Designing Hospitals and Healthcare Facilities Using High Reliability Robust Processes

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Wayne State University
J Bara Innovation

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Disclosures

None.
Put your hand up if...

• You have suffered harm as a patient at a hospital or other care facility (i.e., infection, delayed diagnosis, delay in treatment, etc)
• A family member has suffered harm in a hospital or other care facility...
• A friend or colleague has suffered harm in a hospital or other care facility...
• You have had to disclose harm or otherwise handle the situation when a patient was harmed in your hospital or other care facility
Towards Achieving Better Health by Safe and Reliable Design

Identify the basic requirement of Salutogenic* approach and its implementation at all levels of society in order to prevent disease and promote health, thereby reducing the cost of medical treatment towards improving economic growth, joy and social development in the country.

*Salutogenesis, coined by Aaron Antonovsky, describes an approach focusing on factors that support human health and well-being, rather than on factors that cause disease (pathogenesis).
I Have a Dream: What’s Yours?

• All health care environments in Korea should be healing environments.
• They should feel more like home.
• They should help make getting better easier, not harder.
• They should help restore joy in work for Korean providers.
• They should help people get what they really, really want – to have more choice and control, and less anxiety and confusion.
• Whether a patient is in our care for an hour, a day, a week, or a year, they deserve an optimal healing environment.
THREE CONCURRENT REVOLUTIONS

QUALITY AND SAFETY

BUILT ENVIRONMENT

REIMBURSEMENT
How Good is the Quality of OUR Healthcare System?

• Surgical Site Infections (SSI)
• Patient Handoff communication
• Hospital HHI
• Patient falls
• Wrong site surgery
Makary said he and co-author Michael Daniel, also from Johns Hopkins, conducted the analysis to shed more light on a problem that many hospitals and health care facilities try to avoid talking about.

Death in the United States

Johns Hopkins University researchers estimate that medical error is now the third leading cause of death. Here's a ranking by yearly deaths.

<table>
<thead>
<tr>
<th>Cause</th>
<th>Deaths</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heart disease</td>
<td>614,348</td>
</tr>
<tr>
<td>Cancer</td>
<td>591,699</td>
</tr>
<tr>
<td>Medical error</td>
<td>251,454</td>
</tr>
<tr>
<td>Respiratory disease</td>
<td>147,101</td>
</tr>
<tr>
<td>Accidents</td>
<td>136,053</td>
</tr>
<tr>
<td>Stroke</td>
<td>133,103</td>
</tr>
<tr>
<td>Alzheimer's</td>
<td>93,541</td>
</tr>
<tr>
<td>Diabetes</td>
<td>76,488</td>
</tr>
<tr>
<td>Flu/pneumonia</td>
<td>55,227</td>
</tr>
<tr>
<td>Kidney disease</td>
<td>48,146</td>
</tr>
<tr>
<td>Suicide</td>
<td>42,773</td>
</tr>
</tbody>
</table>

Source: National Center for Health Statistics, BMJ
Mirror, Mirror on the Wall, 2014 Update: How the U.S. Health Care System Compares Internationally

EXHIBIT ES-1. OVERALL RANKING

<table>
<thead>
<tr>
<th>COUNTRY RANKINGS</th>
<th>AUS</th>
<th>CAN</th>
<th>FRA</th>
<th>GER</th>
<th>NETH</th>
<th>NZ</th>
<th>NOR</th>
<th>SWE</th>
<th>SWIZ</th>
<th>UK</th>
<th>US</th>
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<tr>
<td>Overal Rank (2013)</td>
<td>4</td>
<td>10</td>
<td>9</td>
<td>5</td>
<td>5</td>
<td>7</td>
<td>7</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>11</td>
</tr>
<tr>
<td>Quality Care</td>
<td>2</td>
<td>9</td>
<td>8</td>
<td>7</td>
<td>5</td>
<td>4</td>
<td>11</td>
<td>10</td>
<td>3</td>
<td>1</td>
<td>5</td>
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<tr>
<td>Effective Care</td>
<td>4</td>
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<td>9</td>
<td>8</td>
<td>5</td>
<td>2</td>
<td>11</td>
<td>10</td>
<td>8</td>
<td>1</td>
<td>3</td>
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<tr>
<td>Safe Care</td>
<td>3</td>
<td>10</td>
<td>2</td>
<td>6</td>
<td>7</td>
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<td>11</td>
<td>10</td>
<td>5</td>
<td>4</td>
<td>7</td>
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<tr>
<td>Coordinated Care</td>
<td>4</td>
<td>8</td>
<td>9</td>
<td>10</td>
<td>5</td>
<td>2</td>
<td>7</td>
<td>11</td>
<td>3</td>
<td>1</td>
<td>6</td>
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<td>Patient-Centered Care</td>
<td>5</td>
<td>8</td>
<td>10</td>
<td>7</td>
<td>3</td>
<td>6</td>
<td>11</td>
<td>9</td>
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<td>4</td>
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<td>Access</td>
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<td>2</td>
<td>4</td>
<td>7</td>
<td>6</td>
<td>4</td>
<td>2</td>
<td>1</td>
<td>9</td>
</tr>
<tr>
<td>Cost-Related Problem</td>
<td>9</td>
<td>5</td>
<td>10</td>
<td>4</td>
<td>8</td>
<td>6</td>
<td>3</td>
<td>1</td>
<td>7</td>
<td>1</td>
<td>11</td>
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<tr>
<td>Timeliness of Care</td>
<td>6</td>
<td>11</td>
<td>10</td>
<td>4</td>
<td>2</td>
<td>7</td>
<td>8</td>
<td>9</td>
<td>1</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>Efficiency</td>
<td>4</td>
<td>10</td>
<td>8</td>
<td>9</td>
<td>7</td>
<td>3</td>
<td>4</td>
<td>2</td>
<td>6</td>
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<td>Equity</td>
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<td>4</td>
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<td>6</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>11</td>
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<tr>
<td>Healthy Lives</td>
<td>4</td>
<td>8</td>
<td>1</td>
<td>7</td>
<td>5</td>
<td>9</td>
<td>6</td>
<td>2</td>
<td>3</td>
<td>10</td>
<td>11</td>
</tr>
<tr>
<td>Health Expenditures/Capita, 2011**</td>
<td>$3,800</td>
<td>$4,522</td>
<td>$4,118</td>
<td>$4,495</td>
<td>$5,099</td>
<td>$3,182</td>
<td>$5,669</td>
<td>$3,925</td>
<td>$5,643</td>
<td>$3,405</td>
<td>$8,508</td>
</tr>
</tbody>
</table>

