Impact of Preoperative Briefings on Operating Room Delays

A Preliminary Report

Shantanu Nundy, MD; Arnab Mukherjee, MD; J. Bryan Sexton, PhD; Peter J. Pronovost, MD, PhD; Andrew Knight, MBA; Lisa C. Rowen, RN, DNSc; Mark Duncan, MD; Dora Syin, MD; Martin A. Makary, MD, MPH

**Hypothesis:** Preoperative briefings have the potential to reduce operating room (OR) delays through improved teamwork and communication.

**Design:** Pre-post study.

**Setting:** Tertiary academic center.

**Participants:** Surgeons, anesthesiologists, nurses, and other OR personnel.

**Intervention:** An OR briefings program was implemented after training all OR staff in how to conduct preoperative briefings through in-service training sessions. During the preoperative briefings, the attending surgeon led OR personnel in a 2-minute discussion using a standardized format designed to familiarize caregivers with each other and the operative plan before each surgical procedure.

**Main Outcome Measures:** The OR Briefings Assessment Tool was distributed to OR personnel at the end of each operation. Survey items questioned OR personnel about unexpected delays during each procedure and the relationship between communication breakdowns and delays. Responses were compared before and after the initiation of the preoperative briefings program.

**Results:** The use of preoperative briefings was associated with a 31% reduction in unexpected delays; 36% of OR personnel reported delays in the preintervention period, and 25% reported delays in the postintervention period ($P < .04$). Among surgeons alone, an 82% reduction in unexpected delays was observed ($P < .001$). A 19% reduction in communication breakdowns leading to delays was also associated with the use of briefings ($P < .006$).

**Conclusions:** Preoperative briefings reduced unexpected delays in the OR by 31% and decreased the frequency of communication breakdowns that lead to delays. Preoperative briefings have the potential to increase OR efficiency and thereby improve quality of care and reduce cost.


OPERATING ROOM (OR) time is expensive, costing an estimated $15 per minute,\(^1\) and is a big contributor to the total cost of surgical services, which constitute approximately 40% of hospital revenue.\(^2\) Efficiency in the OR is increasingly used as a marker of the quality of surgical care. As a result, efforts to improve efficiency and quality in the hospital setting are often focused on reducing preventable delays in the OR.\(^2\) To this end, the Institute of Medicine, in its seminal report *Crossing the Quality Chasm*,\(^3\) identified efficiency and timeliness as 2 of 6 areas for improvement for US hospitals.

Nearly all studies on improving OR efficiency and decreasing delays focus on clinicians’ technical tasks rather than team tasks. Some of these studies focus on the role of the anesthesiologist and propose overlapping patient inductions, using separate induction rooms, or changing induction techniques.\(^4,6\) Other studies recommend a total process management approach.\(^7,8\) Although a number of these studies suggest the importance of teamwork and communication in reducing delays, none of them evaluate interventions aimed at increasing intraoperative communication and collaboration.

We developed an OR briefing tool\(^9\) to enhance communication among members of the OR team. During a briefing, the team has a discussion just prior to skin incision to familiarize the team with the plan for the operation and review a checklist of important items (eg, thromboembolic prophylaxis, potential haz-
ard, instrumentation). The purpose of the briefings is to formulate and share the operative plan, to promote teamwork, to mitigate hazards to patients, to reduce preventable harm, and to ensure all required equipment is available. However, the impact of OR briefings on delays is unknown. The specific aim of this study was to evaluate OR delays before and after the introduction of the OR briefing tool.

METHODS

STUDY DESIGN AND POPULATION

We used a pre-post design to evaluate the impact of briefings on operative delays. The preintervention period was 2 months, the intervention period was 3 months, and the postintervention period was 2 months. To evaluate delays, we used a case-based version of the Safety Attitudes Questionnaire (SAQ, OR version10) called the OR Briefing Assessment Tool (ORBAT), from May through November 2005. The study setting was the general ORs of an academic medical center (the Johns Hopkins Bayview Medical Center) where a defined set of 14 surgeons operate (7 general surgeons, 2 plastic surgeons, 3 neurosurgeons, and 2 urologic surgeons). Of these 14 surgeons, 11 agreed to implement briefings and formed the study population (6 general surgeons, 2 plastic surgeons, 2 neurosurgeons, and 1 urologic surgeon). The ORBAT was administered to OR staff, including physicians and nurses, at the end of each operation performed by a participating surgeon. Sampling was not used owing to the small sample sizes for diverse health care provider roles in the OR, which would threaten the generalizability of the data. Instead, a high response rate was sought to capture the representative assessments of each caregiver type in the OR.

