achieve; and obstacles to fully achieving these financial goals were clearly delineated in the *ORBP* report. These obstacles included facilities' physical constraints to implementing Best Practices; short timeframe for cost data base; and the likelihood that some data supplied by managers and physician chiefs were estimates (ie, figures not actually observed).

The decision to publish the total overall potential savings was made by the Task Force and was supported by the Steering Committee; however, publication of this dollar figure caused those who only read or heard the "bottom line" of the study to place unrealistic expectations on the managers who would be required to implement the cost reductions. Therefore, for purposes of the 1996 follow-up study, we reduced by a third the potential savings figure reported for the three metrics.

**Need for Promoting Acceptance of Results**

Most key stakeholders enthusiastically accepted the findings of this study, with one exception in one area. Extensive work was done during the project to overcome this problem and to resolve the issues, but in the end, all attempts were unsuccessful. In one KP Division, the problem has interfered with acceptance of the other 90% of the *ORBP* report. In retrospect, more stringent initial validation of process ownership and of study results by each key stakeholder would have great value. To achieve effective implementation, a project of this size needs active "champions" by peers in each area.

**Need to Integrate Data**

From the outset, we knew that data collection would present major problems. For the technical support staff, for example, integrating four different OR information systems into comparable data was very difficult. In addition, because Divisions defined like times differently, data for these times were reported inconsistently, and many inaccuracies in the data were discovered. More time spent during the initial phases of the project in identify-

ing and resolving these issues would have saved us much time later in the study.

**Organizational Effects of the Study**

Several years have passed since publication of the results of this extensive benchmarking project in the *Operating Room Best Practices (ORBP)* report. Indeed, the key to the operational value of this study is its Best Practices information. We are very happy to report that most aspects of the study have been accepted and that the report is in various stages of implementation and recalibration throughout each KP Division and at individual KP facilities. The largest Division, California, has expanded and improved upon specific data points. Immense strides have been made in increasing the timely production of accurate comparative information for facilities to use in their day-to-day operations.

This study has changed the culture of our organization in how it looks at the OR. Before the advent of this project, most administrators believed that saving money and improving efficiency in the OR was the responsibility of individual perioperative managers. By emphasizing clinical and economic benefits of collaboration among surgeons, anesthesia personnel, and the OR staff, and by using the Task Force and Core Team as role models, the report has helped to make the multidisciplinary approach to problemsolving in the OR the accepted norm.

In studying some "sacred cows" in OR practice, we have shown that some of these can be justifiably eliminated without eventuating any adverse clinical outcome. Each day, talented and innovative perioperative managers and physicians are discovering new ways to improve the cost-effectiveness and productivity in their ORs. We should continue our efforts in external benchmarking to add another dimension—especially outside the KP organization—to increasing the efficiency and cost-effectiveness of our ORs. ❖

**Bibliography**

- Benchmarking study identified hospitals' best practice. *OR Manager* 1993;9,11,14,15.
- Boosalis M, Allawi S, Collins TR, Trombley B. Benchmarking: tracking "the best" hospitals. *Healthc Forum J* 1993 Jan/Feb;36(1):53-7.
- Brodsky JB. Cost savings in the operating room. *Anesthesiology* 1998;88:834.
- Camp R. Learning from the best leads to superior performance. *J Bus Strategy* 1992 May/Jun;13:3-6.
- Camp RC. Benchmarking: the research for industry best

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***"I have found several 'thumbnail' metrics useful in managing the surgery department and its approach to the OR. For example, a well-managed OR has 85% utilization; a minute of OR time costs about \$13; an hour of OR time costs roughly the same as a day of hospitalization; the OR costs about twice as much as an ambulatory surgery unit, with short-stay cases being or intermediate cost."***  
Albert Mariani, MD

***"We should remember that this is a Best (Business) Practices study, which means that although quality of service was acknowledged to be an important determinant of organizational success, this study emphasized cost."***  
Albert Mariani, MD