Notes: * Includes ties. ** Expenditures shown in $US PPP (purchasing power parity); Australian $ data are from 2010.
USA: Failure to Rescue & Surgery Outcomes

Association Between Evening Admissions and Higher Mortality Rates in the Pediatric Intensive Care Unit

Yeseli Arias, Doublas S. Taylor, and James P. Marcin
Pediatrics 2004; 113: 530-534
Does the day of the week matter?

Operations performed on Fridays were associated with a higher 30-day mortality rate than those performed on Mondays through Wednesdays: 2.94% vs. 2.18%; Odds ratio, 1.36; 95% CI, 1.24–1.49
<table>
<thead>
<tr>
<th>Country</th>
<th>Hospitals</th>
<th>Records</th>
<th>Emergency (%)</th>
<th>Elective (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>England</td>
<td>11</td>
<td>1 334 089</td>
<td>885 864 (66.4)</td>
<td>448 225 (33.6)</td>
</tr>
<tr>
<td>Australia</td>
<td>7</td>
<td>575 136</td>
<td>407 807 (70.9)</td>
<td>167 329 (29.1)</td>
</tr>
<tr>
<td>USA</td>
<td>12</td>
<td>758 180</td>
<td>431 698 (56.9)</td>
<td>326 482 (43.1)</td>
</tr>
<tr>
<td>Netherlands</td>
<td>8</td>
<td>315 165</td>
<td>160 086 (50.8)</td>
<td>155 079 (49.2)</td>
</tr>
<tr>
<td>TOTALS</td>
<td>38</td>
<td><strong>2 982 570</strong></td>
<td><strong>1 885 455 (63.2)</strong></td>
<td><strong>1 097 115 (36.8)</strong></td>
</tr>
</tbody>
</table>
In-house mortality weekday vs weekend....
Adverse events identified by Global Trigger Tool in 245 or 1/3 of patients with colon cancer

• Medical records were reviewed with the Global Trigger Tool method
• Adverse events categorized as E (harm requiring some treatment), F (prolonged hospital stay), G (permanent disability), H (life saving measures performed in the intensive care unit), I (mortality associated with harm). Degree of preventability was evaluated.
• Results. Adverse events (n=112) were reported in 35.9 % of the patients (n=88). They were more common after urgent than after elective admittance (45.3 % versus 31.8 %). Category E was registered in 11.0 %, F in 18.8 %, and I in 6.1 % (53.3 % after urgent and 2.4 % after elective admittance). Preventable or possibly preventable adverse events were judged to occur in 88.9 % in the E group, 97.8 % in the F group, and in 53.3 % in the I group.
• Conclusions: Adverse events were reported in one third of the patients.

• Sjödah R et al., 2016
My Story--Colon Cancer, Sept 2016

- Surgical resection, stage 3 A
- 6 months chemotherapy
- *Dindo-Clavien GRADE 1*

However…
* Several Complications (minor?)
  - Medication error
  - Surgical site infection
  - Hospital readmission
  - Lasting neuropathy

- My bill….USD $585,000
Naval Aviation Class A Flight Mishap Rate

776 aircraft destroyed in 1954

24 aircraft destroyed in FY03 - all in flight mishaps

Angled Decks
Aviation Safety Center
Naval Aviation Maintenance Program
RAG (FRS) Concept Initiated
NATOPS Program
Squadron Safety Program
System Safety Aircraft Design
CRM
Aircrew reviews
ORM
Safety culture

Fiscal Year

50 60 70 80 90 95 96-2003

FY50-03

776 aircraft destroyed in 1954

24 aircraft destroyed in FY03 - all in flight mishaps
Projected Hull Loss —
Assuming Current Accident Rate Does Not Decline
But Traffic Increases as Forecast
How Safe are US Airlines?

- **1990-2001**
  - 129 deaths per year
  - 9.3 million flights per year
  - Rate = 13.9 deaths per million flights

- **2002-2010**
  - 18 deaths per year
  - 10.6 million flights per year
  - Rate = 1.74 deaths per million flights

= 87%↓
Safety: Airlines vs. Health Care

- IOM “To Err is Human” estimate
  - 44,000-98,000 deaths in hospitals due to errors in care
  - 34.4 million hospitalizations per year
  - Rate = 1300-2800 deaths per million hospitalizations

- US Airlines: 2002-2010
  - Rate = 1.74 deaths per million flights

- Hospital care is 750-1600 times less safe
Nuclear Energy Institute Data
1985-2008
The likelihood of being injured seriously enough to require overnight hospitalization for treatment is 1 in 24 million. The chance of being fatally injured is 1 in 750 million. (Based on an average of five rides per guest.)
The Flight to High Reliability: Adapting High Reliability Science to Hospitals
Does anyone do strategic planning?