OR DELAYS

To evaluate delays we surveyed OR staff using the ORBAT tool at the end of each procedure. Delays were measured with 2 ORBAT questions: (1) “There was an unexpected delay related to the case” and (2) “Communication breakdowns that lead to delays in starting surgical procedures are common.” We included all caregiver assessments of delays, rather than just 1 response per operation. The study was not designed to match respondents in the preintervention and postintervention periods.

OR BRIEFING ASSESSMENT TOOL

Survey questions were developed by generating a case-based version of the Safety Attitudes Questionnaire (SAQ, OR version10) called the OR Briefing Assessment Tool (ORBAT), from May through November 2005. The study setting was the general ORs of an academic medical center (the Johns Hopkins Bayview Medical Center) where a defined set of 14 surgeons operate (7 general surgeons, 2 plastic surgeons, 3 neurosurgeons, and 1 urologic surgeon). The ORBAT was administered to OR staff, including physicians and nurses, at the end of each operation performed by a participating surgeon. Sampling was not used owing to the small sample sizes for diverse health care provider roles in the OR, which would threaten the generalizability of the data. Instead, a high response rate was sought to capture the representative assessments of each caregiver type in the OR.

THE BRIEFING PROGRAM

The OR briefing checklist, OR Briefing 5, is a tool to enhance communication among OR team members and improve patient safety (Figure 1). Our 2-minute OR briefing familiarizes health care providers with each other and with the operative plan through 3 critical components: each member of the OR team states his or her name and role; the surgeon leads the

METHODS

STUDY DESIGN AND POPULATION

We used a pre-post design to evaluate the impact of briefings on operative delays. The preintervention period was 2 months, the intervention period was 3 months, and the postintervention period was 2 months. To evaluate delays, we used a case-based version of the Safety Attitudes Questionnaire (SAQ, OR version10) called the OR Briefing Assessment Tool (ORBAT), from May through November 2005. The study setting was the general ORs of an academic medical center (the Johns Hopkins Bayview Medical Center) where a defined set of 14 surgeons operate (7 general surgeons, 2 plastic surgeons, 3 neurosurgeons, and 1 urologic surgeon). The ORBAT was administered to OR staff, including physicians and nurses, at the end of each operation performed by a participating surgeon. Sampling was not used owing to the small sample sizes for diverse health care provider roles in the OR, which would threaten the generalizability of the data. Instead, a high response rate was sought to capture the representative assessments of each caregiver type in the OR.

OR DELAYS

To evaluate delays we surveyed OR staff using the ORBAT tool at the end of each procedure. Delays were measured with 2 ORBAT questions: (1) “There was an unexpected delay related to the case” and (2) “Communication breakdowns that lead to delays in starting surgical procedures are common.” We included all caregiver assessments of delays, rather than just 1 response per operation. The study was not designed to match respondents in the preintervention and postintervention periods.

OR BRIEFING ASSESSMENT TOOL

Survey questions were developed by generating a case-based version of the Safety Attitudes Questionnaire (SAQ, OR version10) called the OR Briefing Assessment Tool (ORBAT), from May through November 2005. The study setting was the general ORs of an academic medical center (the Johns Hopkins Bayview Medical Center) where a defined set of 14 surgeons operate (7 general surgeons, 2 plastic surgeons, 3 neurosurgeons, and 1 urologic surgeon). The ORBAT was administered to OR staff, including physicians and nurses, at the end of each operation performed by a participating surgeon. Sampling was not used owing to the small sample sizes for diverse health care provider roles in the OR, which would threaten the generalizability of the data. Instead, a high response rate was sought to capture the representative assessments of each caregiver type in the OR.

THE BRIEFING PROGRAM

The OR briefing checklist, OR Briefing 5, is a tool to enhance communication among OR team members and improve patient safety (Figure 1). Our 2-minute OR briefing familiarizes health care providers with each other and with the operative plan through 3 critical components: each member of the OR team states his or her name and role; the surgeon leads the
lays decreased from 38% to 7% from preintervention to postintervention (P<.001).

