



Bridging the communication gap in the operating room with medical team training

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Abstract

Background: In the operating room (OR), poor communication among the surgeons, anesthesiologists, and nurses may lead to adverse events that can compromise patient safety. A survey performed at our institution showed low communication ratings from surgeons, anesthesiologists, and OR nursing staff. Our objective was to determine if communication in the operating room could be improved through medical team training (MTT).

Methods: A dedicated training session (didactic instruction, interactive participation, role-play, training films, and clinical vignettes) was offered to the entire surgical service using crew resource management principles. Attendees also were instructed in the principles of change management. A change team was formed to drive the implementation of the principles reviewed through a preoperative briefing conducted among the surgeon, anesthesiologist, and OR nurse. A validated Likert scale survey with questions specific to effective communication was administered to the nurses, anesthesiologists, and surgeons 2 months after the MTT to determine the impact on communication. Data are presented as mean \pm SEM.

Results: There was a significant increase in the anesthesiologist and surgeon communication composite score after medical team training (anesthesia pre-MTT = $2.0 \pm .3$, anesthesia post-MTT = $4.5 \pm .6$, $P < .0008$; surgeons pre-MTT = $5.2 \pm .2$, surgeons post-MTT = $6.6 \pm .3$, $P < .0004$; nurses pre-MTT = $4.3 \pm .3$, nurses post-MTT = $4.2 \pm .4$, $P = .7$).

Conclusions: Medical team training using crew resource management principles can improve communication in the OR, ensuring a safer environment that leads to decreased adverse events. © 2005 Excerpta Medica Inc. All rights reserved.

Keywords: Communication; Team training; Change team; Crew resource management; Prophylactic antibiotics

Inadvertent errors in the delivery of medical care are recognized as a leading cause of inpatient morbidity and mortality. Estimates from the Institute of Medicine's [1] report in 1999 suggest that medical error is the eighth leading cause of death in the United States and results in up to 100,000 deaths annually. This has been brought to the public's attention secondary to recent media reports that have put a spotlight on the increasing number of medical errors occurring in U.S. health care institutions [2]. Strategies to reduce error and increase patient safety have not been developed or embraced widely by physicians in general and surgeons specifically [2]. Ineffective team commu-

nication frequently has been found to be at the root of medical errors [3–8]. Research into surgical outcomes has focused primarily on the role of patient risk factors and on the skills of the individual surgeon. However, this approach neglects a wide range of factors such as teamwork and effective communication, which have been found to be important in achieving safe, high-quality performance in high-risk environments [4,6].

In contrast to the increasing error rate in health care, the aviation industry has experienced a significant decrease in their error rate. This marked improvement in aviation safety has led to the question of whether the safety techniques used in the aviation industry can be applied to health care [5]. In 1979, the National Aeronautic and Space Administration convened workshops that examined the role of human error in airline crashes based on information collected from avi-

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Table 1
Preoperative briefing guide

1. Time out
– Patient name
– Procedure
– Site verification
– Laterality
2. Roll call
– Staff surgeon
– Anesthesiologist
– Nurse
3. Anticipated problems
4. Documentation
– Consent
– History and physical within 30 days
– Staff preoperative note
5. Case discussion
– Anesthesia plans/concerns
– Allergies
– Intravenous antibiotics
– Position
– Sequential compression device
– Required instrumentation
– Special equipment
– Blood
– Length of procedure
– Postoperative disposition
– Precautions
– Consensus on plan and site

ation accidents that occurred during the 1970s. Safety initiatives resulting from this careful analysis included using all available sources (information, equipment, and people) to achieve safe and efficient operations. The focus of operations was on safety, efficiency, and morale of people working together. This developed into current practices that use Line-Oriented Flight Training [9]. Line-Oriented Flight Training includes working in flight simulators, the use of preflight and postflight debriefings, and measurement of airline crew performance. Examination of these successful techniques led the Institute of Medicine in 2000 to recommend establishing team training programs for personnel in critical care areas using the crew resource management techniques used in aviation. Moreover, the Joint Commission on Accreditation of Healthcare Organizations now has included patient safety as a priority. In fact, one of the 2004–2005 patient safety goals is to improve the communication of accurate patient information. To achieve this, one of the Joint Commission on Accreditation of Healthcare Organizations recommendations is to include team training as part of a comprehensive patient safety plan (www.jcaho.org).

Our objectives of this study were as follows: (1) to determine a baseline assessment of communication among the nurses, anesthesiologists, and surgeons in the operating room (OR), (2) to determine if communication in the OR could be improved through medical team training, (3) to determine if preoperative briefings could be used to ensure practice mandates such as appropriate usage and timing of

administration of prophylactic antibiotics and deep venous thrombosis (DVT) prophylaxis.