ARE YOUR PROJECTIONS REALISTIC OR OPTIMISTIC?

THEY'RE HALFWAY BETWEEN A LUCID DREAM AND A NEAR-DEATH HALLUCINATION.

I'LL CALL THEM "MOST LIKELY."
Concurrent Revolutions

• Too expensive, paying for Value instead of Volume
• Reducing variations
• Harm and suffering prevention
• Increasing Patient Expectations—patient centeredness—Public reporting and Transparency of Outcomes and Scores
• Environmental Sustainability is Now Mainstream
• Discouraged, Unhappy Workforce, Vendors, Engineers and …Architects
Aims of the healthcare delivery system

Health outcomes for children, carers, and population
Health status, patient experience, illness burden

High reliability system performance
Quality, safety, value

Professional development
Competence, pride, joy

Batalden, PB; Davidoff, F. What is “quality improvement” and how can it transform health care?” Qual Saf Health Care 16(1): 2-3, 2007
Redesigning Health Systems (what Graham-Cassidy seems to have overlooked)

“The American healthcare delivery system is in need of fundamental change….Healthcare today too frequently harms and routinely fails to deliver its potential benefit…. Between the healthcare we have and the care we should receive lies not just a gap, but a chasm.”
Average rate per exposure of catastrophes and associated deaths in various industries and human activities

Assuming a system is 99.9% safe; How Safe is “Safe Enough” for healthcare???

- 84 unsafe landings /day at ORD
- 1 major plane crash every 3 days
- 16,000 mail items lost/hr
- 37,000 bank transaction errors/hr
The Politics
Key components of a highly reliable organization

- Organizational Culture of Safety
- Robust Process Improvement
- Leadership Commitment
High Reliability Definitions

• **Reliability** – A probability that a system will yield a specified result.

• **HRO** – An organization that is involved in a complex and high risk environment that delivers exceptionally safe and consistently high quality service/care over time.
  
  – Nuclear Power Plant, Aircraft Carrier, Airline Flight, Amusement Park, Hospitals??
What is a System?

A system is “a network of interdependent components that work together to accomplish a shared aim”

- Every system has an aim (no aim, no system)
- Every system must be managed
- Management requires “knowledge of the interrelationships between all the components within the system and the people who work in it”

Reliability Principles

- Relentless measurement of performance to evaluate, calculate, and improve the overall reliability of a complex system
- Optimizing and standardizing hospital design AND operational processes
- Responsibility and accountability of staff
- A transparent culture devoted to quality
Risk Mapping and Risk analysis
Main Prospective methods

• Preliminary hazard analysis (PHA)
• Failure mode and effect analysis (FMEA)
• failure mode effect and criticality analysis (FMECA)
• Hazard and operability study (HAZOP)
• Hazard analysis and critical control point (HACCP)
• Probabilistic risk assessment (PRA)

WHAT DOCTORS HATE ABOUT HOSPITALS

An insider’s view of what can go wrong—and how you can improve your odds of getting the right treatment

BY NANCY GIBBS & AMANDA BOWER
Introduction of Surgical Safety Checklists in Ontario, Canada

David R. Urbach, M.D., Anand Govindarajan, M.D., Refik Saskin, M.Sc., Andrew S. Wilton, M.Sc., and Nancy N. Baxter, M.D., Ph.D.

ABSTRACT

BACKGROUND
Evidence from observational studies that the use of surgical safety checklists results in striking improvements in surgical outcomes led to the rapid adoption of such checklists worldwide. However, the effect of mandatory adoption of surgical safety checklists is unclear. A policy encouraging the universal adoption of checklists by hospitals in Ontario, Canada, provided a natural experiment to assess the effectiveness of checklists in typical practice settings.

METHODS
We surveyed all acute care hospitals in Ontario to determine when surgical safety checklists were adopted. Using administrative health data, we compared operative mortality, rate of surgical complications, length of hospital stay, and rates of hospital readmission and emergency department visits within 30 days after discharge among patients undergoing a variety of surgical procedures before and after adoption of a checklist.

RESULTS
During 3-month periods before and after adoption of a surgical safety checklist, a total of 101 hospitals performed 109,341 and 106,370 procedures, respectively. The adjusted risk of death during a hospital stay or within 30 days after surgery was 0.71% (95% confidence interval [CI], 0.66 to 0.76) before implementation of a surgical checklist and 0.65% (95% CI, 0.60 to 0.70) afterward (odds ratio, 0.91; 95% CI, 0.80 to 1.03; P = 0.13). The adjusted risk of surgical complications was 3.86% (95% CI, 3.76 to 3.96) before implementation and 3.82% (95% CI, 3.71 to 3.92) afterward (odds ratio, 0.97; 95% CI, 0.90 to 1.03; P = 0.29).

CONCLUSIONS
Implementation of surgical safety checklists in Ontario, Canada, was not associated with significant reductions in operative mortality or complications. (Fundied by the Canadian Institutes of Health Research.)