Table 1. Respondent Characteristics

<table>
<thead>
<tr>
<th>Respondent Type</th>
<th>No. (%) of Respondentsa</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attending surgeon</td>
<td>86 (20.4)</td>
</tr>
<tr>
<td>Surgical resident</td>
<td>61 (14.5)</td>
</tr>
<tr>
<td>Attending anesthesiologist</td>
<td>40 (9.5)</td>
</tr>
<tr>
<td>Anesthesiology resident</td>
<td>19 (4.5)</td>
</tr>
<tr>
<td>Certified registered nurse anesthetist</td>
<td>34 (8.1)</td>
</tr>
<tr>
<td>Scrub nurse</td>
<td>73 (17.3)</td>
</tr>
<tr>
<td>Circulating nurse</td>
<td>80 (19.0)</td>
</tr>
<tr>
<td>Nurse assistant/physicians’ assistant</td>
<td>6 (1.4)</td>
</tr>
<tr>
<td>Medical student</td>
<td>16 (3.8)</td>
</tr>
<tr>
<td>Other/missing</td>
<td>7 (1.7)</td>
</tr>
<tr>
<td>Total</td>
<td>422 (100)</td>
</tr>
</tbody>
</table>

aBecause of rounding, percentages do not sum to 100.

In our study, the use of OR briefings was associated with a 31% reduction in OR delays. Delays in the OR are a major component of the quality, efficiency, and work environment of surgical care. Decreased OR delays allow for increased surgical capacity, resulting in shorter waiting times for patients with acute illness (“add-on” cases), lower nurse turnover rates, and increased job satisfaction. These factors are often associated with safety because improved efficiency and capacity mean that more operations are performed during the daytime, when important backup personnel are readily available, and fewer operations are performed at night, when skeleton teams who may be unfamiliar with one another are more likely to work together. Thus, OR briefings have the potential to improve both quality and safety while decreasing costs and creating a more favorable and predictable work environment.

We have previously reported the positive impact of the OR briefings program on wrong-site surgery13 and OR culture. Here, we link an improvement in OR briefing on wrong-site surgery16 and creating a more favorable and predictable work environment.

The use of standardized procedures is generally accepted as a strategy to improve technical work. This study provides support for the idea that standardized procedures for communication, through OR briefings, also improve teamwork and OR delays. Efforts to standardize communication, such as through OR briefings, may be an effective strategy for improving patient safety.

Assessing the correlates and consequences of a delay in the OR is time-consuming, expensive, and often subjective. In one study conducted at a major academic hospital, only 77% of 1881 anesthesia records were correctly completed. Given that delays are difficult to quantify and case-specific, we concluded that the best judges of delays during a case are the OR staff involved with the case. Such firsthand assessment is logistically more feasible and, we believe, captures the dynamic nature of the OR in real time. Given the time and expense of measuring OR delays, the ORBAT may serve as a valuable tool to evaluate the effectiveness of interventions to improve OR efficiency.

LIMITATIONS

We recognize some important limitations to this study. First, we determined caregiver assessments of issues related to delays using the ORBAT, rather than measuring the duration of delays. Assessments are inherently subjective, and survey items are open to interpretation. We chose this method because it addresses the unexpected nature of the delays, allowing health care providers to decide whether delays were expected for the given operation (ie, a surgical exploration for a more invasive cancer than expected or a procedure in which a patient has an anatomical variation). Furthermore, scores on the SAQ have been associated with important clinical and operational outcomes in the OR. Second, we used a pre-post design without a control group, rather than a randomized design. We recognize the methodological weakness in our exclusion of a control group and our inability to track OR personnel at the surgical case level. Because nurses and anesthesiologists work with multiple surgeons, we believed a randomized design was not feasible in this early stage of the research, and the control group would likely be contaminated by OR personnel who were trained in briefings. The sample we chose allowed us to introduce the intervention to all the relevant personnel in 1 campaign. Nevertheless, an important lesson learned for future research and implementation of OR briefings is the need to focus on the surgeon as the unit of analysis, such that each surgeon is assigned to a control or experimental group and OR personnel are grouped with their surgeon for pre-post analyses. Third, not all the surgeons invited to implement the briefing program agreed to participate, introducing the possibility of selection bias. Finally, we studied a single academic medical center, and each institution has its own barriers to changing the culture and procedures of the OR.

