What Can the Operating Room Learn from the Cockpit?

Richard C. Karl, M.D.

Richard G. Connar Professor and Chairman
Department of Surgery
College of Medicine
University of South Florida

Founder, Surgical Safety Institute

Contributing Editor, Flying Magazine
Tampa, FL

Captain Robert Haynes

Director of Flight Standards & Quality Assurance, Southwest Airlines
Dallas, TX
What Can an Operating Room Learn from a Cockpit?

- What is realistic?
- What are the fundamental/immutable differences?
- What can be done now?
- What can be done in the future?
- What can you do tomorrow?
Is the cockpit model perfectly transferable to the OR?
Differences Unlikely to Change

- Regulation
- Employment
- Number of people harmed per incident
- Harm to the team
Differences That Could Change... Eventually

- Credentialing and re-evaluation
- Simulators
Differences That Could Change…Now

- Limitation of hours
- Teamwork and communication
- The culture in the OR
Why Teamwork and Communication?

To help compensate for the FACT that humans (even well-trained, highly experienced, good ones) make errors:

- Stress
- Fatigue
- Overload
- Emergency
- Unfamiliar
- Distractions/interruptions
100,000 die from medical errors

Does not include:
- wrong site
- retained surgical item
- surgical site infection with hypothermia
- cancer recurrence with blood transfusion
- consequences of hyperglycemia

15,000,000 harms - IHI
Clinical Reasons to Communicate
Glucose Control

- Higher incidence of SSI in diabetic patients undergoing CABG with poor glucose control.
  
  **Latham, ICHE 2001;22:607-12**

- Moderate hyperglycemia (200 mg/dL) at any time during the first postoperative day increases risk of SSI *fourfold* after noncardiac surgery.
  
  **Pomposelli, JPEN 1998;22:77-81**

- Critically ill patients, tight glucose control
  - 34% decrease in mortality
  - Reduced blood stream infections by 44%
  - Decreased renal failure and less likely to require prolonged mechanical ventilation

  **Van Den Berghe, NEJM 2001;345:1359-67**
Blood Transfusions

Transfusion of any volume of red blood cell concentrates more than triples the risk of nosocomial infection.

Transfusion of critically ill patients
- Increases risk of nosocomial infection
- Worsens organ dysfunction
- Increases mortality

Linked to cancer recurrence or cancer-related deaths
- Head and neck cancer, breast cancer, gastric cancer, lung cancer, and colon cancer

Hill, J Trauma 2003;54:908-14
Taylor, CCM 2002;30:2249-54
Englesbe, JACS 2005;200(2):249-54
Burrows, Lancet 1982;2:662
Effects of Intravenous Fluid Restriction on Postoperative Complications: Comparison of Two Perioperative Fluid Regimens

A Randomized Assessor-Blinded Multicenter Trial

Birgitte Brandstrup, MD, PhD,* Hanne Tønnesen, MD, DMSc, * Randi Beyer-Holgersen, MD, † Else Hjortso, MD, || Helle Ørding, MD, DMSc, ** Karen Lindorff-Larsen, MD, †† Morten S. Rasmussen, MD, † Charlotte Lanng, MD, † Lene Wallin, MD, DMSc, § and The Danish Study Group on Perioperative Fluid Therapy (Lene H. Iversen, MD, PhD, ** Christina S. Gramkow, MD, † Mette Okholm, MD, || Tine Blemmer, MD, || Poul-Erik Svendsen, MD, † Henrik H. Rottensten, MD, † Birgit Thage, MD, † Jens Riis, MD, †† Inge S. Jeppesen, MD, § Dorthe Teilum, MD, †† Anne Mette Christensen, MD, ** Ben Graungaard, MD, || and Frank Pott, MD, ||