- practices that lead to superior performance. Milwaukee, WI: ASQC Quality Press; 1989.
- Cattalini D. Best practices in ambulatory surgery. *Healthc Forum J* 1993 Jan/Feb;36(1):28-9.
- Does optimal operating room utilization result in efficiency? *Osteopath Hosp Leadership* 1987 Jul/Aug;31: .
- Drachman DA. Benchmarking surgeon satisfaction at academic health centers: a nationwide comparative survey. *Best Pract Benchmarking Healthc* 1996 Sep;1(5):236-41.
- Edelist G, Urbach G. Anaesthesia for day-care surgery: a symposium (II). Organization of the out-patient surgical facility. *Can Anaesth Soc J* 1980;27:406-8.
- Falasco PR, Eastaugh NA. Effective utilization of operating room services. *Health Matrix* 1986 Fall;4(3):29-31.
- Flower J. Benchmarking: springboard or buzzword? *Healthc Forum J* 1993 Jan-Feb;36(1):14-6.
- Haiart DC, Paul AB, Griffiths JMT. An audit of the usage of operating theatre time in a peripheral teaching surgical unit. *Postgrad Med J* 1990;66:612-5.
- Hoffman M. A graphic look at OR utilization. *AORN J* 1975;22:473.
- Jennings K, Westfall F. Benchmarking for strategic action. *J Bus Strategy* 1992 May-Jun;13:22-5.
- Kaiser benchmarking study to identify best practices. *OR Manager* 1994 May;10(5):1,16,17.
- Lambertus TD. Understanding benchmarking. *J Healthc Mater Manage* 1993 Oct;11(9):36-40.
- Markin A. How to implement competitive-cost benchmarking. *J Bus Strategy* 1992;13:14-20.
- Mathias JM. Manager's bane: scheduling and utilization. *OR Manager* 1990 Dec;6(12):12-3.
- Mitchell L. Benchmarking, benchmarks, or best practices? Applying quality improvement principles to decrease surgical turnaround time. *Best Pract Benchmarking Healthc* 1996 Mar;1(2):70-4.
- Patrick MS. Benchmarking: targeting "best practices". *Healthc Forum J* 1992 Jul-Aug;35(4):71-2.
- Patterson P. OR facing pressure for higher utilization. *OR Manager* 1992 Jan;8(1):1,8-9.
- Patterson P. Turnover time is linked to variety of factors. *OR Manager* 1991 Feb;7(2):1,6-8.
- Rotondi AJ, Brindis C, Cantees KK, DeRiso BM, Ilkin HM, Palmer JS, et al. Benchmarking the perioperative process. I. Patient routing systems: a method for continual improvement of patient flow and resource utilization. *J Clin Anesth* 1997;9:159-69.
- Rummler GA, Brache AP. Improving performance: how to manage the white space in the organization chart. 2nd ed. San Francisco: Jossey-Bass; 1995. (Jossey-Bass management series)
- Schanilec JL. Key strategies help to tame turnover time. *OR Manager* 1991 Apr;7(4):23.
- Spendolini MJ. How to build a benchmarking team. *J Bus Strategy* 1993;14:53-7.
- Spry C. Essentials of perioperative nursing: a self-learning guide. 2nd ed. Gaithersburg, MD: Aspen; 1996.
- Survey: What OR managers are earning. *OR Manager* 1991 Jul;7(7):1,6-11.
- Swanberg G, Fahey B. More operating rooms or better use of resources? *Nurs Manage* 1983 May;14(5):16-9.
- Tomas S. Benchmarking: a technique for improvement. *Hosp Mater Manage Q* 1993 May;14(4):78-82.
- Turner PH, Lamberta J. Rewarding efficient OR/PACU utilization. *Nurs Manage* 1989 Aug;20(8):561.
- Young GJ, Charns MP, Daley J, Forbes MG, Henderson W, Khuri SF. Best practices for managing surgical services: the role of coordination. *Health Care Manage Rev* 1997;22:72-81.

## Commentary

### Hawaii Region



**Albert Mariani, MD**

Dr. Mariani did his training in Urology at the Mayo Clinic, after which he joined the Hawaii Permanente Medical Group in 1980. He was appointed Chief of Surgical Services in 1983 and has served in that capacity since. He has served on the Interregional New Technologies Committee since 1991 and authored the Hawaii Specialty Care Model which has been featured at national meetings.

The Operating Room Benchmarking Study was the largest effort to date by the KP Medical Care Program to understand that incredibly complex and very expensive health care environment known as the OR. The Task Force consisted of analysts, OR directors, hospital administrators, anesthesiologists, CRNAs, and

surgeons. The Task Force members were experienced, knowledgeable, and dedicated to what turned out to be several multiday meetings over three years.

