Patient Safety in the Operating Room: Improving Team Coordination and Communication

Anna Grome, Beth Crandall, Jeff Brown

Applied Research Associates
Klein Associates Division
Fairborn, OH
agrome@ara.com, bcrandall@ara.com,
jpbrown@ara.com

Sue Sanford-Ring, Steve Douglas

University of Wisconsin
Hospitals and Clinics
Madison, WI
Ssanford-ring@uwhealth.org,
sdouglas@uwhealth.org

ABSTRACT

Teamwork and communication issues continue to present significant challenges in healthcare. Such challenges reflect a system that is vulnerable to error and adverse patient outcomes. This paper describes an effort to address team communication and coordination challenges - and ultimately improve patient safety - in the general surgery operative unit at a large university-affiliated teaching hospital. The research team consisted of cognitive and human factors scientists, in addition to patient safety and quality personnel from the hospital. A primary goal of this effort was to study and describe team functioning in the OR, and develop a tailored intervention that would address the unique needs and challenges faced by the surgical teams studied. An additional goal was to demonstrate that improvements in team coordination and communication positively impact patient care and safety outcomes in the OR. Using Cognitive Task Analysis methods, we conducted fourteen in-depth interviews with members of the general surgery team and direct observations of three surgical procedures. We identified several areas where teams are functioning well – including shared goals and commitment to safe and high quality care. We also identified several factors that constrain teamwork and effective information flow among the OR team. Based on the findings, we developed a set of recommendations for addressing the challenges identified. Members of the OR leadership group elected to implement and evaluate a preoperative briefing intervention. To ensure that the preoperative briefing was not an off-the-shelf solution, but one that was customized for the teams we studied, we facilitated a co-creative preoperative briefing development workshop with key stakeholders. The workshop enabled representatives of the surgical team to create and adapt content and structure for the briefing. We describe the process used for developing the preoperative briefing, along with metrics for assessing the impact of the briefing on teamwork, communication, and patient safety.

ABOUT THE AUTHORS

Anna Grome is a Senior Cognitive Scientist at Klein Associates Division of Applied Research Associates. She uses cognitive field research methods to study decision making and skilled performance in individuals and teams across a range of high stakes work domains. She has led multiple projects aimed at improving human performance through applications including team development and training, physical space re-design, and decision support systems. Her work has included efforts related to patient safety and medical decision making, terrorist decision making, crisis response, multinational collaboration, and submarine command decision making. Mrs. Grome holds a M.S. in Industrial-Organizational and Human Factors Psychology from Wright State University, Dayton, OH, and a B.A. in Psychology and Spanish from Denison University, Granville, OH.

Beth Crandall is a Principal Scientist at Klein Associates Division of Applied Research Associates. Ms. Crandall conducts research on the nature of cognitive processes such as situation assessment, problem detection, mental simulation, and decision making, and has studied real world problems for a variety of government and commercial clients. Ms. Crandall was a major contributor to development and validation of Cognitive Task Analysis (CTA) methodologies, particularly in the use of incident-based methods to study cognition in context. She has extensive experience collecting and analyzing CTA data, and representing CTA findings for users and clients. Ms. Crandall's research activities have also included development of applications for training, decision support, organizational design, and product design in a wide range of tasks and work settings. Ms. Crandall received a B.S. in Psychology from Wright State University in 1978. She has co-authored over 40 reports, journal articles, and chapters for edited

volumes. Ms. Crandall is lead author of *Working Minds: A Practitioner's Guide to Cognitive Task Analysis*, a book published in 2006 by MIT Press.

