Teamwork, Communication, Briefing, Checklists, & O.R. Safety

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University of Washington Medical Center (UWMC), Seattle, Washington
Systems Approach to Understanding Errors

Human error is caused often by a combination of active and latent failures, only the last of which is an unsafe act of an individual.

Understanding Errors

Observation of 31 cardiac surgical cases

Technical “errors,” n=155, 3.7/hr
Surgical flow disruptions, n=341, 8.1/hr

Understanding Errors

Error:
An occasion in which a planned sequence of activities failed to achieve its intended outcome initially.

Surgical flow disruption:
Deviation from the natural progression of an operation

Causes of disruption:

- **Teamwork** 52%
- Extraneous interruption 17%
- Equipment and technology 11%
- Resource-based issue 8%
- Supervisory/training-related issue 12%

Understanding Errors

Understanding Errors

• Poor teamwork may predispose to surgical errors

• Good teamwork, in turn, may facilitate the detection and remediation of errors

Operating Room Teamwork among Physicians and Nurses: Teamwork in the Eye of the Beholder

Martin A Makary, MD, MPH, J Bryan Sexton, PhD, Julie A Freischlag, MD, FACS, Christine G Holzmueller, BLA, E Anne Millman, MS, Lisa Rowen, RN, DNSc, Peter J Pronovost, MD, PhD

BACKGROUND: Teamwork is an important component of patient safety. In fact, communication errors are the most common cause of sentinel events and wrong-site operations in the US. Although efforts to improve patient safety through improving teamwork are growing, there is no validated tool to scientifically measure teamwork in the surgical setting.

STUDY DESIGN: Operating room personnel in 60 hospitals were surveyed using the Safety Attitudes Questionnaire. Surgeons, anesthesiologists, certified registered nurse anesthetists, and operating room nurses rated their own peers and each other using a 5-point Likert scale (1 = very low, 5 = very high).

RESULTS: Overall response rate was 77.1% (2,135 of 2,769). Ratings of teamwork differed substantially by operating room caregiver type, with the greatest differences in ratings shown by physicians: surgeons (F[4, 2058] = 41.73, p < 0.001), and anesthesiologists (F[4, 1990] = 53.15, p < 0.001). The percent of operating room caregivers rating the quality of collaboration and communication as “high” or “very high” was different by caregiver role and whether they were rating a peer or another type of caregiver: surgeons rated other surgeons “high” or “very high” 85% of the time, and nurses rated their collaboration with surgeons “high” or “very high” only 48% of the time.

CONCLUSIONS: Considerable discrepancies in perceptions of teamwork exist in the operating room, with physicians rating the teamwork of others as good, but at the same time, nurses perceive teamwork as mediocre. Given the importance of communication and collaboration in patient safety, health care organizations should measure teamwork using a scientifically valid method. The Safety Attitudes Questionnaire can be used to measure teamwork, identify disconnects between or within disciplines, and evaluate interventions aimed at improving patient safety. (J Am Coll Surg 2006;202:746–752. © 2006 by the American College of Surgeons)
<table>
<thead>
<tr>
<th>Caregiver Position Performing Rating</th>
<th>Surgeon</th>
<th>Anesthesiologist</th>
<th>Nurse</th>
<th>CRNA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surgeon</td>
<td>85</td>
<td>84</td>
<td>88</td>
<td>87</td>
</tr>
<tr>
<td>Anesthesiologist</td>
<td>70</td>
<td>96</td>
<td>89</td>
<td>92</td>
</tr>
<tr>
<td>Nurse</td>
<td>48</td>
<td>63</td>
<td>81</td>
<td>68</td>
</tr>
<tr>
<td>CRNA</td>
<td>58</td>
<td>75</td>
<td>76</td>
<td>93</td>
</tr>
</tbody>
</table>

Caregiver Position Being Rated
Different Perceptions of Collaboration and Communication

<table>
<thead>
<tr>
<th>Communication &amp; Collaboration with</th>
<th>Rated By</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surgeons</td>
<td>4.4*</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Nurses</td>
<td>3.4*</td>
<td></td>
</tr>
<tr>
<td>Surgeons</td>
<td>4.3</td>
<td></td>
</tr>
<tr>
<td>Nurses</td>
<td>4.3</td>
<td></td>
</tr>
</tbody>
</table>

Carney. AORN J 2010; 91: 722
Different Perceptions of Collaboration and Communication

Definitions of collaboration:

- **Nurses** – having their **input respected**
- **Surgeons** - having nurses **anticipate their needs and follow instructions**