In the Hawaii Region, the OR metrics proved to be the most useful and have become the benchmarks whereby we measure our OR efficiency. I have found several "thumbnail" metrics useful in managing the surgery department and its approach to the OR. For example, a well-managed OR has 85% utilization: If utilization is less than that, expensive OR time is being wasted; if more than that, the OR schedule is getting too crowded—which results in unacceptably long waits for surgery as well as the need for overtime and extended working hours. In addition, a minute of OR time costs about \$13. This concept is useful when considering the cost-effectiveness of timesaving equipment or supplies. Moreover, an hour of OR time costs roughly the same as a day of hospi-



talization. Careful definitions of OR Turnaround Times (Room Turnaround Time, Surgeon Turnaround Time) can be useful for quantifying what really is going on regarding turnaround. Unfortunately, we were unsuccessful in our efforts to collect this information in a public way to challenge discrepancies and thus to validate the data. The data have been collected but taking action on the data would be difficult without independent validation, which would require a focused study.

Finally, marked cost efficiencies can be achieved by assigning cases to the appropriate setting. The OR costs about twice as much as an ambulatory surgery unit (ASU), with short-stay cases being of intermediate cost. These OR metrics give us an instrument that measures performance by commonsense, widely accepted definitions that allow longitudinal comparisons over time. We have adopted the metrics of the Task Force to measure the efficiency of our OR.

There are some caveats. We should remember that this is a Best (Business) Practices study, which means that although quality of service was acknowledged to be an important determinant of organizational success, this study emphasized cost. Some evidence showed a trend toward a mild negative correlation between cost and satisfaction.

Despite Herculean efforts to standardize data, this task was impossible without on-site inspection. However, this standardization of on-site data would be prohibitively expensive if done for ongoing evaluation of OR services in every service market. Collecting comparable data in the same market over time would be more feasible because the same market uses the same information services infrastructure over time. Thus, not all intuitively good ideas could be quantified. Some were accepted in our Region simply because they made sense on the basis of extensive OR management experience. Uncovering new ideas was the most beneficial effect of the attempt to standardize the data.

While I am obviously biased and while there are few endeavors that depend upon teamwork as much as in the OR, there is a hierarchy of required satisfaction determined by personal risk and responsibility. That hierarchy looks something like this: patients>>surgeons>anesthesiologists>CRNA>staff. This concept was not addressed in the report. At each meeting, never more than 3 of approximately 30 participants were surgeons, and only 1 of these surgeons attended all sessions. Some of the report's recommendations must be read in this light. The report notes that the Permanente Medical Groups are managed by influence rather than authority. In my experience, influence based on correct data is far

more powerful than authority for achieving desired results, and this report represents a substantial and meaningful effort to provide such data.

### Southern California Region

**Max Wirjo, MD**

Coordinating Chief of Anesthesiology, SCPMG.

As we all remember, the *ORBP* Task Force initially created controversies and criticism—if not skepticism—from different directions when it was created. Even we had to settle our differences in the final days of finishing that document. Furthermore, looking at the criticisms carefully, I notice that they entirely differ from each other depending on the specialty and department that produced the criticism. On the basis of this experience alone, I concluded that the *ORBP* report is probably the best document or set of recommendations that we have ever created, and that we should be proud of that.

Even now, three years later, we can still look at the *ORBP* report and check whether our practices match its recommendations. The *ORBP* report is certainly specific to our practice and culture, but I think the report would apply and be useful to any health care organization that has a setup similar to ours.

My only disappointment has been that the *ORBP* document has been underutilized—that not enough commitment was given to implementing it. This could well be due either to the criticism heard at the time or to the lack of champions for the report's recommendation, but I believe that time will show the *ORBP* report being used as a reference for OR Best Practices.

Thanks for asking me to comment and reflect on this important document.

### Northern California Region



**Gene Golfus, MD**

Medical Director of OR and Perioperative Services, Napa-Solono (Vallejo), California; and Co-chair, Regional Perioperative Management Group (RPMG).

