High Reliability: A road or an endpoint?

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Session Objectives

1. Context and Definitions
2. Process Reliability
3. High Reliability Organizations - Us?
4. Integration Exercises
5. Questions/Discussion
Our expanding toolbox

- Kotter, Leading Change
- Complexity Theory
- Deming- Profound knowledge
- Robust Process Improvement- TJC
- IHI Model for Improvement
- Baldridge
- High Reliability - W and S
- Lean, Six-Sigma, Lean-Six sigma
Implement and sustain

Communicate for Buy-in

Don’t Let Up

Create short term wins

Empower action

Set the right vision

Build guiding coalition

Increase urgency

Making it Stick

Creating a climate for change

Engaging and enabling the teams
CHSPS’s “Theory of Knowledge”

Organizational Safety Culture

SAFETY GOVERNANCE (SG)

LEADERSHIP METHODS (LM)

ERROR PREVENTION (EP)

CAUSE ANALYSIS (CA)

HIGH-RELIABILITY UNITS (HRUs)

PATIENT & FAMILY ENGAGEMENT (PFE)

READMISSIONS

CLINICAL BLOOD STREAM INFECTIONS (BSI)

URINARY TRACT INFECTION (UTI)

VENTILATOR-ASSOCIATED PNEUMONIA (VAP)

SURGICAL SITE INFECTIONS (SSI)

ADVERSE DRUG EVENTS (ADE)

PRESSURE ULCERS (PU)

SERIOUS FALLS (SF)

OBSTETRICAL ADVERSE EVENTS (OB)

VENOUS THROMBOEMBOLISM (VTE)
Reliability Theory
Definition Of “Reliability”

Reliability is failure free operation over time.

Can reliability principles be applied effectively to improve the consistent delivery of high-quality health care?

How does the definition of reliability connect to the IOM’s six dimensions of quality for the health care system? What does unreliability result in?

1-
2-
3-
4-
5-
6-
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How does the definition of reliability connect to the IOM’s six dimensions of quality for the health care system? What does unreliability result in?

- **effectiveness** (where failure can result from not applying evidence),
- **timeliness** (where failure results from not taking action in the required time)
- **patient/family-centeredness** (where failure results from not meeting patients/families’ values and preferences).
- **safety** (where failure results in harm)
- **efficiency** (where failure results in waste)
- **equity** (where failure results in health disparities)
Quantifying “Reliability”

• “Reliability” = Number of actions that achieve the intended result ÷ Total number of actions taken

• “Unreliability” = 1 minus “Reliability”

• It is convenient to use “Unreliability” as an index, expressed as an order of magnitude (e.g. $10^{-2}$ means that the action fails to achieve its intended result 1 time in 100)

• Related measure: Time or counts between failures (e.g., Number of transplant cases between organ rejections)
## Levels of Reliability

<table>
<thead>
<tr>
<th>Level</th>
<th>Reliability</th>
<th>Success Rate</th>
<th>Failures in 10,000 actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>$10^{-1}$</td>
<td>80%-95%</td>
<td>1500-2000</td>
</tr>
<tr>
<td>2</td>
<td>$10^{-2}$</td>
<td>96%-99.5%</td>
<td>50-1499</td>
</tr>
<tr>
<td>3</td>
<td>$10^{-3}$</td>
<td>99.6% - 99.95%</td>
<td>5-49</td>
</tr>
<tr>
<td>4</td>
<td>$10^{-4}$</td>
<td>99.96% - 99.995</td>
<td>0.5-4</td>
</tr>
<tr>
<td>5</td>
<td>$10^{-5}$</td>
<td>99.996 – 99.9995</td>
<td>0.1-0.4</td>
</tr>
<tr>
<td>6</td>
<td>$10^{-6}$</td>
<td>&gt;99.9996</td>
<td>&lt;0.1</td>
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</table>
Journey to improving reliability – the next zero

Optimized Outcomes

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

Reliability Culture
- Core Values & Vertical Integration
- Hire for Fit
- Behavior Expectations for all Fair, Just and 100% Accountability

Process Design
- Evidence-Based Best Practice
- Focus & Simplify
- Tactical Improvements (e.g. Bundles)

Reliability

\[10^{-1}, 10^{-2}, 10^{-3}, 10^{-4}, 10^{-5}, 10^{-6}, 10^{-7}, 10^{-8}\]
Shaping Behaviors at the Sharp End

Design of Work Processes
Design of Culture
Design of Policy & Protocol
Design of Structure
Design of Technology & Environment

Behaviors of Individuals & Groups

Outcomes

Adapted from R. Cook and D. Woods, Operating at the Sharp End: The Complexity of Human Error (1994)

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Strategies to improve process reliability

Level 1 \((10^{-1})\):
“Intent, Vigilance and Hard Work” Design Concepts

- Awareness and training (“education”)
- Common equipment (and other structural standardization)
- Standard orders sheets
- Personal check lists
- Feedback of information on compliance

Level 2 \((10^{-2})\):

**Design Concepts**

- Standardization of processes
- Building decision aids and reminders into the system
- Taking advantage of existing habits and patterns
- Making the desired action the default (based on evidence)
- Creating redundancy
- Scheduling using proper operations theory
What about $10^{-3}$ Reliability and better??

