High Reliability & Robust Process Improvement

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EVP & Chief Clinical Officer, Memorial Hermann Health System

Mark R. Chassin, MD, FACP, MPP, MPH
President and CEO, The Joint Commission

Session Objectives

- Differentiate between Robust Process Improvement (RPI) and traditional approaches to healthcare quality improvement.

- Understand the kinds of problems that can be addressed with checklists and other kinds of problems where Robust Process Improvement (RPI) is the best approach.

- Identify why and how the cause of quality and safety problems vary among different healthcare settings and organizations, and how to implement high reliability solutions.
High Reliability Healthcare

M. Michael Shabot, MD, FACS, FCCM, FACMI
Executive Vice President
Chief Clinical Officer
Memorial Hermann Health System

Patient Harm 2015

**Question:** How many avoidable deaths occur in U.S. hospitals each year?

- 25,000
- 50,000
- 100,000
- 200,000

Equivalent to a fully-loaded Boeing 737 crashing *every 7 hours*
Patient Harm 2015

Memorial Hermann’s Goal

0 (Zero)

Equivalent to a fully-loaded Boeing 737 crashing every 7 hours

Becoming a High Reliability Healthcare System

• It’s the right thing to do … “First Do No Harm”

• Our current healthcare system is harming and killing patients at an unacceptable rate

• Accountability for transparent quality data
Board Commitment

Moving the Memorial Hermann Healthcare System from Safety as a Priority to Safety is our Core Value

Leadership behavioral expectations change when safety is the core value
Memorial Hermann Health System
Performance Improvement, Quality & Safety Reporting Structure

Memorial Hermann’s Journey to High Reliability
MHHS Safety Culture Training
Completed in 2007
Hospital Training Complete
>20,000 Employees Trained
>4,000 Physicians Trained
>540 Safety Coaches Trained
>$18M Expense

Safety Culture Training
• Step 1: Set Behavior Expectations
  Define Safety Behaviors & Error Prevention Tools proven to help reduce human error

• Step 2: Educate
  Educate our staff and medical staff about the Safety Behaviors and Error Prevention Tools

• Step 3: Reinforce & Build Accountability
  Practice the Safety Behaviors and make them our personal work habits
Self-Checking With STAR* (Stop, Think, Act, & Review)

* Jefferson Center for Character Education

"It sort of makes you stop & think, doesn't it?"

Safety Success Stories

Self-Check with STAR (Stop, Think, Act, & Review)

"Good for Her"

Edna Coutts, RN
Sugar Land Hospital Safety Champion of the Month 2007
Support Each Other:
CUSS Words

• I am Concerned
• I am Uncomfortable
• This is for Safety
• Stand up and Stand Together

Red Rules
Absolute Compliance

1. Patient Identification
2. Time Out
3. Two Provider Check
Effectiveness of solutions

Effectiveness = Q x A₁ x A₂

Quality of solution (Q) x

Acceptance (A₁) x

Accountability (A₂)
Robust Process Improvement: Changing Standard Work

Standard Work = What we do every day

What we do every day = CULTURE!

3rd Annual Robust Process Improvement Expo 2/26/15
Robust Process Improvement:
High Reliability Standard Work

Culture Change

Central Line Sterile Insertion Bundle
Ultrasound Guidance for Central Line Punctures

OR Surgical Safety Checklist
High Reliability Hand Hygiene

High Reliability Transformation

Hospital Acquired Conditions “Never Events”

Acute Hemolytic Transfusion Reactions

Transfusion Events Jan 2007 - Dec 2014

1,994,000 Adjusted Admissions
10,787,000 Adjusted Pt Days
1,008,000 Transfusions
This document is privileged and confidential. Quality Committee or Peer Review work product under Hospital Committee Privilege contained in the Texas Health and Safety Code §161.031 & §161.032, or Medical Peer Review under the Medical Practice Act, Texas Occupations Code, §151.001 et. seq.; and the Medical Peer Review immunity provided by federal law, the Health Care Quality Improvement Act, 42. U.S.C. 11101, et. seq.

Acute Hemolytic Transfusion Reactions

Transfusion Events Jan 2007 - Dec 2014

- 1,994,000 Adjusted Admissions
- 10,787,000 Adjusted Pt Days
- 1,008,000 Transfusions

Zero

Joint Commission Hand Hygiene
Center for Transforming Healthcare

Baseline Compliance 44%

>90% compliance since Nov 2012
Adult ICU Central Line Associated Blood Stream Infections (CLABSI)

System Adult ICU CLABSI
Do No Harm
Central Line Associated Blood Stream Infections

CLABSI Rate per 1K Line Days

Source file date: 3/23/2012
Generated: 4/2/2012 7:45:37 AM
Reporting Months produced by System Quality and Patient Safety