• Checklist made little difference in Ontario Hospitals
• Multiple processes and factors influenced SSC adherence.
• This may explain why, in studies evaluating SSC impact, outcomes were highly variable.
WHO checklist time-out: percent of cases in which each item was checked

% cases item was checked

<table>
<thead>
<tr>
<th>Name of procedure</th>
<th>Count</th>
<th>Surgical concerns</th>
<th>Specimen</th>
<th>Equipment problems</th>
<th>Anesthetic concerns</th>
<th>Nursing concerns</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name of procedure</td>
<td>92</td>
<td>87</td>
<td>69</td>
<td>69</td>
<td>69</td>
<td>64</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>28</td>
</tr>
</tbody>
</table>
Which specialties are the most burned out?
Medscape 2015 survey

- Emergency Medicine
- Critical Care
- Family Medicine
- Ob/Gyn & Women's Health
- Internal Medicine
- Anesthesiology
- General Surgery
- Neurology
- Urology
- Nephrology
- HIV/Infectious Diseases
- Orthopedics
- Oncology
- Diabetes & Endocrinology
- Pulmonary Medicine
- Cardiology
- Gastroenterology
- Radiology
- Dermatology
- Rheumatology
- Pediatrics
- Ophthalmology
- Psychiatry & Mental Health
- Pathology

Burnout = loss of enthusiasm for work, feelings of cynicism, and a low sense of personal accomplishment
Nursing Units/Patient Rooms

Cluny 12th C

Ospedale Maggiore, Milan

Hotel Dieu

Antwerp

Friedriks, Copenhagen
“...the very first requirement in a Hospital [is] that it should do the sick no harm.”

– Notes on Hospitals, 1863
Crimean Quagmire

Scutari, former Turkish barracks, 43% die

Fig. 160. An improvised ward in the barracks hospital of Scutari, 1854.
Those clever Brits

The answer: Isambard Kingdom Brunel
The Result

Nightingale Pavilion

St. Thomas Hospital - 1976
1915-The heads of Mass. General Hospital watched, scratching their heads and asking:

“If we let her know the truth about our patient [outcomes], do you suppose she [Patients] would still be willing to lay?”
HH: hand hygiene. OT: operating theatre.
NSG: non-sterile gloves.
SG: sterile gloves

Placing alcohol gel dispensers in hallways next to patient doors does not appear to increase hand washing (Muto, Sistrom and Barr, 2000)

For busy preoccupied persons, out-of-sight may be out-of-mind
High Reliability Organizations

- Environment rich with potential for errors
- Unforgiving social and political environment
- Learning through experimentation difficult
- Complex processes
- Complex technology
- Psychological safety

Weick, KE and Sutcliffe, KM, 1999
What is a High Reliability Organization (HRO)?

An organization/system

– Conducting relatively error free operations
– Over a long period of time
– Making consistently good decisions resulting in
– High quality and reliability operations
Scope of the Leadership Commitment

• The achievable imperative – **ZERO** preventable harm to patients
• Commitment learning in the first year has focused on:
  – How to lead a health care system toward high reliability
  – The leadership requirement to drive a system to being highly reliable
  – The practical attributes and behaviors reflective of a safe and just culture
Guide to Human factors

- ‘**Hard Stuff**’:
  - people interacting with machines
  - People interacting with computers
  - People interacting with automation

- ‘**Soft Stuff**’:
  - People working with people:
    - Team performance
    - handovers
    - Culture

Barach P, et al. 2013
Reason – Complex Systems

Organisational and corporate culture

- Management decisions and organisational processes

Contributory factors influencing clinical practice

- Error producing conditions
- Violation producing conditions

Care management problems

- Errors
- Violations

Unsafe acts or omissions

Defence barriers

Accident/ incident
Facility design

• Affects the design of how people work, and what processes, systems and technologies they will require to support the functioning of the work environment.

• Different ways of working and different configurations of clinical teams will emerge to ensure appropriate acquisition and use of new skills and competencies to produce quality outcomes.
Conceptual model based on Reason’s model showing the role of the environment as a latent condition or barrier to adverse events in health care settings.

Sources: Dickerman and Barach (2008); Joseph et al 2008; Patti and Barach (2011); Cassin and Barach (2012); Sanchez and Barach (2012)
High Reliability Organizations: Collective Mindfulness

• A mental orientation that enables continuous learning and continuous evaluation of the environment for the expected and unexpected.
• Leaders at all levels constantly think in terms of how the organization can become better and avoid error.
• Anticipation for events that may produce harm combined with containment once an unexpected event has occurred to prevent or minimize harm.
Mindful vs Mind-less-ness

• “To be mind-ful is to have a rich awareness of discriminatory detail and an enhanced ability to discover and correct errors that could escalate into a crisis”
Deepwater Horizon—the role of culture and management?

• “The true cause of most disasters is not so much the initial accident but the failure to identify the accident early in its birth.” Sidney Dekker

• The blowout of BP’s Macondo Prospect well was a case study in how a series of small mistakes and misjudgments, when not caught in time, can snowball into catastrophe.
High Reliability– Five Key Concepts

• **Sensitivity to Operations (situational awareness)**
  – Focus on systems and processes and how they affect patient care.

• **Reluctance to Simplify**
  – Systems are made simple, but the explanation for failure is rigorously pursued and understood. *(Take nothing for granted.)*

• **Preoccupation with Failure**
  – Relentless pursuit of perfection and a constant search for what might go wrong. *(Focus on timely notification and evaluation of near misses.)*

• **Deference to Expertise**
  – Information is freely shared and staff are engaged at all levels.
  – In a crisis, the person with the most expertise leads.

• **Resilience**
  – The organization quickly contains and mitigates errors.
An HRO must sustain a “mindful infrastructure” which

1. Observes and tracks small failures and anomalies
2. Resists oversimplification
3. Remains sensitive to operations
4. Maintains capabilities for resilience
5. Looks to expertise not rank to inform decisions
1) Observe and track small failures and anomalies

• Worry chronically about errors.
• Assume each day is a bad day.
• Difficult to do.
• “Collective bonds among suspicious people.”
A deviation from generally accepted performance standards that...