Jeffrey Brown is a Principal Scientist at Klein Associates Division of Applied Research Associates. He is engaged in multiple patient safety improvement and research initiatives, primarily concerned with supporting interdisciplinary decision making and teamwork in healthcare organizations. Mr. Brown has been a member of the core faculty for the HRET - National Patient Safety Foundation Leadership Fellowship in Patient Safety since its inception and serves as lead faculty member for content on safety across industries. He is actively engaged in patient safety education efforts across the USA, and is an organizer of the Safety Across High Consequence Industries (SAHI) Conference, an initiative of St. Louis University, led by the Department of Aviation Science. In 2002 Mr. Brown joined a cardiac surgery care team in receiving a John M. Eisenberg Patient Safety Award for System Innovation from JCAHO and the National Quality Forum. He has authored and co-authored a number of articles on patient safety and is co-author of *Safety Ethics: Cases from Aviation, Healthcare, and Occupational and Environmental Health*. Ashgate Publishing, Aldershot, England, 2005. Mr. Brown earned his M.Ed. and B.S. degrees from the University of Maine.

Sue Sanford-Ring is the Director Quality and Patient Safety at the University of Wisconsin Hospital & Clinics**.** Her responsibilities include peer review, external reporting, meeting regulatory and accreditation requirements, and improving clinical, safety and service quality. Sue serves as the organization's Patient Safety Officer and is a 2008 HRET - National Patient Safety Foundation Patient Safety Leadership Fellow.

Steve Douglas Steve Douglas currently works as a Quality Analyst for the University of Wisconsin Hospital & Clinics in the Department of Quality Resources. As a nurse and human factors engineer, his role involves the support of patient safety activities and the analysis and facilitation of quality and performance improvement initiatives. He has worked on AHRQ-funded patient safety research ("CPOE in ICUs") through the Systems Engineering Initiative in Patient Safety (SEIPS), housed within the Center for Quality and Productivity Improvement at the University of Wisconsin. He earned a B.A degree in Psychology from Roanoke College, Bachelors and Masters degrees in Nursing from the University of Virginia, and a Master's degree in Industrial Engineering (Human Factors) from the University of Wisconsin-Madison

Patient Safety in the OR: Improving Team Coordination and Communication

Anna Grome, Beth Crandall, Jeffrey Brown
Applied Research Associates
Klein Associates Division,
Fairborn, OH
agrome@ara.com, bcrandall@ara.com,
jpbrown@ara.com

Sue Sanford-Ring, Steve Douglas
University of Wisconsin
Hospitals and Clinics
Madison, WI
ssanford-ring@uwhealth.org,
sdouglas@uwhealth.org

TEAMWORK AND PATIENT SAFETY IN THE OR

Healthcare teams face a variety of non-technical challenges, particularly within the realm of team communications, hand-offs, and transitions of care. It is well documented that communication failures and other challenges associated with team coordination are a significant contributor to medical errors and preventable harm to patients (Flin, O'Connor, & Crighton, 2008; Kohn, Corrigan, & Donaldson, 2000; Nemeth, 2008). In an attempt to address these challenges and reduce the occurrence of errors, external entities such as the National Quality Form and the Joint Commission have required team training initiatives targeted at improving communication among interdisciplinary members of healthcare teams (Joint Commission on Accreditation of Healthcare Organizations, 2009; National Patient Safety Forum, 2009). However, there is not yet a body of empirical evidence to support the assumption that these team training interventions consistently lead to improvements in patient safety (Salas, Diazgranados, Weaver, & King, 2008).

In an effort to improve teamwork and to demonstrate a linkage between team intervention and patient safety outcomes, University of Wisconsin Hospital and Clinics (UWHC) commissioned a collaborative pilot study of their general surgery teams to identify challenges and develop appropriate interventions for improving teamwork and communication. It was important to UWHC's patient safety officer that this was not a one-size-fits-all solution, but rather an approach tailored specifically to the specific demands and constraints faced by the Operating Room (OR) teams within this particular hospital.

Overview of Effort

The primary objective of the pilot effort was to increase patient safety through improved team communication and coordination within the OR and along the continuum of care. To accomplish this, we sought to 1) provide insight into team functioning in the OR, including the team strengths, and barriers to teamwork and patient safety, and 2) develop an intervention to improve teamwork in the OR, and assess its impact on patient safety. The intent was to carry this approach over to other high risk clinical areas in the hospital, such as the Intensive Care Unit (ICU) and the Emergency Department (ED) once improved teamwork and patient safety had been demonstrated in the OR setting.