UCL = 9.42
Mean = 5.53
LCL = 1.64

February CLABSI rates not available due to ISD technical difficulties

Qtr 1
Qtr 2
Qtr 3
Qtr 4
Qtr 1
Qtr 2
Qtr 3
Qtr 4
Qtr 1
Qtr 2
Qtr 3
Qtr 4

HAI Hospital Scorecard

Sugar Land Hospital HAI Scorecard

<table>
<thead>
<tr>
<th>ICU CLABSI</th>
<th>Floor CLABSI</th>
<th>ICU CAUTI</th>
<th>Floor CAUTI</th>
<th>Total SSI</th>
<th>Perf Std SSI</th>
<th>NHSN SSI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hip</td>
<td>Knee</td>
<td>ORIF</td>
<td>MRSA</td>
<td>Clostridium difficile</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Number of HAIs in one month
HAI Hospital Scorecard

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<tr>
<td>0</td>
<td>0</td>
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<td>0</td>
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<tr>
<td>0</td>
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<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Number of HAIs in one month

Hospital Acquired Infections, Conditions and Patient Safety Indicators

- Central Line Associated Bloodstream Infections
- Ventilator Associated Pneumonias
- Surgical Site Infections
- Retained Foreign Bodies
- Iatrogenic Pneumothorax
- Accidental Punctures and Lacerations
- Pressure Ulcers Stages III & IV
- Hospital Associated Injuries
- Deep Vein Thrombosis and/or Pulmonary Embolism
- Deaths Among Surgical Inpatients with Serious Treatable Complications
- Birth Traumas
- Serious Safety Events
Central Line Associated Bloodstream Infections
Ventilator Associated Pneumonias
Surgical Site Infections
Retained Foreign Bodies
Iatrogenic Pneumothorax
Accidental Punctures and Lacerations
Pressure Ulcers Stages III & IV
Hospital Associated Injuries
Deep Vein Thrombosis and/or Pulmonary Embolism
Deaths Among Surgical Inpatients with Serious Treatable Complications
Birth Traumas
Serious Safety Events
High Reliability
Certified Zero Award

1. Zero Events
2. 12 Consecutive Months
3. Certified Zero Category

High Reliability
Certified Zero Award
To: Memorial Hermann Southeast Hospital
Zero iatrogenic Pneumothorax for 12 Months
February 1, 2010 to January 31, 2011

Dan Wolferman
President & Chief Executive Officer

M. Michael Shubat, M.D.
System Chief Medical Officer

Robert G. Crevel
Chair, Health Systems Board
High Reliability 2011-15
Certified Zero Awards

ICU Central Line Associated Bloodstream Infections (14)
ICU Catheter Associated Urinary Tract Infections (3)
Hospital-Wide Central Line Associated Bloodstream Infections (5)
Ventilator Associated Pneumonias (23)

Surgical Site Infections
Retained Foreign Bodies (39)
Iatrogenic Pneumothorax (18)
Accidental Punctures and Lacerations (3)
Pressure Ulcers Stages III & IV (27)
Hospital Associated Injuries (5)
Deep Vein Thrombosis and/or Pulmonary Embolism (1)
Deaths Among Surgical Inpatients with Serious Treatable Complications
Birth Traumas (12)
Obstetric Trauma in Vaginal Deliveries with Instrumentation (1)
Serious Safety Events 1&2 (12)
All Serious Safety Events (1)
Early Elective Deliveries (4)
Manifestations of Poor Glycemic Control (14)

Serious Safety Events
John M. Eisenberg Patient Safety and Quality Award

March 8, 2013  |  Washington, DC

The Joint Commission  |  NATIONAL QUALITY FORUM
A Better Way to Do Improvement

Mark R. Chassin, MD, FACP, MPP, MPH
President, The Joint Commission

Institute for Healthcare Improvement
27th Annual Forum
Orlando, FL
December 8, 2015
Current State of Quality

Routine safety processes fail routinely
- Hand hygiene
- Medication administration
- Patient identification
- Communication in transitions of care

Uncommon, preventable adverse events
- Surgery on wrong patient or body part
- Fires in ORs, retained foreign objects
- Infant abductions, inpatient suicides

Current State of Improvement

We have made some progress
- Project by project: leads to “project fatigue”
- Satisfied with modest improvement

Current approach is not good enough
- Improvement difficult to sustain/spread
- Getting to zero, staying there is very rare

High reliability offers a different approach
- The goal is much more ambitious
- High reliability is not a project
**High Reliability Healthcare**

Our team has worked for >6 years with academics and experts from HROs (nuclear, aviation, military, amusement parks)

- We have created a model for healthcare:
  - Leadership commitment to zero harm goal
  - Safety culture embedded throughout
  - RPI (lean, six sigma, change management)

- New resources, tools, and strategies

High reliability is catching on

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**Robust Process Improvement**

- Systematic approach to problem solving: (RPI = lean, six sigma, change management)

- The Joint Commission has adopted RPI
  - Improve processes and transform culture
  - Focus on our customers, increase value

- The Joint Commission is adopting all components of safety culture

- We measure RPI and safety culture and report on strategic metrics to Board
What is Lean?