Carney. AORN J 2010; 91: 722
Different Perceptions of Collaboration and Communication

Significantly different ratings by nurses and surgeons:

• Nurse input is well received
• Difficult to speak up if I perceive a problem with patient care
• Disagreements are resolved by what is best for the patient, not who is “right”
• It is easy to ask questions if I do not understand
• Surgeons and nurses work as a well-coordinated team

Carney. AORN J 2010; 91: 722
Different Perceptions of Collaboration and Communication in the Operating Room

Significantly different ratings by nurses and surgeons:

• I am comfortable intervening in a procedure if I have concerns about what is occurring
• During surgical and diagnostic procedures, everyone on the team is aware of what is happening.
• Morale on our team is high
• Everyone on our team is comfortable giving feedback to other team members

Evaluation of a Preoperative Checklist and Team Briefing Among Surgeons, Nurses, and Anesthesiologists to Reduce Failures in Communication

Lorelei Lingard, PhD; Glenn Regehr, PhD; Beverley Orser, MD, PhD; Richard Reznick, MD, MEd; G. Ross Baker, PhD; Diane Doran, RN, PhD; Sherry Espin, RN, PhD; John Bohnen, MD; Sarah Whyte, MA

Objective: To assess whether structured team briefings improve operating room communication.

Design, Setting, and Participants: This 13-month prospective study used a preintervention/postintervention design. All staff and trainees in the division of general surgery at a Canadian academic tertiary care hospital were invited to participate. Participants included 11 general surgeons, 24 surgical trainees, 41 operating room nurses, 28 anesthesiologists, and 24 anesthesia trainees.

Intervention: Surgeons, nurses, and anesthesiologists gathered before 302 patient procedures for a short team briefing structured by a checklist.

Results: One hundred seventy-two procedures were observed (86 preintervention, 86 postintervention). The mean (SD) number of communication failures per procedure declined from 3.95 (3.20) before the intervention to 1.31 (1.53) after the intervention (P < .001). Thirty-four percent of briefings demonstrated utility, including identification of problems, resolution of critical knowledge gaps, decision-making, and follow-up actions.
Other Centers Experience with Briefings and Checklists
Communication Failures Before and After Team Briefing

<table>
<thead>
<tr>
<th></th>
<th>Cases with Zero Failures</th>
<th>Failures per Procedure</th>
<th>Failure with Consequence</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Before</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Briefing</td>
<td>86</td>
<td>6%</td>
<td>4.0*</td>
</tr>
<tr>
<td><strong>After</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Briefing</td>
<td>86</td>
<td>38%</td>
<td>1.3*</td>
</tr>
</tbody>
</table>

*p < 0.001

Lingard. Arch Surg 2008;143:12-17
## Preoperative Briefings

### Results

<table>
<thead>
<tr>
<th></th>
<th>Pre</th>
<th>Post</th>
<th>Decrease</th>
<th>p Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total disruptions per case</td>
<td>9.5</td>
<td>5</td>
<td>47%</td>
<td>0.0002</td>
</tr>
<tr>
<td>Knowledge disruptions per case</td>
<td>4.1</td>
<td>2.2</td>
<td>46%</td>
<td>0.007</td>
</tr>
<tr>
<td>Miscommunications</td>
<td>2.5</td>
<td>1.2</td>
<td>53%</td>
<td>0.03</td>
</tr>
<tr>
<td>Circulator to core</td>
<td>10</td>
<td>4.7</td>
<td>53%</td>
<td>0.008</td>
</tr>
<tr>
<td>Time spent in core</td>
<td>6.6</td>
<td>2.9</td>
<td>56%</td>
<td>0.01</td>
</tr>
</tbody>
</table>

Henrickson. JACS 2009; 208:1115-23
Preoperative Briefings
Duration

Henrickson. JACS 2009; 208:1115-23
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 sur-

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).
Impact of Briefings on Delays

- All reported delays – 31% reduction
- Surgeon-reported delays – 82% reduction
- Communication breakdowns – 19% reduction

Nundy. Arch Surg 2008; 143:1068-72
Intraoperative Behavior and Surgical Site Infections

<table>
<thead>
<tr>
<th>Factor</th>
<th>Odds Ratio</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMI &gt; 30</td>
<td>2.0</td>
<td>0.006</td>
</tr>
<tr>
<td>Duration &gt; 3 hr</td>
<td>3.3</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Discipline score ≥ 1</td>
<td>2.0</td>
<td>0.04</td>
</tr>
<tr>
<td>Intest. Anastomosis</td>
<td>6.7</td>
<td>&lt; 0.001</td>
</tr>
</tbody>
</table>

Not Significant: Extended antiseptic measures - including frequent glove changes, more compulsive cover up and scrub clothing, iodine-impregnated adherent drapes, changing instruments, and extensive irrigation.