We used Cognitive Task Analysis (CTA) interviews and direct observation to study facilitators and barriers to effective team coordination and communication in general surgery teams. Based on the findings, we recommended a variety of interventions to target the identified challenges. Among the recommendations, the intervention elected by the OR leadership group was the preoperative briefing. In conjunction with members of the OR leadership team and representatives from the general surgery team, we conducted a unique co-creative development process for constructing the preoperative briefing. This developmental approach enabled key stakeholders to create and own the content and process used in their teams.

In this paper, we first describe the data collection and analysis methods employed. We then present the main findings of the study, including positive contributors to teamwork and patient safety in the OR and barriers to effective teamwork. We organize the barriers into three main sections: challenges within the OR, challenges across units, and challenges at the organizational level. After describing the findings, we present a summary of the intervention recommendations for addressing the challenges faced by the surgical teams. We then describe the unique approach used to develop the preoperative briefing. Finally, we describe the success indicators developed for evaluating the impact of the preoperative briefing on teamwork and patient safety.

METHOD

The research team - which included UWHC's patient safety and quality improvement personnel, along with

cognitive and human factors scientists - conducted a total of fourteen in-depth interviews with members of the General Surgery team and members of the OR leadership team. We also conducted in situ observations of three surgical procedures to view the team communications and interactions. Interviewees included three RNs, four Surgeons, three Anesthesiologists, two surgical technicians, and two members of the OR leadership team. The data collection followed a Cognitive Task Analysis (CTA) methodology, focusing on barriers and facilitators to teamwork, common ground, and information flow within the OR, and the associated impact on patient safety. We used a variety of qualitative analysis techniques, including thematic analysis and card sort techniques, to structure and organize the data (For more detail about CTA see, Crandall, Klein, & Hoffman, 2006).

FINDINGS

Overall, interviewees described the OR as a "pretty safe place." This Academic Medical Center provides quaternary care and has a national reputation for quality care. We identified a variety of positive contributors to teamwork and patient safety that exist within the general surgery teams. It was clear that team members genuinely care about providing safe, high quality care to their patients and have a shared goal of efficiency and limiting wasted resources. Team members also have shared goals of change and improvement within their unit.

Yet the OR team was not without its challenges. The analysis yielded a variety of barriers to teamwork and safety in the OR and across the continuum of care that might be addressed through tailored team interventions. We have organized these findings into three separate categories: challenges within the OR, challenges across units, and challenges at the organizational level.

Challenges within the OR

❖ *Overconfidence in the culture of safety* – With some exceptions, the personnel we interviewed expressed confidence that the general surgery unit is a safe place for patients. According to one surgeon, "There's no real safety concern in the OR, just efficiency problems. It's a safe place in the OR…" Though most OR personnel reported challenges and areas for improvement in the realm of teamwork, many did not associate issues of teamwork with patient safety concerns. Specifically related to team information flow, many did not appear to perceive risk associated with problems stemming from stale or faulty

information. It is "just the way it is," as one interviewee noted. Risk to patient safety can be heightened under circumstances of over-confidence.

❖ *Lack of preparation/training for surgeons as leaders* - The surgeons we interviewed view themselves as the "team leader" in the OR; and most members of the OR team agree with that view. Studies of leadership in safety-critical domains outside of healthcare often cast effective leaders as facilitative and inclusive. Effective leaders create information-rich communication environments. They seek to de-sensitize differences in rank by example, and create an environment in which personnel do not perceive risk in the act of sharing or seeking information. Of the OR teams studied here, variations in the communication and information richness in the OR appear to be significantly influenced by each surgeon's affect and style.

In the cases we observed or heard about, it is clear that many positive leadership attributes exist, and the vast majority of surgeons are viewed by their teams as well-intentioned and good to work with. But given the leadership position held by surgeons, it is our view that surgeons could benefit from structured leadership development that builds upon existing strengths. We found that there is a lot to build upon, given the strategies currently used by some of the surgeons - including strategies for calming the team in the midst of tension, and using humor or conversation during long periods of quiet tedium. Some surgeons recognized they would benefit from further leadership skill development. Currently there is no orientation to the OR for new surgeons and no explicit code of conduct to inform their thinking about peri-operative leadership.