A major recommendation of the final *ORBP* report was that each of our ORs should have a physician-director, as I am. The report also recommended that a group like the RPMG continue to work collaboratively between Kaiser Foundation Hospitals (KFH) and The Permanente Medical Group (TPMG) on OR issues. The RPMG is composed of the OR Directors within TPMG, the Perioperative Service Line Directors within KFH, and the OR Managers within KFH for the North's 23 OR facilities. Although I was

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Gene Golfus, MD

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*"However, there are things in the report that, in retrospect, I do not think hold up as well. For example, the ever-rising bar of the '25th percentile' Best Practice time was accepted by the senior leadership but is less than clear as an attainable goal—and may not be a desirable one."*

Gene Golfus, MD

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not a part of the original OR Benchmarking Study, I have been invited as a participant in the 1998 "OR Improvements Task Force," a group put together by Kay Stodd involving the California Division, to look for guidelines for KP ORs.

Before I begin "picking" on this report, I would like to emphasize that I think Kay Stodd deserves a medal for it and for her continued work on ORs for this organization. I do not wish to be misunderstood; I am not criticizing Kay. To the contrary: this report is a monumental achievement, and it offers central points that allowed me to begin to think about ORs.

That being said, I paraphrase a famous author: It was the best of reports, it was the worst of reports.

Actually, the report was good; the way it has been interpreted and implemented is, well, less good. I think the *ORBP* study was a fantastic attempt to put together an organized look at a very complex area: the OR. Much is useful in the 1994 *ORBP* report as a stepping-stone to continued thinking about ORs, but many of the conclusions and uses of the report are misguided.

Moreover, much of the good has been lost and forgotten, and much of the error, revered. Many of the caveats were good, but no one remembers them.

The value in this report is largely as a beginning, and a stimulus for further progress in the OR. The *ORBP* report—and the facility profile that came from its work—had an impact on me and on the OR I work in. In 1991, the Vallejo OR was at 45% utilization, whereas today it is at 93% utilization. Much of that increase came from this report, which encouraged addition of an OR director and stimulated the OR manager, Sharon Fine, of KFH and myself to work as a collaborative team to improve OR utilization. The sections on professional satisfaction of surgeons, OR nursing, and anesthesia are also very good beginnings.

The report was correct in noting that an OR that is already achieving utilization beyond 85% may have difficulty adding urgent add-on cases. We are experiencing that situation now; the report was correct—we have overshot the mark.

However, there are things in the report that, in retrospect, I do not think hold up as well. For example, the ever-rising bar of the "25th percentile" Best Practice time was accepted by the senior leadership but is less than clear as an attainable goal—and may not be a desirable one.

The OR timeline is split into time intervals, and mean operative time for each interval is calculated for each OR. The time that is the fastest at the level of the 25th percentile (ie, the upper fourth in time) is considered the "Best Practice." The assumption then is that if each OR across the Region were to come to

the best 25th percentile in each time slot through a case, then the Region could save \$20 million. The amount of time your OR took "to set up the case" or "from cut to close" beyond the Best Practice 25th percentile would be seen as potential savings by multiplying "excess" minutes times dollars per minute.

The problem presented by this measure is seen when you look at a cataract operation in two different facilities, one that took 77 minutes total time and another that took 80 minutes—that is, it took the same amount of time by the level of accuracy we can achieve using this measure. If these two procedures were to take "the same" total time, then calculating the savings of some minutes times dollars for each of their parts is not going to save any money. This error is compounded by each time period in each OR and thus creates very large error in evaluating potential savings.

Even if an operation can be done faster, being done 6.2 minutes faster at the end of a day does not save money. To save money, ORs must be closed and people not paid.

So if you can learn to work faster and do more cataract operations per day and thus complete your caseload of cataract operations in fewer OR days, you can then close ORs and send people home instead of paying them—then you can save money. If you get more efficient and do more operations and then do more operations on those extra OR days, well, that costs—not saves—money, because it costs money to do more surgery.

By adopting this procedure, you have also not begun to answer—or even address—questions about either cost-effective surgery or quality-vs-cost balances. The total mean times for completing a specific procedure would need to be compared, and if the result exceeds some statistical limit, you would need to go back and examine the steps.

This process had an impact on my CSA in that \$3 million was removed from the OR's budget as allocated for 1996 to determine the 1997 budget. This budgetary reduction was largely based on the report's numbers and led to an unrealistic, unobtainable budget.