<table>
<thead>
<tr>
<th></th>
<th>Blinded Assessment</th>
<th>Unblinded Assessment</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Restricted Group</td>
<td>Standard Group</td>
</tr>
<tr>
<td>Overall complications</td>
<td>21</td>
<td>40</td>
</tr>
<tr>
<td>Major complications†</td>
<td>8</td>
<td>18</td>
</tr>
<tr>
<td>Minor complications‡</td>
<td>15</td>
<td>36</td>
</tr>
<tr>
<td>Tissue-healing complications†</td>
<td>11</td>
<td>22</td>
</tr>
<tr>
<td>Cardiopulmonary complications‡</td>
<td>5</td>
<td>17</td>
</tr>
</tbody>
</table>

n = 69 in restricted group and n = 72 in standard group.
†Number of patients in subgroups does not add up to number of overall complications because some patients had more than 1 complication.
Pre-Flight Inspection

12-30-02

The entire Pre-Flight Inspection is accomplished prior to every flight except for the items in Additional Checks. When maintenance has been performed, the pre-flight item(s) associated with the system, component, etc., should be checked. Also check that any associated c-b's that may have been pulled have been reset.

**NOTES**
- On all flights without Flight Attendants on board, determine that all galley drawers and doors are closed and latched prior to taxi.
- A 5 identifies a 757 only item and a 6 identifies a 767 only item. Items without an identifier apply to both airplanes.

**Exterior Safety Inspection**
- Wheel Chocks ...................... INSTALLED
- Flight Control Surface Areas .................. CLEAR
- APU Exhaust Area .................. CLEAR

**Cockpit Preparation**

**Cockpit Safety Inspection**
- Battery Switch .................. ON (Guarded)
- Standby Power Selector .................. AUTO
- Electrical Panel .................. CHECK
- Emergency Lights Switch .................. ARMED
- Hydraulic Panel .................. SET
- Gear Handle .................. DOWN and IN
- Altn Flaps Selector / Switches .................. CHECK
- Flap Handle / Flap Position .................. AGREE
- Circuit Breakers .................. CHECK

**Cockpit Initial Preparation**
- Starting the APU is at the Captain's discretion. Normally it will be started about ten minutes before departure. Earlier starts should be considered:
  - When necessary to satisfy air conditioning or special electrical requirements
  - On critical flights and international flights to avoid delays resulting from APU start problems
- APU Power / External Power .................. ESTABLISH

**Cockpit Area Inspection**
- Crew Life Vests .................. CHECK ABOARD
- Cockpit Emergency Equipment .................. CHECK ABOARD
  - Portable Halon Fire Extinguisher
  - Portable Oxygen Bottle (if installed)
  - PBE
  - Crash Axe

**Walk-Around Inspection**
- Walk-Around Inspection .................. ACCOMPLISH

**Cockpit Final Preparation**
- Yaw Damper Switches .................. CHECK ON
- Electronic Engine Control Switches .................. ON (Guarded)
- Overhead Annunciator Panel .................. CHECK
- Evacuation Command Switch ................. OFF (Guarded)
- Passenger Oxygen Switch .................. BLANK (Guarded)
- Ram Air Turbine Switch .................. BLANK (Guarded)
- Engine Limiter Control Switches .................. ON
- Engine Start Panel .................. SET / CHECK
- Fuel Jettison Panel (if equipped) .................. SET
- Fuel Panel .................. SET
- Wing Anti-Ice Switch .................. BLANK
- Engine Anti-Ice Switches .................. BLANK
- Cargo Heat Switches .................. OFF
- Window Heat Switches .................. ON
- No Smoking Signs .................. ON
- Fasten Seat Belt Signs .................. OFF
- Pressurization System .................. SET

**Additional Checks**
- Accomplish the following on the first flight of the day:
  - Standby Power .................. TEST
  - Indicator Lights Test Switch .................. PRESS
  - Fire and Overheat Detection System .................. TEST
  - Fire Extinguisher and Overwing Slide Squibs .................. TEST