There are also opportunities for change in process. Despite the surgeon being viewed as the team leader, we discovered that many surgeons are not present at the beginning (or in advance of) the case. As one surgeon noted, "many surgeons fail because they're not there from the start." An anesthesiologist echoed this sentiment*:* "A good team has the surgeon there from the beginning of every case explaining what they want…there's nothing worse than staff doing the prep, and the surgeon comes in at the last minute and says its set up all wrong. Communication should be in advance."

❖ *Power/authority gradient impacts* - Overall, both surgeons and other team members are very aware

of the "power of the white coat" and its effect on interdisciplinary communication. The effects on communication are found from both points of view. As is often reported in studies on interdisciplinary communication in healthcare, nurses and techs may hold back from raising concerns for fear of reprisal or concern that the information may be discounted. A tech reported a situation in which she did not speak up when noticing a lapse by a surgeon, "I don't say anything because it's not worth it…he'd turn around and say I have a character flaw and can't handle stress." But interestingly, surgeons may also refrain from communicating useful, constructive information because of their awareness of how it might impact a nurse or tech. One surgeon explained, "I go to the nursing supervisor with constructive comments that could be interpreted as negative. I don't think a surgeon and a nurse can have a constructive conversation. The white coat carries more power than it should."

❖ *Conflict Avoidance* - Interviews with members of the general surgical team indicated a prevailing style of conflict avoidance. "Our culture isn't one where we do open conflict. People don't know how to raise a concern or express disagreement…We don't have any starter language to begin conversing." Rather than providing constructive feedback to one another, and handling conflict or disagreement directly, many surgical team members tend to communicate indirectly through managers. This not only increases the workload for management, but conflict avoidance, interpersonal conflict, and problems with trust are antithetical to high-performing teams. It can create conditions within the OR where individuals may be reluctant to identify a concern or intervene when a problem is recognized.

❖ *Passive-Aggressiveness* - Related to conflict avoidance, members of the general surgery team indicated concerns about passive aggressive behavior in the OR as a means of addressing simmering resentment or payback for "bad behavior." As a surgeon noted, "If you upset someone like a tech, they can suddenly become the most powerful person in the room. They will deliberatively make you wait five seconds longer, or you have to ask for everything even though they know what's coming." Further, some interviewees noted that rather than address concerns in-the-moment, the incident-reporting system used to capture and learn from errors and near-misses is sometimes used as a mechanism for "tattling" on one another. The type of environment created

under these circumstances can make it more challenging to detect and solve unexpected problems, coordinate activity, and avoid or mitigate error.

Challenges across Units

❖ *Shallow concepts of teamwork* – The OR team is one component of the larger health care team managing patients across the peri-operative continuum of care. Along that continuum there are sub-teams, comprised of individuals in First Day Surgery (FDS), the OR, the Post Anesthesia Care Unit (PACU), and a variety of ancillary services. Interestingly, though interviewees from FDS and the PACU viewed the OR as part of their "team," members of the OR team generally did not hold a similar view of FDS and the PACU. This perception can affect the quality of information exchange and sensemaking activity across the care continuum.

A related theme emerging from the interviews was the importance of understanding the information needs of other team members, and awareness of how one's actions or inactions impact another's job and ultimately the patient. Clearly, every person's role in the system is important, and some interviewees described what they call hidden "lynchpins" - lower-ranking people with a high impact on the system. A surgeon noted: "Something that occurred a month ago, like assembling instrument trays in the sterile supply areas, can affect how we care for a patient. How do we help these people understand they are critically important to patient care? I can't do my job without the right equipment at the right time." Surgeons noted that a critical challenge is conveying their sense of urgency, especially to functions such as x-ray and pathology outside of the OR. An understanding of information needs and how one's own work impacts another's job and care of the patient is vital for providing safe and high quality care across the continuum.