WHO Checklist and Complications
London, Toronto, Seattle, Auckland, New Delhi, Amman, Manila, Ifakara

<table>
<thead>
<tr>
<th></th>
<th>Before</th>
<th>After</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n=3773</td>
<td>n=3955</td>
</tr>
<tr>
<td>SSI</td>
<td>6.2%</td>
<td>3.4%</td>
</tr>
<tr>
<td>Unplan Return-O.R.</td>
<td>2.4%</td>
<td>1.8%</td>
</tr>
<tr>
<td>Any Complication</td>
<td>11.0%</td>
<td>7.0%</td>
</tr>
<tr>
<td>Death</td>
<td>1.5%</td>
<td>0.8%</td>
</tr>
</tbody>
</table>

Haynes. NEJM 2009; 360: 491-9
Change in Safety Attitudes and Change in Complication Rates

Haynes. BMJ Qual Saf 2011;20:102e107
## Checklist and Complications

### The Netherlands

<table>
<thead>
<tr>
<th></th>
<th>Before n=3760</th>
<th>After n=3820</th>
</tr>
</thead>
<tbody>
<tr>
<td>SSI</td>
<td>3.8%</td>
<td>2.7%</td>
</tr>
<tr>
<td>Complic/100 pts</td>
<td>27.3</td>
<td>16.7</td>
</tr>
<tr>
<td>Pts with Complic</td>
<td>15.4%</td>
<td>10.6%</td>
</tr>
<tr>
<td>Death</td>
<td>1.5%</td>
<td>0.8%</td>
</tr>
</tbody>
</table>

de Vries. NEJM 2010; 363: 1928-37
Checklist Completion and Complications

Checklist Completion

<table>
<thead>
<tr>
<th>Above median</th>
<th>Below median</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.1%</td>
<td>11.7%</td>
</tr>
</tbody>
</table>

de Vries. NEJM 2010; 363: 1928-37
Checklist Completion and Mortality
The Netherlands

22 item checklist modeled on WHO
25, 513 patients followed

Record of checklist completion:
• Not done
• Partial - at least 1 of 22 done
• Completed - all done

Checklist Completion and Mortality

Adjusted Odds Ratio

Mortality

All patients 0.85 (0.73-0.98)

<table>
<thead>
<tr>
<th>Checklist Completion</th>
<th>Adjusted Odds Ratio</th>
<th>Mortality</th>
</tr>
</thead>
<tbody>
<tr>
<td>All patients</td>
<td>0.85 (0.73-0.98)</td>
<td></td>
</tr>
<tr>
<td>Completed</td>
<td>0.44 (0.28-0.70)</td>
<td></td>
</tr>
<tr>
<td>Partial</td>
<td>1.09 (0.78-1.52)</td>
<td></td>
</tr>
<tr>
<td>Not done</td>
<td>1.16 (0.86-1.56)</td>
<td></td>
</tr>
</tbody>
</table>

I would be willing to fly to Chicago tomorrow if I knew that the Pilot did not do the preflight checklist.

A. Yes
B. No
I think that having an operation is safer than flying to Chicago.

A. Yes
B. No
<table>
<thead>
<tr>
<th>Agree or strongly agree</th>
<th>After</th>
</tr>
</thead>
<tbody>
<tr>
<td>Checklist easy to use</td>
<td>56%</td>
</tr>
<tr>
<td>Checklist improved O.R. safety</td>
<td>60%</td>
</tr>
<tr>
<td>Took a long time to complete</td>
<td>23%</td>
</tr>
<tr>
<td><strong>I would want checklist for me</strong></td>
<td><strong>88%</strong></td>
</tr>
<tr>
<td>Communication was improved</td>
<td>81%</td>
</tr>
<tr>
<td>Checklist helped to prevent errors</td>
<td>67%</td>
</tr>
</tbody>
</table>
Association Between Implementation of a Medical Team Training Program and Surgical Mortality

Julia Neily, RN, MS, MPH
Peter D. Mills, PhD, MS
Yinong Young-Xu, ScD, MA, MS
Brian T. Carney, MD
Priscilla West, MPH
David H. Berger, MD, MHCM
Lisa M. Mazzia, MD
Douglas E. Paull, MD
James P. Bagian, MD, PE

ADVERSE EVENTS RELATED TO surgery continue to occur despite the best efforts of clinicians. Teamwork and effective communication are known determinants of surgical safety. Previous efforts at demonstrating the efficacy of patient safety initiatives have been limited because of the inability to study a control group. For example, the

Context There is insufficient information about the effectiveness of medical team training on surgical outcomes. The Veterans Health Administration (VHA) implemented a formalized medical team training program for operating room personnel on a national level.