**Equipment Cooling Switch** .................. BLANK
**Equipment Cooling Switch** .................. AUTO
**Magnetic Standby Compass** .................. CHECK
**Reserve Brakes Switch** .................. BLANK
**Reserve Brakes / Steering Switch** .................. BLANK
**Standby Attitude Indicator** .................. CHECK / NO FLAGS
**Standby Altimeter** .................. CHECK
**Standby Airspeed Indicator** .................. CHECK
**Caution and Warning System** .................. CHECK
**Standby Engine Indicator** .................. AUTO
**Auto Brakes Selector** .................. OFF
**EICAS Display Switch** .................. ENGINE
**EICAS Display Switch** .................. STATUS
**EICAS Computer Selector** .................. AUTO
**Thrust Reference Selector** .................. BOTH / IN
**HSI Hdg Ref Switch** .................. NORM
**Altn Gear Extend Switch** .................. OFF (Guarded)
**Gnd Prox / Flap Ovrhd Switch** .................. BLANK (Guarded)
**Gnd Prox / Config** .................. BLANK (Guarded)
**Gnd Ovhd Switch** .................. DOWN
**Spoiler Handle** .................. DOWN
**Reverse Lever and Throttles** .................. DOWN and CLOSED
**Stabilizer Trim Cutout Switches** .................. NORM (Guarded)
**Fuel Control Switches** .................. CUT/ OFF
**Fire Handles** .................. IN
**Fire Bottle Discharge Lights** .................. EXTINGUISHED
**Transponder / TCAS** .................. TEST / SET
**Aileron and Rudder Trim** .................. SET
**Fuel Panel, Quantity and Distribution** .................. SET and CHECK
**ACARS** .................. DATA / SET

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### PRE-OPERATIVE CHECKLIST

|☐ Consent Signed |☐ Blood consent Signed T&S/T&C _______ units |☐ Other Info: Precautions/Isolation |☐ Type of Admission: OP |
|☐ History & Physical |☐ Slide Review Form Signed |☐ Communicable Diseases |☐ AM ADM |
|☐ Chest X-Ray Report |☐ EKG |☐ Neutropenic |☐ Obs |
|☐ Blood work report on chart |☐ Hgb_____ Hct_____ PLT_____ Date_______ |☐ MRSA |☐ In-patient |
|☐ Orders noted |☐ Patient labels sent with patient |☐ Chemo Precautions |☐ NKA |
|☐ OLD chart sent with patient |☐ TED hose on patient (Knee High/Thigh High) |☐ Allergies: |☐ Latex |

**Lab Results:**
- ☐ Hgb < 10.0 Dr. __________ notified
- ☐ Abnormal Lytes Dr. __________ notified
- ☐ PLT < than 50,000 Dr. __________ notified

☐ Abnormal Coags Dr. __________ notified
☐ bHCG sent @____/______ ☐ Hyst/BTL ☐ Postmeno ____ yrs
☐ Accuchek = __________ @__________
Traditional Surgical Brief
Teamwork and Communication

- Have structured and clear team roles
- Use patterned communication
- Brief and debrief
- Plan for contingencies
- Know the game plan
- Invite input
- Know and use names
- Assert: Speak up if something looks wrong or confusing
- Read back all the time
- Watch out for each other/vigilance
- Identify and deal with red flags
### Key Skills by Crew Position

<table>
<thead>
<tr>
<th>Captain</th>
<th>First Officer</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Briefing</td>
<td>- Inquiry/Assertion</td>
</tr>
<tr>
<td>- Leadership</td>
<td>- Preparation, Planning, &amp; Vigilance</td>
</tr>
<tr>
<td>- Interpersonal Skill</td>
<td>- Technical Proficiency</td>
</tr>
<tr>
<td>- Communication</td>
<td>- Leadership</td>
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</table>
Are Teamwork and Communication Enough?