❖ *Accountability for the patient's "story"* - In the same vein, members of the larger team of which the OR team is a part, face challenges related to who is accountable for the patient's "story." We heard several examples of hand-off challenges, particularly between the OR and the PACU, where critical information failed to be passed along. One nurse distinguished quality hand-offs from a "FedEx" model of hand-off, in which a person simply delivers a patient without sharing the back-story of the patient. A nurse highlighted the need

for clarity about responsibilities during post-operative transfer of a patient from one unit to the next: "Some will say, 'I don't know, I just took over. You may have to call x person." "I don't know" is often a response we get when we ask about what the patient's deficits are. The background information about a patient is sometimes lacking. One anesthesiologist would say "it's all in the paperwork" and then leave.

❖ *Porous Information Flow* - Our data revealed a number of issues with information quality and timeliness of information delivery that impact OR wait times and delays and, at times, may pose a risk to patients. A number of these issues appear to stem from pre-surgical process problems that are likely to require commitment to improvement at an organizational level. Others are more clearly within the span of control of the OR staff. In addition to incomplete hand-offs, some of the primary sources of turbulent information flow that we identified include incomplete or inaccurate reservation cards or physician preference cards. Reservation cards contain information about the particular case in question, including positioning of the patient, and any special equipment needed. Physician preference cards contain information about an individual surgeon's preferences related to a certain type of case. "Getting these filled out incorrectly is a huge issue. An incorrect card can ruin the whole day: the surgeon gets irritated, the pace slows down, it delays everything, you need to change equipment in the room…"

When these cards are incomplete or inaccurate, a significant amount of time is spent by the OR staff - particularly nurses and techs - trying to fill in the gaps or engage in compensatory activities. The needed information is often conveyed through ad-hoc means to address information deficits or changes. As a nurse reported: "the surgeon doesn't always let you know when they have made a change in the procedure. The preop nurse might pick up the change and call us. But more often, we find out by happenstance about a change or consent. We are usually not called or notified."

Too often gaps or delays in communicating key information leads to delays, hold-ups, and breakdowns in coordination of care. Common outcomes of missing or incomplete information include:
- Time spent altering the room set up (breaking down and re-setting the OR)
- Time spent retrieving needed equipment or supplies

- Lack of appropriate preparation due to surgeon adding or changing procedure, without notifying the team ahead of time.
- Ancillary services not being informed that the procedure will require labs, x-ray, and so on, and scrambling to fit it into their schedule.

The delays caused by missing or incomplete information can lead to inefficiency, wasted material resources, wasted personnel time, interpersonal tension, patient and family inconvenience and delay, and above all, risk of injury to the patient.

The hospital is addressing these issues of porous information flow, at least in part, by use of a fully integrated Electronic Health Record (EHR). The operative piece of the EHR will launch in October of 2009.

Challenges at the Organizational Level

Culture of Tolerance - Interviewees indicated a general culture of tolerance across the wider organization that impacts team functioning and communication in the OR. We heard several reports of "bad behavior," particularly on the part of a small subset of surgeons. Yet interviewees felt that this behavior was generally tolerated both within the OR and across the wider organization. Similarly, though there was an awareness and discomfort with passive-aggressive behaviors and a general tendency for conflict-avoidance, this issue did not appear to be addressed at a higher level. In some cases, we detected a degree of "learned helplessness" among some of the OR staff. Some believed there was little point in reporting certain undesirable behaviors because they perceived that nothing would be done to address the problem. Some seem to believe that this is tied to the economics of healthcare and the pressure for revenue.

Important to note is that the OR in this facility has a long-standing "behavior committee," which has been effective in addressing some of the more egregious behavior problems. Yet, the issue is that the OR staff seem to put up with a lot. Some interviewees commented that they recognize the pressures that surgeons are under, so they put up with the yelling and other undesirable behaviors. It is the more egregious activities that are addressed by the behavior committee.