**Serious Safety Event**
- Reaches the patient
- Results in moderate to severe harm or death

**Precursor Safety Event**
- Reaches the patient
- Results in minimal harm or no detectable harm

**Near Miss Safety Event**
- Does not reach the patient
- Error is caught by a detection barrier or by chance

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Sentara Serious Safety Event Rate

Sentara Hampton Roads Hospitals

80% Reduction Since 2003
2) Resist oversimplification

- All organizations must ignore many things.
- Doing so may force them to ignore key sources of problems.
- Restrain temptations to simplify.
- Through checks and balances, adversarial reviews, and multiple perspectives.
- Can you recall a serious safety event that with hindsight was due to an inappropriate simplification?
Swiss or Brie cheese model?

- ...Just as bizarre as asking what was the cause of not having the accident.
- We don’t find causes, we construct them
  - Choices are arbitrary
    - Governed by forces other than evidence available
- Multiple factors, each necessary and only jointly sufficient
- But every cause is also an effect
  - Multiplies *ad infinitum*
Human factors and design thinking are about designing innovative technologies, workplace settings, organizational culture and the equipment to fit people and accommodate for limitations of human performance.
3) **Remain sensitive to operations**

- Pay close attention to operations.
- Everyone values organizing to maintain situational awareness.
- Use resources so people can see and comprehend what is happening.
- Outline an example where increased awareness of front line operations in your area of responsibility might reduce the risk of failure.
What are we trying to accomplish?
How will we know that a change is an improvement?
What change can we make that will result in improvement?

The Model encourages you to act your way into learning, rather than thinking your way into acting.


Lloyd Provost, API
The Five Dysfunctions of (healthcare) Teams

1. Absence of trust
2. Fear of Conflict
3. Commitment
4. Accountability
5. Results

After Patrick Lencioni, 2007
Model of “Big 5” Teamwork/TEAMSTEPPS

THE CORE

- Team Leadership
- Mutual Performance Monitoring
- Back-Up Behavior
- Adaptability
- Team Orientation

Closed Loop Communication
Mutual Trust
Shared Mental Models

Baker, Salas, King, Battles, Barach, 2006; 2007; Barach and Cosman, 2015
The TeamSTEPPS Framework

- **Knowledge**
  - Shared Mental Model

- **Attitudes**
  - Mutual Trust
  - Team Orientation

- **Performance**
  - Adaptability
  - Accuracy
  - Productivity
  - Efficiency
  - Safety

4) Maintain capabilities for resilience

- Developing capabilities to detect, contain, and bounce-back from events that do occur.
- Anticipate trouble spots.
- Capability to improvise.
- Improve capacity to
  - Do quick studies
  - Develop swift trust
  - Engage in just-in-time learning
- What is your worst fear?
- How well prepared are you to handle if this became reality?
5) Look to expertise not rank to inform decisions

- Pushing decision making down and around to the person with the most directly related knowledge and expertise
- Let decisions “migrate” to those with expertise to make them.
- Avoid rigid hierarchies.
- Simplify
THE OVERCOMMITTED ORGANIZATION

HOW TO AVOID TEAM BURNOUT
PAGE 58
High Reliability Organizations: Four Leadership Elements

(1) Executive Leadership Support

- A culture of safety is pervasive throughout organization.
- Transparency is the key to changing culture.
- Safety must be the overarching strategy that drives efficiency and effectiveness, rather than the opposite.
- Leaders take ownership for setting the climate and focusing the work.
- Is this focus beginning or mature?
  * Board
  * Management
  * Physicians
High Reliability Organizations: Four Leadership Elements (2)

(2) Alignment with Business Case
   – Align the business case for quality/safety with financial performance. (CFO on board)
   – Is this reflected in the
     • Quality strategy?
     • Quality Measures?
     • Information Technology

(3) Linking Staff Behavior with Desired Outcomes
   – Introduce changes only when fully linked with policies and aligned with incentives.
   – Ensure there are clearly defined owners for system implementations.
   – Is it linked quality and safety to operations, financial incentives?
Improved Blood Utilization and Transfusion Rate
Achieved through a multi-faceted process

Focused on most blood-intensive surgeries

Transfusion Rates for Complex Surgeries:
Hip & Knee Revisions, Complex & Ant/Post Spines

Transfusions per Complex Surgery continue to fall significantly despite increased volume (p<.0001)

Affecting an Estimated 1,680 surgeries per year for annualized average monthly volumes

Estimated $17.2 M mean Annualized savings from pre to post monthly means.*

From highest to most recent: Estimated $14.08 M mean Annualized savings from 11/06 versus 12/08 monthly means.*
Improved Mortality Rates

Hospital Standardized Mortality Ratio

Impacts & Benefits with the:
• Decreased negative outcome
  16.7% lower pre-Post intervention year-to-year (103.7 to 86.3)
Falls Prevention

Falls
• 14.1% reduced year-over-year from Pre-baseline
• 13 fewer falls

Falls with Injury
• 45.7% reduced year-over-year from Pre-baseline
• 11 fewer falls with injury
High Reliability Organizations: Four Leadership Elements(3)

(4) Just/Safety Culture

– The reporting of errors, near misses, mistakes, waste, etc. is relentlessly pursued by the organization.
  • It is used to strengthen the system or pursue staff?
– The person reporting does so without fear of reprisal or personal risk.
  • Is there personal and transparent accountability for deviant behavior?
– Reporting becomes the responsibility of all individuals in the organization.
– The errors and events are used to improve performance.
  • Are RCA’s done in constructive and engaging manner?
  • Is it assessed in meaningful manner (clinical sensemaking)?
Stages in the development of a safety culture

- **CALCULATIVE**: We have systems in place to manage all hazards.
- **PROACTIVE**: Safety leadership and values drive continuous improvement.
- **REACTIVE**: Safety is important, we do a lot every time we have an accident.
- **PATHOLOGICAL**: Who cares as long as we're not caught.