An integrated approach

- Create cohesive, clear, reliable policies
  - Ensuring no RSI or wrong surgery is a team function, not solely a nursing or surgeon function
- Make teamwork and communication the bedrock of safety in job descriptions
- Hire for teamwork skills – ALL team members
- Deal with disruptive team members
- Align physician and nurse codes of conduct
- Regularly train team and practical skills
- Commit to imbedding teamwork into the culture
Bringing Surgeons into the Team

- Everyone feels frustrated and powerless
- OR is now leaderless
- MD as solitary craftsman
- Anesthesia, prep and nursing as solitary craftsmen
- MDs are leaders, not just craftsmen – rise to the occasion, control their environment
- MD role is to provide leadership and create a functioning team
Our Experience – Success Factors

- Have early and simultaneous MD training
- Insist on physician-to-physician training
- Separate MDs from the rest of the team initially
- Start with an MD dinner
- Win them over one by one
- Emphasize the clinical and efficiency reasons to communicate
- Emphasize how briefs can solve nagging frustrations:
  - Travelers/temps
  - Ill-timed breaks
  - Interruptions and distractions
  - Equipment issues
  - Respect for everyone’s critical times
- Use alpha dogs
- Spread MD testimonials of early successes
Our Experience – Success Factors

- Use tools for support:
  - White boards
  - Observations
- Show support from the top and the middle
- Exhibit dogged and determined leadership
- Integrate the effort
- Provide recurrent training
What you can do to make this happen tomorrow
What you can do to make this happen tomorrow

- Provide leadership – it can come from anywhere
- Advocate for this – don’t give up
- Hand out articles on the topic
- Discuss the topic at managers’ meetings
- Have a grand rounds or in-service on the topic
- Consider how communication played a role in every event
- Walk in and observe what’s going on now
- Introduce white boards
What you can do to make this happen tomorrow

- Start small with a willing group
- Use outsiders initially – aviation is sexy, engaging and convincing
- Use physician trainers
- Do briefs
- Spread anecdotes of success – believer to non-believer
- Develop “killer” item checklists
- Stress function over form
- Incorporate teamwork and communication into all policies, job descriptions, by-laws
- Be consistent in support of teamwork
- Commit to a coordinated approach – not just team training
Does it Work?
Aviation

- U.S. airline fatality rate 1/5th of 1950
- No one died in a domestic airliner in 2002-2004
Operating Rooms

Preoperative brief results:

- WSS decreased from 3 to 0 per year
- Employee satisfaction increased 19%
- Nursing turnover decreased 16%
- Early resolution of equipment issues
- Reduced delays in receiving equipment
- Reduced case delay or cancellations

The Permanente Journal Spring 2004 Vol 8 No 2  James DeFontes, MD, Stephanie Surbida, MPH
Medicine is a lot harder

These techniques can make it easier,
more efficient,
and safer
Bibliography

While there are increasing numbers of articles about the topic of crew resource management (or team training) in the health care literature, this is a quick list of several that may help to persuade others:

- *The Permanente Journal* Spring 2004 Vol 8 No 2 “Preoperative Safety Briefing Project” James DeFontes MD and Stephanie Surbida MPH
- *Journal of the American College of Surgeons* February 2007 Volume 204 No. 2 “Operating Room Briefings and Wrong-Site Surgery” Makary, Mukherjee, Sexton, Syin, et al
Bibliography

- **Journal of the American College of Surgeons** July 2007 Vol 205 No 1 169-176 “Briefing and Debriefing in the Operating Room Using Fighter Pilot Crew Resource Management” J McGreevey, MD, T Otten, BS

- **Academic Medicine** March 2002 Vol 77 No 3 “Team Communications in the Operating Room: Talk Patterns, Sites of Tension, and Implications for Novices” Lingard, Reznick, Espin, Regehr, DeVito

- **American Journal of Surgery** 2005 Nov 190(5) 770-4 “Bridging the communication gap in the operating room with medical team training” Awad SS, Fagan SP, Bellows C, Albo D, Green-Rashad B, De la Garza M, Berger DH

- **Annals of Surgery** May 2006 Vol 243 Issue 5 Page 628 “Patient Safety in Surgery” Martin A. Makary, MD, MPH; J Bryan Sexton, PhD; Julie A. Freischlag, MD; E Anne Millman, MS; David Pryor, MD; Christine Holzmueller, BLA; Peter J. Pronovost, MD, PhD
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