❖ *Production Pressures* Production pressure and speed pressures are a clear challenge faced by OR teams. Though the value of team communications in advance of a given surgery is recognized, OR teams find their preoperative communications constrained by the pressures they feel for productivity and on-time starts. Such pressure can have unintended consequences, comprising the quality of information-sharing, and ultimately the care and safety of patients. An anesthesiologist reported: "I wish we didn't have to rush so much. We're always worried about efficiency and always feeling rushed. Always concerned about on-time starts and turnover time in the OR…We can miss things when there's not enough time in the preop…"

patient safety in the OR. Each intervention has the capacity to impact several of the identified challenges. Though some of the interventions included are part of standard CRM training, it was our intent to tailor these interventions to the unique demands within the UWHC setting. A summary table of key challenges and possible interventions is provided in Figure 1 below.

Of the various interventions recommended, the OR leadership team elected the preoperative briefing as a means of improving team communication and patient safety in the OR. A preoperative briefing is a short, structured conversation prior to the start of a surgical procedure. It can provide the team with an opportunity to:

Challenges to Patient Safety & Teamwork and Possible Interventions: Overview

Safety & Teamwork Challenges	Dec-making exercises to clarify roles and role expectations	Decentering training for expanded view of team: FDS, OR, PACU	Surgeons as Leaders Program	Filling the gaps in DPC and RES cards	Enhancing Integrity of Patient Portfolio	Preop brief for surgical team	Post surgical debrief	Standardized format for difficult convers	Standardized language for conveying concern
Overconfidence in UWHC culture of safety					☐	☐	☐	☐	☐
Conflict Avoidance; Passive-aggressive behavior		☐	☐					☐	☐
Surgeons lack training/preparation to be leaders			☐			☐	☐	☐	☐
Economic Pressures				☐	☐	☐			
Shallow teamwork concepts		☐	☐		☐	☐	☐		☐
Lack of Accountability; Role and function ambiguity	☐					☐	☐		☐
Consequences of the Power/Authority Gradient			☐					☐	☐
Porous Information Flow	☐	☐		☐	☐	☐	☐		
Organization and culture factors: reliance on heroics; tolerance for bad behavior	☐		☐	☐	☐			☐	☐

Figure 1. Challenges to teamwork and safety in the OR and potential interventions

RECOMMENDATIONS

A variety of challenges to teamwork and patient safety exist in the OR. Some of these challenges can be addressed at the team or unit level, while others would require change at the organizational level. Following our data collection and analysis of findings, we developed descriptions of nine possible interventions to address the most critical challenges to teamwork and

- Verbalize expectations, exchange patient information, identify technical needs, surface discrepancies, express concerns
- Create a more open communication environment
- Enhance predictability, anticipation, and cross-monitoring by achieving a shared understanding of the plan along with any special roles and responsibilities at the outset of a surgical case

PREOPERATIVE BRIEFING DEVELOPMENT WORKSHOP

Though the preoperative briefing has been implemented at other healthcare institutions (Defontes & Surbida, 2004; Dunn et al., 2007; Lingard et al., 2008; Wright, 2005), in order for the intervention to take hold and be effective in this environment, it was imperative to customize the preoperative briefing to "fit" the needs and demands of the OR teams within this particular institution. Thus, rather than impose a structure, content, and process for the preoperative briefing, we recommended and ultimately facilitated a preoperative briefing development workshop with key stakeholders.

The intent of the preoperative briefing development workshop was to facilitate a co-creative process by which stakeholders would have ownership of the content and process used for the briefing that would best fit the needs and constraints of their particular environment. Participants in the workshop included representatives of each interdisciplinary role of the surgical team, members of the patient safety group, and members of the OR leadership team.

We split the workshop into two core phases: 1) development of the preoperative briefing content, and 2) development of the preoperative briefing process/structure.

Preoperative Briefing Content Development

Given that the preoperative briefing is not a new concept, significant groundwork has been conducted upon which a tailored briefing could be built. Thus, rather than starting from scratch in developing content, we offered three examples of preoperative briefing checklists used in other healthcare settings as a starting point for discussion. Workshop participants were split into three groups, and asked to examine one of the three example checklists and to either add, remove, or revise the checklist content based upon what they believed was needed and realistic within the general surgery unit.

Upon completion of this task, we asked each workshop participant to examine the three revised examples and indicate the items they believed to be essential for inclusion in the briefing. We include items that received support from at least two participants in a compiled list. The group then reviewed the compiled list of items, clarified questions about the content, and made any necessary revisions. The group achieved consensus on the necessary items to cover during the briefing, and agreed that this was a realistic set of items to cover in a brief period of time.