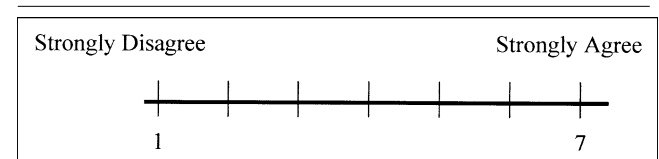
Methods

To determine the baseline communication among nurses, surgeons, and anesthesiologists, a validated Likert scale survey with questions aimed at communication in the OR was administered. This was followed by a dedicated training session that was offered to the entire surgical service by the Veteran's Affairs (VA) National Center for Patient Safety using crew resource management principles. This course consisted of didactic instruction, interactive participation, role-play, training films, and clinical vignettes. Attendees also were instructed in the principles of change management. At the completion of this session, a change team was created that included representatives from general surgery, anesthesiology, and OR nursing who were committed to this project. This team was charged to drive the implementation of the principles reviewed through the creation of a preoperative briefing. The change team met weekly and adjustments were made to the briefing guide based on charge team feedback. Three time periods were examined, each of the first 2 months after implementation and 4 months after implementation.

Briefing

Based on data that suggest that the current weaknesses in communication in the OR may derive from a lack of standardization and team integration [3], we elected to institute a policy of formal OR preoperative briefings. A briefing is a dialogue or discussion using concise and relevant information to promote clear and effective communication (Table 1). A briefing promotes people-to-people transfer of information in real time and sets the stage for how everyone will communicate. Additionally, a briefing establishes a platform for common understanding and gives people permission to be frank and honest. Finally, a briefing gets all

Table 2
Communication survey (sample questions)



- Our TEAM routinely discusses procedures before starting them
- During procedures, everyone on the team is aware of what is happening
- Everyone on the team feels comfortable giving feedback to other team members
- Our TEAM has a specific way of insuring other team members heard and understood all important communications

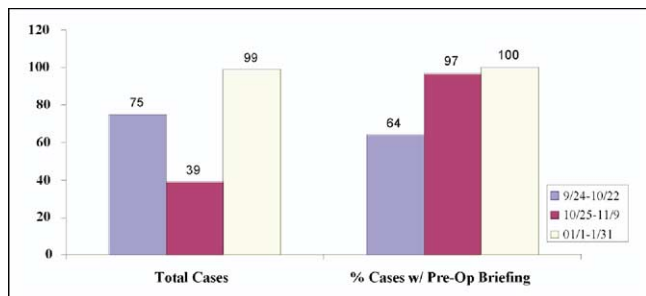


Fig. 1. Implementation of preoperative briefings. Light gray columns, September 24 through October 22; black columns, October 25 through November 9; white columns, January 1 through January 31.

members of the team on the same page and provides a structure for collaborative planning. This communication then results in a shared mental model of how that particular patient encounter will proceed.

The validated Likert scale survey again was administered to the nurses, anesthesiologists, and surgeons 4 months after commencement of the briefing process on the general surgery service (Table 2). Other data prospectively collected included the number of patients who received appropriate prophylactic antibiotics and DVT prophylaxis. These measures were chosen because it had been proposed that these measures were to become formal national VA performance measures in 2005. The impact of preoperative briefings on patient safety also was examined. Data are presented as mean \pm SEM. Statistical analysis was performed using analysis of variance and the Student *t* test.

Results

After the implementation of team training, the number of briefings performed was reviewed during 3 separate time periods. Fig. 1 shows an increase in the number of preoperative briefings from 64% at 1 month after implementation increasing to 100% by 4 months after implementation. To determine the impact of briefings on perceived communication among surgeons, anesthesiologists, and OR nurses, the results of the communication survey were examined at baseline and at 4 months after implementation of the preoperative briefings. Table 3 shows a statistically significant increase in the communication score for the anesthesiologists and surgeons. There was no significant improvement in communication scores among the OR nursing staff (anesthesia pre-MTT = $2.0 \pm .3$, anesthesia post-MTT = $4.5 \pm .6$,

Table 3
Results of communication survey before and after briefing process

Health care provider	Before briefing	After briefing	<i>P</i>
Anesthesiologist	$2.0 \pm .3$	$4.5 \pm .6$.0008
Surgeon	$5.2 \pm .2$	$6.6 \pm .3$.0004
OR nurse	$4.3 \pm .3$	$4.2 \pm .4$.7

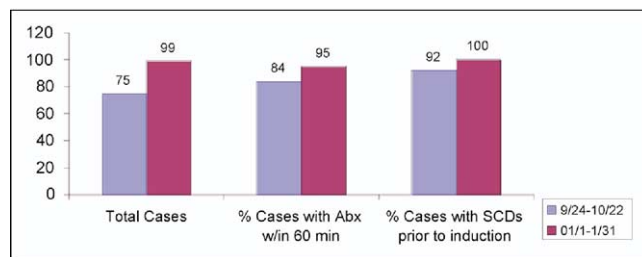


Fig. 2. Effect of preoperative briefings on antibiotic and DVT prophylaxis. Light gray columns, September 24 through October 22; black columns, January 1 through January 31.