High Reliability Organizations
High Reliability Theory

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

*Weick, KE and Sutcliffe, KM 1999*
High Reliability Organizations

HROs “operate under very trying conditions all the time and yet manage to have fewer than their fair share of accidents.”

3 Principles of Anticipation
“Stay Out of Trouble”
- Sensitivity to Operations
- Preoccupation with Failure
- Reluctance to Simplify

2 Principles of Containment
“Get Out of Trouble”
- Commitment to Resilience
- Deference to Expertise
Characteristics of HRO’s

1. Preoccupation with failure
2. Sensitivity to operations
3. Reluctance to simplify
4. Commitment to resilience
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1. Preoccupation with failure
   Regarding small, inconsequential errors as symptoms that something is wrong; finding and learning from latent risks, and near miss and no-harm events … examples?

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   What’s happening on the front-line?

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   Asking the next questions.... Why? Where else? .. Examples?

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Characteristics of HRO’s

1. **Preoccupation with failure**
   Regarding small, inconsequential errors as a symptom that something is wrong; finding the half-event

2. **Sensitivity to operations**
   Paying attention to what’s happening on the front-line

3. **Reluctance to simplify**
   Asking the next questions.... Why? Where else?

4. **Commitment to resilience**

5. **Deference to expertise**
Risk Resilience Model

Adverse Event

Resilience eroded-lucky

Analysis of defenses, Ability to react

Endless threats
People, equipment, knowledge, conditions

Actual boundary
Rigid boundary (Policies etc.)
Characteristics of HRO’s

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3. **Reluctance to simplify**
   - Asking the next questions ... Why? Where else?

4. **Commitment to resilience**
   - Developing capabilities to detect, contain, and bounce back from events that do occur

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5. Deference to expertise
   Pushing decision making to the person with the most related knowledge and expertise - may be patient and family. Not always the most senior person!
How we are thinking about HRO theory

• “It’s about the journey, not about reaching a destination”
• Activities consistent with HRO theory
  – Sensitivity to Operations (Daily Brief, Leader rounding, VMBs)
  – Preoccupation with failure (Incident reporting and follow-up)
  – Reluctance to simplify (DxE efforts; approach to QSRS, cause analysis)
  – Commitment to resilience (…)
  – Deference to expertise (Speak up culture; Patient/Family Engagement)
• Still, a long way to go to do this all well and consistently
  – What should we teach, and to what groups of people?
High-Reliability Health Care: Getting There from Here

MARK R. CHASSIN and JEROD M. LOEB

The Joint Commission

Context: Despite serious and widespread efforts to improve the quality of health care, many patients still suffer preventable harm every day. Hospitals find improvement difficult to sustain, and they suffer “project fatigue” because so many problems need attention. No hospitals or health systems have achieved consistent excellence throughout their institutions. High-reliability science is the study of organizations in industries like commercial aviation and nuclear power that operate under hazardous conditions while maintaining safety levels that are far better than those of health care. Adapting and applying the lessons of this science to health care offer the promise of enabling hospitals to reach levels of quality and safety that are comparable to those of the best high-reliability organizations.
<table>
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<tr>
<td>Board</td>
<td>Board's quality focus is nearly exclusively on regulatory compliance.</td>
<td>Full board's involvement in quality is limited to hearing reports from its quality committee.</td>
<td>Full board is engaged in the development of quality goals and approval of a quality plan and regularly reviews adverse events and progress on quality goals. Board commits to the goal of high reliability (i.e., zero patient harm) for all clinical services.</td>
</tr>
<tr>
<td>CEO/management</td>
<td>CEO/management's quality focus is nearly exclusively on regulatory compliance.</td>
<td>CEO acknowledges need for plan to improve quality and delegates the development and implementation of a plan to a subordinate.</td>
<td>CEO leads the development and implementation of a proactive quality agenda.</td>
</tr>
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<td>Physicians</td>
<td>Physicians rarely lead quality improvement activities; overall participation by physicians in these activities is low.</td>
<td>Physicians champion some quality improvement activities; physicians participate in these activities in some areas but not widely.</td>
<td>Physicians often lead quality improvement activities; physicians participate in these activities in most areas, but some important gaps remain.</td>
</tr>
</tbody>
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*Continued*
Discussion

• What organization-wide or microsystem initiatives have been designed around reliability principles?
  – What were some of the factors that made them successful?
  – What methodologies were used?
Open Dialog and Questions