Objective To determine whether an association existed between the VHA Medical Team Training program and surgical outcomes.

Design, Setting, and Participants A retrospective health services study with a contemporaneous control group was conducted. Outcome data were obtained from the VHA Surgical Quality Improvement Program (VASQIP) and from structured interviews in fiscal years 2006 to 2008. The analysis included 182,409 sampled procedures from 108 VHA facilities that provided care to veterans. The VHA’s nationwide training program required briefings and debriefings in the operating room and included checklists as an integral part of this process. The training included 2 months of preparation, a 1-day conference, and 1 year of quarterly coaching interviews.

Main Outcome Measure The rate of change in the mortality rate 1 year after facilities enrolled in the training program compared with the year before and with non-training sites.

Results The 74 facilities in the training program experienced an 18% reduction in annual mortality (rate ratio [RR], 0.82; 95% confidence interval [CI], 0.76-0.91; P = .01) compared with a 7% decrease among the 34 facilities that had not yet undergone training (RR, 0.93; 95% CI, 0.80-1.06; P = .59). The risk-adjusted mortality rates at baseline were 17 per 1000 procedures per year for the trained facilities and 15 per
Team Training and Mortality

![Graph showing the relationship between quarters of training program and average risk-adjusted mortality rate.]

- Deaths per 1000 Procedures
- Baseline: 0, 1, 2, 3, 4
- Quarters of Training Program
- No. of Facilities: 74, 16, 20, 24, 14

Neily. JAMA 2010;304:1693-1700
Incorrect Surgical Procedures 2000 to 2010

* Team Training Program

Team Training and Morbidity

- 42 VA hospitals underwent team training and 32 did not during 2007.
- Both groups demonstrated reduction in overall morbidity and postoperative infections from 2006 to 2008.
- Hospitals with team training had 20% greater reduction in morbidity (p<0.001) and 17% greater reduction in infections (p<0.005).

Clearly culture, communication, and teamwork in the O.R. have an enormous amount to do with patient outcome including SSI risk, RFB, and many other potential complications.
Culture of Delivering Safe, High-Acuity Perioperative Care

- Clear central goals, widely shared across organization
- Hierarchical structure honors collegial decision-making independent of rank
- Vigilance is prized & safety rewarded
- Databases support safety goals
- Reporting and simulation enhance learning

SCOAP Surgical Checklist

1. Before Induction: Briefing
   - All Team Members - (Attending Surgeon or designee leads):
     - Confirm patient (at least 2 identifiers), procedure, site, Left/Right
     - Describe procedure, expected duration, & anticipated difficulties
     - Expected blood loss & blood availability
     - Need for special instruments / supplies / IV access beyond usual
     - Heparin given/not needed and/or SCDs in place and turned on
   - Nursing/Tech reviews:
     - Equipment issues (instruments ready, staff in-serviced, implants available)
   - Anesthesia reviews:
     - Airways or other concerns
     - Allergies
     - Special meds, other
   - All Team Members
     - Questions/issues/concerns from any team member & duty to speak up at any time in the procedure

2. Before incision: Process control
   - Attending Surgeon reviews: (as applicable)
     - Attending Surgeon not present for SCOAP? Repeat SCOAP 1.
     - Each person introduces self by name & role
     - Personnel exchanges: timing, plan for announcing changes
     - Essential imaging displayed, right & left confirmed
     - Has patient positioning changed since SCOAP 1? Is marking still visible?
     - Antibiotic prophylaxis - drug, dose, time, redosing plan
     - Active warming – needed? In place, turned on?
     - Risk of hyperglycemia? Plan for insulin protocol if needed
     - Sharps management plan
     - Specialty-specific checklist

3. Just before closure of operative field or removal of trocars: No retained objects
   - Attending Surgeon:
     - Perform methodical visual & physical sweep of wound & report
   - Nursing/Tech:
     - All music, conversation, & distractions halted
     - Perform preliminary count of needles/sponges/instruments & report