**GENERATIVE** (High Reliability Orgs)
HSE is how we do business round here.

After Westrum
What is a Safety Culture?

• An organization that
  – Commits to safety as a priority
  – Creates opportunities for open honest communication with staff and patients
  – Acknowledges risk
  – Values recognition of errors as opportunities
  – Supports a non-punitive and safe environment
  – Reports /learns from errors systematically
  – Provides mechanism for restitution or compensation
  – Chronic sense of unease regarding potential events

Kizer K, 1997; Barach, Johnson, 2009; Johnson Barach 2012
February 1, 2003: The Columbia Accident Investigation Board's independent assessment takes seven months.
Report Blames Flawed NASA Culture for Tragedy

Miscommunication, Bungling Halted Bids for Shuttle Photos

By Bob Stein
Washington Post Staff Writer

NASA never obtained pictures of the space shuttle Columbia in orbit that may have helped prevent the disaster because of a series of misunderstandings, miscommunications and bureaucratic bunglings that exemplify the space agency's problems, investigators concluded yesterday.

Lower-level engineers and officials requested at least three times that the Defense Department use its network of high-powered telescopes and satellites to take pictures of the shuttle's damaged left wing, but the requests were either never acted upon or blocked because of inadequate, imprecise or conflicting follow-ups by the space agency, investigators found.

The requests are among eight "missed opportunities" to obtain images of Columbia in space that might have prevented the shuttle's Feb. 1, destruction, which occurred because a piece of foam insulation hit and damaged a wing during lift-off. The report makes it clear that investigators believe such images could have helped save Columbia and its crew of seven—perhaps by prompting a rescue or repair attempt—and the failure to obtain them underscores leadership failures at the space agency.

While investigators had previously revealed that NASA officials had discussed and even requested that the Pentagon take pictures of the shuttle in space, yesterday's 248-page report by the Columbia Accident Investigation Board for the first time details how those requests arose, were executed and, in the end, were quashed.

See REPORT, A15, Col. 1

In Broad Indictment of Practices, Shuttle Panel Says Safety Suffered

By Katy Sauer and Eric Pianin
Washington Post Staff Writers

The shuttle Columbia and a crew of seven were lost on Feb. 1 because NASA, for the second time in its recent history, allowed its engineering to grow careless, its safety system to wither, its communications to become muddled and prudent professional curiosity to become stifled.

Those conclusions were part of a far-reaching indictment issued yesterday by the Columbia Accident Investigation Board, in a comprehensive and unsparing assessment of the human spaceflight program. Laying at least part of the blame for NASA's failings on persistent budget and other pressures flowing from Congress and the White House over several administrations, the panel's 248-page report is designed to provide the foundation for an unprecedented national debate on the future of human spaceflight, which the board said is long overdue.

A 1.7-pound chunk of foam in a section that struck Columbia's left wing at more than 500 mph during the Jan. 15 ascent was "the direct physical action that initiated the chain of events leading to the loss of Columbia and her crew," the board wrote.

But, in chilling echoes of the environment that produced the 1986 Challenger tragedy, the board found that NASA's management and cultural mindset were as culpable because they paved the way for the foam strike to do its deadly work. Before the mission, managers did not heed forewarnings of the potential threat, and during the
“Cultural norms tend to be fairly resilient...the norms bounce back into shape after being stretched or bent. Beliefs held in common resist alteration....This culture acted over time to resist externally imposed changes.

By the eve of the Columbia accident, institutional practices that were in effect at the time of the Challenger accident had returned to NASA.”
Shaping the environment for engagement and loyalty

Employees really enjoy working with one another but don't feel particularly challenged.

Here the focus is on collaboration and learning in the service of high-performance outcomes.

Employees tend to be apathetic and spend their time jockeying for position.

People fear to offer tentative ideas, try new things, or ask colleagues for help.

After Amy Edmonson
Normalisation of Deviance

• “Once you have accepted an anomaly or something less than perfect, you have given up your virginity. You can’t go back. You’re at the point when it’s very hard to draw the line. Next time they say it’s the same problem, it’s just eroded 5 mm more. Once you accepted it, where do you draw the line? Once you have done it, it’s very difficult to go back now and get very hard nosed and say I’m not going to accept that”

• “A permissive ethical climate, an emphasis on financial goals at all costs, and an opportunity to act amorally or immorally, all contribute to managerial decisions to initiate deviance.”

The Normalization of Deviance: Do We (Un)Knowingly Accept Doing the Wrong Thing?