The *ORBP* report has also stimulated us to go back and realize that timelines—and the definitions we base those timelines on—are not the same across the Region. This discrepancy could affect the way time is recorded in each box, and it probably means we are not comparing like items.

The Executive Steering Committee of the RPMG compiled in April 1998 and is now implementing a new set of consolidated definitions and a timeline to be used by all ORs in our Region. These definitions will match national definitions agreed upon by AORN



(American Operating Room Nurses) and AACD (American Association of Anesthesia Clinical Directors).

I will conclude with the point that the report is good but should not be taken as “gospel.” The report is a wonderful stimulus for further learning. We should not throw it away, but we should question and improve on its most valuable beginnings.

### Northwest Region



**Tom Janisse, MD**

Former Chief of Anesthesia, Northwest Permanente; Member, Interregional ORBP Task Force member.

### Change and Implementation

As a member of the OR Benchmarking Study Task Force, I experienced all phases of this complex process. It was an enormous undertaking when you consider that the strategy was to include all key stakeholders in four hospital regions and, through them, to include those people involved or affected in local departments as well as in their ORs. This process required many meetings, phone calls, and e-mail exchanges. And still, the more the potential changes could affect each department or individual, or the more interest the Best Practices generated, the more comments arose that people did not feel sufficiently included. This was a major lesson for the group. Change that has major importance requires tremendous communication and inclusion and is likely never to be done well enough. And where change falls short, implementation falters or fails—the best ideas, the best discoveries, and the best efforts may be expended for nothing. Or so it appears, because new ideas and change also require readiness in the local group, and that readiness may arrive many months or years in the future.

### Initial Comments

The following quotes exemplify sentiments initially expressed by our OR members and were to some extent echoed in the four KFH Regions:

“Unfortunately, if we implement many of the recommendations in the staffing paper, the public perception will be focused on the premise that ‘cheap and second-rate’ is our motto instead of ‘quality and safety.’”

“We can’t allow administrators with no idea what our OR/medical center is like to dictate staffing based on theory.”

“I am distinctly unimpressed with the input from people actually doing clinical work, from our own department’s experience.”

“It [the report] picks out things from various practices and puts them together in a fictional Best Practice.”

“It gives only lip service to quality and service.”

“It is my concern that an administrator will look at this document and firmly establish initial guidelines without looking at the big picture, because the big picture isn’t totally presented.”

### Operations Group

In KP-Northwest (KPNW), a study of regional OR practices (by a group called “Group 11”) had been underway in 1994 when the Interregional OR Benchmarking Study work began. We had reached several of the same conclusions before the Task Force did, and from the value of our learnings were able to add experiential credibility to ORBP recommendations. For example, a KPNW team—a surgeon, an anesthesiologist, and an OR manager, known as the “Surgical Operations Group”—was formed to manage the OR. The group studying KPNW ORs clearly recognized from past experience that no one person—surgeon, anesthesiologist, or nurse-manager—could adequately effect change in the OR or, more importantly, manage daily activities and resolve differences involving the three groups.

### An “Open OR”

Another learning for KPNW—which maintains eight operating rooms at one site and 10 at its other site—was the importance of large OR suites having one OR available for urgent and emergent add-on cases each day. This need becomes more critical when the OR suite’s utilization exceeds 80% of capacity. Because so much effort goes into optimal scheduling of elective surgery, disrupting this scheduling with urgent cases by “bumping” elective cases wastes many people’s time, is highly frustrating for the OR team, greatly dissatisfies patients, and is very costly.

The concept of an “open OR”—either a half-day block or a whole-day block—proves valuable for creating a “just-in-time” method of adjusting for another area of complexity, ie, the variable nature of surgical procedures, patients, equipment, and OR capacity. The OR Benchmarking Study Task Force tried to construct a model—or a dynamic equation—for evaluating and predicting this variability so that the schedule could be built and resources made available to routinely improve OR effectiveness. To construct this model, the Task Force researched four factors:

- The case adjustment factor, which uses relative value units (RVUs) to quantify magnitude of surgical case difficulty;
- The patient acuity index, which quantifies the critical nature of an illness or its medical complexity;