Table 2 presents the agreed-upon content for the preoperative briefing.

Table 1. Items to be covered during preoperative briefing

- Type of surgery
- Identify patient and site
- Operative plan
  - description of procedure
  - diagnosis
  - side of surgery
  - interoperative testing and pathology specimens
  - "go ahead likelihood"
- Positioning
- Expected length of procedure
- Visitors (any expected during procedure?)
- Postoperative disposition
- Timing of surgery - bringing patient to OR
- Family and visitor location
- Special equipment
- Allergies (including latex)
- Is procedure standard or are there special features
- Physician preference list
- Type of anesthesia
- Should we anticipate any problems?

Preoperative Briefing Process Development

Following determination of the briefing content, we asked the workshop participants to divide themselves into three groups to create a **process** for the briefing. We gave each group an aid to help them consider various elements of the process - such as who leads it, when does it happen, what aids are needed, and so forth. Similar to the content development portion, we provided examples to participants.

Following independent group work, each group presented their plan to the rest of the workshop participants. The participants engaged in spontaneous discussion regarding the suggested plans, including the strengths and drawbacks of various plan elements. The group ultimately came to agreement on each element of the process for purposes of a pilot study.

Though the group reached general consensus, one anesthesiologist expressed a significant concern. Two of the three plans for the briefing structure connected the preoperative briefing to the existing timeout, which is a pause prior to induction that enables final

verification of the patient, procedure, site, and applicable implants. However, the anesthesiologist strongly urged the group to consider having the briefing occur prior to the timeout in order to identify and correct problems at an earlier point in time. We documented this point, while the group agreed to test the plan accepted by the majority for the duration of the pilot study, and then revise as needed.

Table 2 presents the elements of the agreed-upon process.

Table 2. Elements of preoperative briefing process

	Plan
Who leads it?	Anyone can lead it, but the circulating nurse is the default
Who must be present?	Circ nurse Scrub tech/nurse Anesthesiologist attending plus resident Attending surgeon and resident
When does it occur?	Same time as timeout
Where is it?	Around the patient in OR, similar to the timeout
Time limit?	Maximum of 2 minutes
Ground Rules	Full attention by all; no dual tasking; Comments verbally acknowledged; Contributions valued; Respect; No extraneous chatter
Aids	Whiteboard or lanyard "backers" with topic reminders; Longer term - video for educational purposes
Documentation	Circulating nurse documents key issues discussed on whiteboard

Evaluation Metrics

A key question we posed in the pilot study was whether the intervention developed for the general surgery teams would actually improve teamwork and communication in the OR and, ultimately, have a positive impact on patient safety. To answer these questions, we developed a set of success indicators that would enable such an assessment. As in most domains, a single metric or success indicator would not be sufficient to answer these complex questions. Thus, we proposed a series of success indicators - some of which are oriented toward near-term evaluation; others of which are oriented toward longer-term evaluation. The near-term indicators include those that assess the

process and content of the preoperative briefing itself. Some of these include:
- Whether **briefing actually occurred** (presence/absence) for each procedure
- Presence/absence (or number and type) of **problems detected**/caught during briefing
- **Adherence to "ground rules"** as determined in intervention workshop (brief questionnaire assessing extent to which ground rules were complied with or breached)
- Track **who (what roles) spoke up** during briefing
- Track **how issues/concerns are received** when raised during briefings (Are they acknowledged? Ignored?)
- Track **how issues/concerns are addressed** when raised during briefings (Are they noted or sidelined; does action or plan change in response?)