$P < .0008$; surgeons pre-MTT = $5.2 \pm .2$, surgeons post-MTT = $6.6 \pm .3$, $P < .0004$; nurses pre-MTT = $4.3 \pm .3$, nurses post-MTT = $4.2 \pm .4$, $P = .7$). The impact of briefings on appropriate prophylactic antibiotic administration and DVT prophylaxis is shown in Fig. 2. There was a significant increase in the number of patients who received prophylactic antibiotics within 60 minutes of incision and the number of patients who received DVT prophylaxis before induction. Additionally, preoperative briefings identified 3.3% (7 of 213) of patients before induction who were at high risk for proceeding with surgery. The reasons for cancellation of surgery included unrecognized low platelet count, significantly increased coagulation parameters, previously undetected patient self-administration of platelet inhibitor the night prior, and an undialyzed end-stage renal disease patient.

Comments

Poor communication among health care providers can result in potentially avoidable catastrophic medical errors. An increase in the publication of both retrospective and prospective studies has helped to shed more light on the challenging problem of medical errors. Data from the root-cause analysis database from the VA National Center for Patient Safety identified that 82% of root-cause analyses cited communication failure as at least one of the contributing/causal factors in an adverse event or close-call report [10]. This was corroborated by Sutcliffe et al [7], who interviewed 26 residents at a 600-bed teaching hospital. Qualitative analysis showed that communication failures resulted in 64 mishaps, or 91% of reported errors.

Communication failure has been identified as a leading source of adverse events in surgery. Gawande et al [6] found that confidential interviews with surgeons elicited detailed reports on a large number of surgical adverse events resulting from errors of care. Data from these interviews indicated that 43% of adverse events were a direct result of communication failures between 2 or more clinicians. Lingard et al [3] observed 421 procedurally related communication events in the OR over a 3-month time period. Analysis showed that

communication failures in the OR occurred in 129 cases or approximately 30% of communication events. The investigators characterized the communications into 4 distinct types. The types of communication failure included the following: (1) occasion (45.7%), in which timing of an exchange was requested or provided too late to be useful; (2) content (35.7%), in which information was missing or inaccurate; (3) purpose (24.0%), in which issues were not resolved; and (4) audience (20.9%), in which key individuals were excluded. Thirty-six percent of communication failures result in visible effects on system processes including inefficiency, team tension, resource waste, workaround, delay, patient inconvenience, and procedural error. Additionally, these investigators indicated that communication failures are a signal of a problem originating elsewhere, such as in attitudinal or systems processes. Furthermore, Lingard et al [3] indicated that these current weaknesses in communication in the OR may derive from a lack of standardization and team integration.

Given that the dynamics of the surgical suite are not unlike those of the cockpit of an airplane, it is possible that principles using crew resource management techniques can be applied in the OR setting to improve communication, improve quality, and ensure safety. In this report, we show that communication in the OR was perceived to be poor by the anesthesiologists, adequate by the OR nurses, and good by the surgeons, showing a true disconnect in teamwork. This disconnect in perception of team work in the OR was reported previously by Sexton et al [11], who studied 1,033 OR personnel (attending surgeons, attending anesthesiologists, surgical residents, anesthesia residents, surgical nurses, and anesthesia nurses). A majority of surgical residents (73%) and attending surgeons (64%) reported high levels of teamwork, but only 39% of attending anesthesiologists, 28% of surgical nurses, 25% of anesthesia nurses, and 10% of anesthesia residents reported high levels of teamwork [11,12].

By using crew resource management techniques along with the use of a change team, we showed that communication in the operating room can be improved through the use of preoperative briefings. Perceptions of communication between anesthesia and surgery were improved significantly. There was no change seen in the nurse perceptions of communication. This lack of change in nurse perception may be a result of the fact that only a small number of the entire nursing staff (ie, general surgery nurses) experienced the changes in communication and the briefing process, however, the survey was administered to all nurses. Once the briefing process is implemented in the remainder of the surgical service, the nursing staff will be resurveyed. We hypothesize that an improvement in nurse perceptions of communication will be seen once the briefing process becomes routine in all ORs.

Proper timing of prophylactic antibiotic administration and appropriate DVT prophylaxis have been shown to be important in improving patient outcomes. The importance

of antibiotic and DVT prophylaxis is highlighted by the fact that these process outcomes have become national VA performance measures. Both timely administration of prophylactic antibiotics and appropriate use of sequential compression devices were improved significantly through the use of preoperative briefings. In addition, although there are multiple checkpoints, the preoperative briefing as the last checkpoint before proceeding with the surgery identified previously unidentified patient risk factors that could have resulted in an adverse outcome. Our results are supported by similar experiences with crew resource management techniques with briefings in the intensive care unit environment. Multiple studies have shown the positive impact of collaboration and teamwork in the intensive care unit through improved communication and briefings with lower morbidity and mortality rates, with the added benefit of increased nursing retention [13–16].

In summary, medical team training using crew resource management principles can improve communication in the OR to ensure a safer environment with decreased adverse events. In addition, OR briefings can be used to implement and ensure performance measures such as prophylactic antibiotics, DVT prophylaxis, and medical record documentation.

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