4. After skin closure complete: No retained objects, debriefing, care transition
   - All Team Members (Attending Surgeon or designee leads):
     - Confirm final needles/sponges/instruments count correct
     - Surgeon views all sponges & laps in holders
     - Confirm name of procedure
     - Any specimens? Confirm label & instructions
     - Equipment issues to be addressed? If yes, response plan
     - Other issues? If yes, response plan
   - Surgeon and Anesthesia:
     - Does patient need special monitoring?
     - Insulin drip needed?
     - Post-op beta blockers needed?
     - Post-op anticoagulation needed?
     - Pain management by Surgery or Acute Pain Service?
     - Other special concerns for patient recovery?
Location and Visibility of Checklist:

• The checklist must be visible to and readable by every professional involved in the case in the O.R. for each stage of the checklist.

• The checklist should never be done from memory.
Process:
The checklist requires the participation of all persons in the Operating Room.

Leading means

- first requesting permission from the members of anesthesia and nursing and
- second, addressing every single line by reading each line.
As much as possible the checklist should be run in a way that involves all of the professional disciplines in the room and generates responses to the items on the list.
A member of each of the three disciplines (Anesthesia, Nursing, Surgery) must be present for the checklist which occurs in the operating room before induction.
Before induction: Briefing

All Team Members - (Attending Surgeon or designee leads):
- Confirm patient (at least 2 identifiers), procedure, site, Left/Right
- Describe procedure, expected duration, & anticipated difficulties
- Expected blood loss & blood availability
- Need for special instruments / supplies / IV access beyond usual
- Heparin given/not needed and/or SCDs in place and turned on

Nursing/Tech reviews:
- Equipment issues (instruments ready, staff in-serviced, implants available)

Anesthesia reviews:
- Airway or other concerns
- Allergies
- Special meds, other

All Team Members
- Questions/issues/concerns from any team member & duty to speak up at any time in the procedure
Before incision: Process control

- Attending Surgeon reviews: (as applicable)
  - Attending Surgeon not present for SCOAP 1? Repeat SCOAP 1.
  - Each person introduces self by name & role
  - Personnel exchanges: timing, plan for announcing changes
  - Essential imaging displayed; right & left confirmed
  - Has patient positioning changed since SCOAP 1? Is marking still visible?
  - Antibiotic prophylaxis - drug, dose, time, redosing plan
  - Active warming – needed? In place, turned on?
  - Risk of hyperglycemia? Plan for insulin protocol if needed
  - Sharps management plan
  - Specialty-specific checklist
Specialty groups with specific issues are encouraged to develop specialty-specific checklists and to use them at this time.
### Just before closure of operative field or removal of trocars: No retained objects

<table>
<thead>
<tr>
<th>Attending Surgeon:</th>
<th>Nursing/Tech:</th>
</tr>
</thead>
<tbody>
<tr>
<td>□ Perform methodical visual &amp; physical sweep of wound &amp; report</td>
<td>□ All music, conversation, &amp; distractions halted</td>
</tr>
<tr>
<td>□ Perform preliminary count of needles/ sponges/ instruments &amp; report</td>
<td></td>
</tr>
</tbody>
</table>
## After skin closure complete:

No retained objects, debriefing, care transition

<table>
<thead>
<tr>
<th>All Team Members (Attending Surgeon or designee leads):</th>
<th>Surgeon and Anesthesia:</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Confirm final needles/ sponges/ instruments count correct</td>
<td>- Does patient need special monitoring?</td>
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<td>- Surgeon views all sponges &amp; laps in holders</td>
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<td>- Confirm name of procedure</td>
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</tr>
<tr>
<td>- Equipment issues to be addressed? If yes, response plan</td>
<td>- Pain management by Surgery or Acute Pain Service?</td>
</tr>
<tr>
<td>- Other issues? If yes, response plan</td>
<td>- Other special concerns for patient recovery?</td>
</tr>
</tbody>
</table>
• Any team member who observes deviation from the policies expressed in this document should consider it his or her obligation to call it out immediately.

• We assume that this will be accepted graciously.

• If not, the incident should be reported to your supervisor as soon as possible during or immediately after the case.
Final Thoughts

Effective teamwork is the foundation of patient safety.

Teams *can* learn to be more effective.
I am Dr. Dellinger, and I am a good surgeon, but I am vulnerable to error, so you are here to help me take care of this patient – We are a team.
“The single biggest problem in communication is the illusion that it has taken place.”

George Bernard Shaw