IMPLICATIONS

The use of OR briefings as a routine procedure to reduce preventable surgical risks and delays has many implications for practice and training. These data suggest that hospitals should consider implementing briefings as a strategy to improve clinical and economic outcomes in surgical patients. We have previously shown that there are significant differences in perceptions of teamwork in the OR. In a study of 2135 OR personnel in 60 hospitals, we found that surgeons rated nurses as having good teamwork 87% of the time, whereas nurses rated the teamwork of surgeons as positive 48% of the time. This discrepancy in perceptions of teamwork in the OR suggests that strategies are needed to align expectations of teamwork among physicians and nurses. It was this finding that served as the im-
petus to study the impact of briefings on OR culture. Strategies such as OR briefings may help toward reducing the discrepancy in perceptions of teamwork and the roles various health care providers serve in fostering teamwork. At our institution, OR briefings are conducted before all operative procedures and are taught to surgical and anesthesia residents as part of a patient safety curriculum.

**FUTURE DIRECTIONS**

The OR briefing tool we developed and used in this study is a framework for more specific checklists designed for individual specialties and operations. For example, in performing an organ transplant operation, a confirmation of the crossmatch result or organ blood type may be important. We are still exploring the relative benefits and risks of standardizing the briefing tool across all ORs or allowing local modification. Our hope is that the discussion and not the script of the OR briefing we used will be implemented to improve teamwork, identify and mitigate preventable harm, and increase efficiency. Ultimately, a customized checklist that is continually revisited and revised to meet the changing needs of ORs and surgical techniques will result in improved quality and safety.

**CONCLUSIONS**

The use of OR briefings was associated with a reduction in delays and communication failures that led to delays. Hospitals should consider implementing OR briefings as a strategy to improve OR efficiency and clinical and economic outcomes in surgical patients.

Accepted for Publication: May 25, 2007.

**Author Affiliations:** Quality and Safety Research Group, Department of Anesthesiology (Drs Nundy, Mukherjee, Sexton, Pronovost, Syin, and Makary); The Johns Hopkins University School of Medicine (Mr Knight); Department of Surgery, Johns Hopkins Bayview Medical Center (Dr Duncan); Center for Surgical Outcomes Research,
Department of Surgery (Drs Pronovost, Syin, and Makary); Department of Health Policy and Management, School of Medicine (Drs Pronovost and Makary); Bloomberg School of Public Health, School of Nursing (Drs Pronovost and Rowen), The Johns Hopkins University, Baltimore, Maryland; and School of Medicine and School of Management, Yale University, New Haven, Connecticut (Dr Mukherjee). Dr Nundy is now with the Department of Internal Medicine, The University of Chicago Medical Center, Chicago, Illinois. Dr Mukherjee is now with the Department of Anesthesiology and Critical Care Medicine, The Johns Hopkins University.

Correspondence: Martin A. Makary, MD, MPH, Department of Surgery, The Johns Hopkins University School of Medicine, 1909 Thames St, 2nd floor, Baltimore, MD 21231 (mmakary1@jhmi.edu).

Author Contributions: Drs Nundy, Rowen, Duncan, and Makary had full access to the data in the study and take responsibility for the integrity of the data and the accuracy of the analysis. Study concept and design: Sexton, Pronovost, Rowen, and Makary. Acquisition of data: Syin. Analysis and interpretation of data: Nundy, Mukherjee, Pronovost, Knight, and Duncan. Drafting of the manuscript: Nundy, Mukherjee, Pronovost, Knight, and Sexton. Critical revision of the manuscript for important intellectual content: Nundy, Pronovost, Knight, and Sexton. Administrative, technical, and material support: Sexton, Rowen, and Syin. Study supervision: Nundy, Pronovost, and Makary.

Financial Disclosure: None reported.

REFERENCES

5. Torkki PM, Marjamaa RA, Torkki MI, Kallio PE, Kirvela OA. Use of anesthesia induction rooms can increase the number of urgent orthopedic cases completed within 7 hours. Anesthesiology. 2005;103(2):401-405.