- Failure to wash the hands before and after patient contact.
- Less than 10% of adverse medication events reported.
- Failure to follow recognized isolation procedures and protocols.
- Leaving junior doctors alone at night and weekend without supervision.
- Disconnect alarms during patient movement.
- Wearing hospitals scrubs home.
- Failure to call RRT when criteria are met.
- Not telling the patient and/or family the full story about how harm was caused.
Leverage and Integrate Technology to help Identify and Manage Risk

- Identify provider and patient risks through analytics
- Reduce clinical variance
- Pegwin-reactive documentation and analysis of past events, plus proactive visualization of every patient’s risk profile
- Financial component shows the cost of relative harm
Four building block towards a ‘high reliability’ healthcare organization

<table>
<thead>
<tr>
<th>Workgroup Topics</th>
<th>Workforce Efficiency &amp; Effectiveness</th>
<th>Patient Room</th>
<th>Workforce Retention</th>
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<tr>
<td><strong>1</strong> Nursing Station Design Typology</td>
<td>Effect of Typology on:</td>
<td>Impact of acuity adaptable rooms</td>
<td>Impact of layout configurations and design on encouraging team interaction and respect, as well as caregiver satisfaction, retention and learning</td>
</tr>
<tr>
<td>Different nursing units</td>
<td>Departmental adjacencies and unit configuration</td>
<td>Impact of information technology in patient rooms</td>
<td>Effect of natural light, access to healing gardens, acoustics, etc. on caregiver satisfaction and retention</td>
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<tr>
<td>Medical error, patient falls, failure to rescue rates</td>
<td>Same-handed clinical space</td>
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<td>Staff stress, fatigue, time with patients</td>
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<th>Workgroup Topics</th>
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<th>Medical Errors</th>
<th>Workforce Health &amp; Safety</th>
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<tr>
<td><strong>5</strong> Hospital Acquired Infections - HAI</td>
<td>Impact of patient care area materials on HAI rates</td>
<td>Observation and patient falls</td>
<td>Impact of staff control on work environments</td>
</tr>
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<td></td>
<td>The role of air quality in reducing HAI</td>
<td></td>
<td>Impact of lift design and workplace economics</td>
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</table>

**Center for Health Design and HERD Conferences**
“No matter how well equipment is designed, no matter how sensible regulations are, no matter how much humans can excel in their performance, they can never be better than the system (culture) that bounds them.”

Captain Daniel Maurino, Human Factors Coordinator
International Civil Aviation Organization
Keys Steps on the Climb to High Reliability

• Board establishes patient safety as the system’s core value and zero harm as a primary system goal
• Senior leaders embrace and actively promote a just and safe organizational climate and culture
• Mid-level and frontline leaders are formally trained to be high reliability experts
• Front line staff and patients/families feel safe to speak up, including near miss notification
Keys Steps on the Climb to High Reliability

- An objective system for reporting and evaluating near miss and harm events is in place and actively utilized at all levels of the organization
- Common platform for robust process improvement is instituted and fully supported (training and funding)
- Patients and families are actively engaged at the strategic, operational and clinical levels
- Highly reliable performance is recognized, celebrated and rewarded throughout the organization
Building Blocks to Achieving High Reliability

All people always experience the safest, highest quality, best value health care across all settings

Robust Process Improvement

Safety Culture

Leadership Commitment

Safe Highly Reliable Care

Widespread Adoption of RPI

Process Improvement Training

Process Improvement Methods

Identifying Unsafe Conditions

Strengthening Systems

Trust

Accountability

Assessment

Quality & Safety Strategy

Quality & Safety Measures

Governing Body Commitment

CEO/Senior Leadership Commitment

Physician Leadership

Information Technology

Compliance with Joint Commission Standards & National Patient Safety Goals
Excellent Accountability Measure Performance
## High Reliability: Stages of Organizational Maturity™