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Tom Janisse, MD

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***"It is obvious that we cannot reduce costs only by removing people. We can only drive down Anesthesia Labor costs by driving up anesthesiologist and CRNA productivity. This increased productivity is possible only in a high-performance system that requires high levels of competence and performance from anesthesiologist, CRNA, and technician staff. Progress toward superior, cost-effective care may require a substantial ongoing education and training process for all anesthesia staff."***

Tom Janisse, MD

***"For me, this Best Practices effort has not only saved millions of dollars in well-defined ways across the four KFH Regions, but it has resulted in enhanced business and clinical practice for OR teams as well as significantly improved management of OR operations. Our organization is a leader because of it."***

Tom Janisse, MD

- Evaluation of technology to determine how complicated the equipment was to operate, troubleshoot, or make available;
- OR capacity: the existence and availability of space to perform procedures.

Creating this formula was at first difficult to conceptualize and then became a daunting task to apply in practice, given the time and resources required as well as other priorities. In the end, if you had an "open OR" you could dynamically shift cases or reconfigure case lists that day to adjust for a critically ill patient, a prolonged surgical procedure, or unexpected delays caused by equipment malfunction. In practice, this procedure seemed to work well by supplementing the experience of the OR Team in anticipating these complexities and scheduling appropriately. If OR utilization was in the 60% - 70% range, then an open OR in effect existed. When OR utilization increased to an optimum 85% of capacity, then the open OR had to be incorporated into the schedule ahead of time. It took a great deal of persistence to achieve this, considering the apparent importance of cases vying for use of OR space.

#### **Staffing Model**

Complicating direct application of the anesthesia staffing model recommended in the Best Practices document was the fact that the benchmarking project looked at just the intraoperative area during an eight-hour day without presenting the "big picture" of anesthesia practice. To elucidate that "big picture," the report undertook major exploration of the "extraoperative" work done by anesthesia departments and made great efforts to build the results of that exploration into the staffing model. However, each local site has enough difference in procedures performed (eg, central lines, nerve blocks); in services offered or expected (eg, code response, acute pain service, sedation for cardioversion and MRI scans), and in the staffing for these services (eg, physicians only, physicians teamed with CRNAs) that wholesale application of the model was not easily possible. Today, the KPNW Region does use the recommended 1:3 anesthesiologist-to-CRNA staffing ratio.

The *ORBP* document contains language that I drafted specifically for implementation of the staffing model. We felt this language was imperative for the model to operate well and for it to maintain high levels of quality and service. "It is obvious that we cannot reduce costs only by removing people. We can only drive down Anesthesia Labor costs by driving up anesthesiologist and CRNA productivity. This increased productivity is possible only in a high-performance system that requires high levels of competence and performance from anesthesiologist,

CRNA, and technician staff." Progress toward superior, cost-effective care may require a substantial ongoing education and training process for all anesthesia staff." In large part, this reasoning accounts for why the Task Force recommended that Best Practices be implemented over a broad time line of 18 to 24 months and that each site look at its own OR practice in the larger context of its anesthesia department practice.

#### **Procedure Time and Turnover Time**

I would also comment on the effort to create savings by reducing either the OR Procedure Time or the OR Turnover Time. Although this reduction is important for creating high performance, the few saved minutes does not add up to cost savings unless these increments cumulatively create enough added capacity to allow an extra case to be done. One thing that helped summate increments was to give surgeons a whole-day block of OR time: Within eight hours, efficiencies can be accumulated to an extent not possible in a four-hour block. At times, ending one block and beginning another in the middle of the day creates an artificial construct with much shifting around of staff and equipment; and delays and bumping of cases easily result when blocks are overbooked or when a longer-than-usual morning clinic causes a block to start late.

#### **Conclusion**

For me, this Best Practices effort has not only saved millions of dollars in well-defined ways across the four KFH Regions, but it has resulted in enhanced business and clinical practice for OR teams as well as significantly improved management of OR operations. Our organization is a leader because of it. In KPNW alone, we have seen this in obvious and demonstrable ways. KP OR experts have taken these practices and their experience to other hospitals where we now admit our patients; and these OR experts have been instrumental in recommending and assisting the implementation of many of the practices there. In the final analysis, our members have benefited from our work. I would like to personally thank every person across our organization who spent time and energy, and offered knowledge and expertise, to the OR Benchmarking Study effort and to the resulting *ORBP* report. ❖

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