Other near-term indicators assess teamwork, safety, and efficiency in the procedure following the briefing. Some of these include:
- **Room turnaround** time
- Perceived **quality of teamwork and communication** during procedure (brief questionnaire)
- Perceived **level of safety** during procedure (do the staff feel the environment is safer for this particular patient following the preoperative briefing?) (brief questionnaire)
- Perceived "**problems avoided**" due to preoperative brief (brief questionnaire)
- Number and types of **events that cause delays** or wait times (e.g., wait times for instruments, equipment, radiology, laboratory, personnel, blood, medication, fluids, etc)
- Number (and type) of **problems detected during procedure that weren't caught/detected during preoperative briefing**

Longer-term indicators of success of the preoperative briefing on teamwork, communication, and patient safety include:
- Nature of reports on Patient Safety Network (PSN) reporting system filed pre- and post-intervention
- Do the staff feel the environment is safer for patients overall? (questionnaire)
- Culture of safety questionnaire currently used at the institution
- Physician and staff satisfaction survey currently used at the institution
- NSQIP data
- SCIP data
- Surgical site infection data

Trial Implementation and Evaluation of the Preoperative Briefing

The preoperative briefing workshop was held in June 2008. The intent was to conduct a trial implementation and evaluation of the preoperative briefing during the subsequent months. Due to a variety of organizational issues, including a hospital-wide implementation of an electronic medical record (EMR), the trial implementation and evaluation of the preoperative briefing has been delayed. Thus, the use and impact of the preoperative briefing on teamwork and patient safety in the OR is still undergoing evaluation.

CONCLUSION

The approach employed in this effort is a useful model for identifying and addressing the communication issues that continue to plague healthcare teams. Cognitive Task Analysis and direct observations provided a rich understanding of the strengths and challenges of team coordination and communication in the general surgery teams of UWHC. We believe there are a variety of intervention options at the OR level, as well as the organizational level, which could address challenges to effective teamwork and information exchange within the OR and across the continuum of care. A unique, co-creative development process utilized input from representatives of each discipline of the general surgery team to develop a preoperative briefing that would "fit" the demands and constraints of the general surgery unit in this institution. The stakeholders constructed both the content and a process for preoperative briefings to address the teamwork and communication challenges they face. The co-creative process was essential to giving surgical staff a sense of ownership of the plan, and for tailoring the briefing to best suit the needs and constraints of their team.

In addition to the preoperative briefing, we identified several other intervention options for addressing the challenges to teamwork and patient safety in the OR. Some of these included use of decision making exercises to clarify roles and expectations and develop an expanded view of the "team," a leadership development program for surgeons, post surgical

debriefing, and adoption of standardized starter language for conveying concern in the OR or engaging in difficult conversations. UWHC has many opportunities to continue this work and these areas are ripe for further study.

REFERENCES

Crandall, B., Klein, G., & Hoffman, R. R. (2006). *Working minds: A practitioner's guide to Cognitive Task Analysis*. Cambridge, MA: The MIT Press.

Defontes, J., & Surbida, S. (2004). Preoperative safety briefing project. *The Permanente Journal, 8*(2), 21-27.

Dunn, E., Mills, P., Neily, J., Crittenden, M., Carmack, A., & Bagian, J. (2007). Medical team training: Applying crew resource management in the Veteran's Health Administration. *The Joint Commission Journal on Quality and Patient Safety, 33*(6), 317-325.

Flin, R., O'Connor, P., & Crighton, M. (2008). *Safety at the sharp end: A guide to non-technical skills*. Burlington, VT: Ashgate.

Kohn, L. T., Corrigan, J. M., & Donaldson, M. S. (Eds.). (2000). *To err is human: Building a safer health system*. Washington, D.C.: National Academy Press.

Lingard, L., Regehr, G., Orser, B., Reznick, R., Baker, R., Doran, D., et al. (2008). Evaluation of a preoperative checklist and team briefing among surgeons, nurses, and anesthesiologists to reduce failures in communication. *Archives of Surgery, 143*(1), 12-17.

Nemeth, C. (Ed.). (2008). *Improving healthcare team communication: Building on lessons from aviation and aerospace*. Farnham, UK: Ashgate.

Salas, E., Diazgranados, D., Weaver, S., & King, H. (2008). Does team training work? Princicples for health care. *Academic Emergency Medicine, 15*(11), 1-8.

Wright, M. (2005). KP Northwest Preoperative Briefing Project. *The Permanente Journal, 9*(2), 35-39.