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<th>Leadership</th>
<th>Beginning</th>
<th>Developing</th>
<th>Advancing</th>
<th>Approaching</th>
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</thead>
<tbody>
<tr>
<td>Board</td>
<td>Board quality focus is nearly exclusively on regulatory compliance</td>
<td>Full Board’s involvement in quality limited to hearing reports from its quality committee</td>
<td>Full Board engaged in development of quality goals and approval of quality plan; regulatory reviews adverse events and progress on quality goals</td>
<td>Board commits to goal of high reliability for all clinical services</td>
</tr>
<tr>
<td>CEO/management</td>
<td>CEO/management quality focus is nearly exclusively on regulatory compliance</td>
<td>CEO acknowledges need for plan to improve quality; delegates development and implementation of plan to subordinate</td>
<td>CEO leads development and implementation of proactive quality agenda</td>
<td>Management aims for zero failure rates for all vital clinical processes; some demonstrate zero or near-zero failure rates</td>
</tr>
<tr>
<td>Physicians</td>
<td>Physicians rarely lead quality improvement activities; physician participation in these activities is low</td>
<td>Physicians champion some quality improvement activities; physician participation in these activities occurs in some areas but is not widespread</td>
<td>Physicians often lead quality improvement activities; physician participation in these activities occurs in most areas, but we still have some important gaps</td>
<td>Physicians routinely lead clinical quality improvement activities and accept leadership of other appropriate clinicians; physician participation in these activities is uniform throughout the organization</td>
</tr>
<tr>
<td>Quality strategy</td>
<td>Quality is not identified as central strategic imperative</td>
<td>Quality is one of many competing strategic priorities</td>
<td>Quality is one of our organization’s top 3 or 4 strategic priorities</td>
<td>Quality is the highest priority strategic goal of the organization</td>
</tr>
<tr>
<td>Quality measures</td>
<td>Quality measures not prominently displayed or reported internally or publicly; only measures used are those required by outside entities; not part of reward systems</td>
<td>Few quality measures reported internally; few or none reported publicly; not part of reward systems</td>
<td>Routine internal reporting of quality measures begins; first measures reported publicly; first quality metrics introduced into staff reward systems</td>
<td>Key quality measures are routinely displayed internally and reported publicly; reward systems for staff prominently reflect accomplishment of quality goals</td>
</tr>
<tr>
<td>Information technology</td>
<td>Provides little to no feedback for quality improvement</td>
<td>Supports some improvement activities, but principles of safe adoption not often adhered to</td>
<td>IT solutions support many quality initiatives; organization commits to principles and practice of safe adoption</td>
<td>Safety adopted IT solutions are integral to sustaining improved quality</td>
</tr>
</tbody>
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<tr>
<th>Safety Culture</th>
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</tr>
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<tbody>
<tr>
<td>Trust</td>
<td>No assessment of trust or external behaviors</td>
<td>First codes of behavior adopted in some clinical departments</td>
<td>CEO and clinical leaders establish a trusting environment among all staff by modeling appropriate behaviors and championing efforts to eradicate intimidating behaviors</td>
<td>High levels of (measured) trust exist in all clinical areas; self-policing of codes of behavior in place</td>
</tr>
<tr>
<td>Accountability</td>
<td>Emphasis on blame; discipline not applied equitably or with transparent standards; no process for distinguishing &quot;blameless&quot; from &quot;blameworthy&quot; acts</td>
<td>Beginning recognition of importance of equitable disciplinary procedures; some clinical departments adopt these procedures</td>
<td>Managers at all levels accord high priority to establishing all elements of safety culture; adoption of uniform equitable and transparent disciplinary procedures begins organization-wide</td>
<td>All staff recognize and act on their personal accountability for maintaining a culture of safety; full adoption of equitable and transparent disciplinary procedures</td>
</tr>
<tr>
<td>Identifying unsafe conditions</td>
<td>Root cause analysis limited to adverse events; close calls (&quot;near misses&quot;) not recognized or evaluated</td>
<td>Pilot &quot;close call&quot; reporting programs begin in few areas; some examples of early intervention to prevent harm</td>
<td>Staff in many areas begin to recognize and report unsafe conditions and practices before they harm patients</td>
<td>Close calls and unsafe conditions routinely reported, leading to early problem resolution, before patients are harmed; results routinely communicated</td>
</tr>
<tr>
<td>Strengthening systems</td>
<td>Limited or no effort to assess system defenses against quality failures and remedy weaknesses</td>
<td>RCAs begin to identify same weaknesses in system defenses in many clinical areas; systematic efforts to strengthen them are lacking</td>
<td>System weaknesses catalogued and prioritized for improvement</td>
<td>System defenses proactively assessed; weaknesses proactively repaired</td>
</tr>
<tr>
<td>Assessment</td>
<td>No measures of safety culture</td>
<td>Some measures of safety culture undertaken but are not widespread; little if any attempt to strengthen safety culture</td>
<td>Measures of safety culture adopted and deployed organization-wide; beginning efforts to improve</td>
<td>Safety culture measures part of strategic metrics reported to Board; systematic improvement initiatives underway to achieve fully functioning safety culture</td>
</tr>
</tbody>
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<tr>
<th>Performance Improvement</th>
<th>Beginning</th>
<th>Developing</th>
<th>Advancing</th>
<th>Approaching</th>
</tr>
</thead>
<tbody>
<tr>
<td>Methods</td>
<td>No formal approach to quality management adopted by organization</td>
<td>Exploration of modern process improvement tools beginning</td>
<td>Organizational commitment to adopt full suite of Robust Process Improvement (RPI) tools</td>
<td>Adoption of RPI tools accepted fully throughout organization</td>
</tr>
<tr>
<td>Training</td>
<td>Limited to compliance personnel or to quality department</td>
<td>Recognition that training in PI tools outside quality department is critical to success</td>
<td>Training of selected staff in RPI underway; plan in place to broaden training</td>
<td>Training in RPI is mandatory for all staff, as appropriate for their jobs</td>
</tr>
<tr>
<td>Spread</td>
<td>No commitment to widespread adoption of improvement methods</td>
<td>Pilot projects using new tools conducted in a few areas</td>
<td>RPI tools used in many areas to improve business processes as well as clinical quality and safety; positive ROI achieved</td>
<td>RPI tools used throughout organization for all improvement work; patients engaged in redesigning care processes; RPI proficiency required for career advancement</td>
</tr>
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Journey to Reliability – The Next Zero

- Optimized Outcomes

- Human Factors Integration
  - Intuitive design
  - Obvious to do the right thing
  - Impossible to do the wrong thing

- Reliability Culture
  - Core values & vertical integration
  - Behavior expectations for all
  - Hire for fit
  - Fair, just, and 200% accountability

- Process Design
  - Evidence-based best practice
  - Focus & Simplify
  - Tactical improvements (e.g., process bundles)

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Lessons from Aviation for Medicine

- Safety Science
- Systems/Human factors
- Communication and coordination
- Team based training
- Culture of safety
- Reporting/near miss culture
- Simulation-technical/non-technical (LOSA)
- Audio/Video blackbox
- Pilot wellness
- HRO organizational models

18 March 2000
What can healthcare leaders do?

• Overcome factors that prevent us from learning
  – interpersonal fear
  – irrational beliefs about failure
  – groupthink
  – problematic power dynamics
  – information hoarding
  – Normalised deviance

• Health leaders can shape these factors by
  – Building trust
  – Create psychological safety
  – Encouraging reflection and time to learn
  – Overcoming defensive interpersonal dynamics
  – Fund, support and champion small, rapid cycle improvement pilots
  – Hyper-transparency of plan, design, processes
Conclusions

- Barriers to change—culture eats strategy for breakfast (Peter Drucker)

- Engaging patients and clinicians in the design and operational process remains the biggest obstacle in addressing the growing implementation gap in providing cost effective and reliable care.
For slides and papers please contact me at pbarach@gmail.com