- **Philosophy**: continuous improvement of processes through employee empowerment
- **Teaches us to view our processes from the customer’s perspective**—in value streams
- **Tools**: to increase value by eliminating steps in processes that represent pure waste
- **Waste increases cost, produces no value**
- **All unexamined processes have waste**; often as much as 50% of time and effort is waste

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Lean Fundamentals

**Process Improvement Using Lean**

<table>
<thead>
<tr>
<th>Before</th>
<th>After</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="Image" alt="Graph showing process improvement" /></td>
<td></td>
</tr>
</tbody>
</table>

**Business Improvement** = Eliminate Waste + Improve Outcomes  
Lean + Six Sigma
Six Sigma Uses “DMAIC”
To Improve the Outcomes of Processes

- **Define**
  - Who are the customers?
  - What is critical to the quality of the process?

- **Measure**
  - How can we measure exactly how well the process is performing?

- **Analyze**
  - What are the most important causes of the defects?

- **Improve**
  - How do we remove the causes of the defects?

- **Control**
  - How can we maintain the improvement?

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**Six Sigma Philosophy**
- Philosophy underlying six sigma helps us to think about quality differently
- Six sigma measures bad outcomes as “defects per million opportunities”
- 1% rate of bad outcomes = 10,000 defects per million
- It gives us tools and a way to think about getting to zero harm: the high reliability goal
How Safe are US Airlines?

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

2002-2013
- 14.6 deaths per year
- 10.2 million flights per year
- Rate = 1.43 deaths per million flights

= 90% ↓

The Technical Solution is Not Enough

- Lean, six sigma provide technical solutions
- Why does improvement fail so often?
  - Not for lack of a good technical solution
  - Failures occur when organization fails to accept and implement a good solution it had
- RPI addresses this challenge directly
- Change management = a systematic way to implement and sustain good solutions
The Technical Solution is Not Enough

- Lean, six sigma provide technical solutions
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Change management = a systematic way to implement and sustain good solutions

Facilitating Change

Key components of managing change

1. **Plan**: engage all stakeholders, identify sponsor, champion and process owner
2. **Inspire**: paint a convincing picture of how the change will be beneficial
3. **Launch**: initiate the change, intensify communication to stakeholders
4. **Support**: sustain the improvement; empower process owner

Change management is not linear
RPI in Health Care Today

- Only a small percentage of hospitals or systems use RPI in any form or fashion
- RPI is used differently by different hospitals
  - Most use only some of the parts
  - Most do not use it to transform
  - Most do not have a plan for spread
  - Most do not link RPI training to staff development or advancement

- Compelling business case for RPI

The Business Case

- Administrative processes in health care are often just as broken as clinical processes
  - Billing, supply chain, throughput
  - RPI can directly improve margins
- Quality improvements often don’t save $$$
- Learning RPI allows organizations to solve their own problems, eliminate consultants
- Generate positive ROI now while learning how to redesign care processes for future

Mayo program ROI = 5:1

Training and Deployment

We have a large group of experts in lean, six sigma, and change management (RPI)
  • Studied experience of major corporations (for example, GE, Lilly, BD, Cardinal)
  • Extensive experience with 27 hospitals and systems applying RPI tools

We are training hospitals and systems to:
  • Get the most out of RPI tools and methods
  • Embed RPI throughout their organizations

Create an RPI Program to Last

Don’t confine training to group of experts
  • Aim to spread RPI throughout system
  • Establish different levels of training

RPI becomes transformative when:
  • It becomes “the way we work” every day
  • Front-line employees see opportunities and have the tools to initiate improvement

Use RPI training to identify “best and brightest” for staff development, promotion
Center for Transforming Healthcare

Using RPI together with leading US hospitals and health systems to solve most difficult quality and safety problems

Project topics:
- **2009-10**: hand hygiene, wrong site surgery, hand-off communications, SSIs
- **2011**: safety culture, preventable HF hospitalizations, and falls with injury
- **2012**: sepsis mortality, insulin safety
- **2013-4**: C. difficile prevention, VTE
Participating Hospitals

- Atlantic Health
- Barnes-Jewish
- Baylor
- Cedars-Sinai
- Cleveland Clinic
- Exempla
- Fairview
- Floyd Medical Center
- Froedtert
- Intermountain
- Johns Hopkins
- Kaiser-Permanente
- Mayo Clinic
- Memorial Hermann
- New York-Presbyterian
- North Shore-LIJ
- Northwestern
- OSF
- Partners HealthCare
- Sharp Healthcare
- Stanford Hospital
- Texas Health Resources
- Trinity Health
- VA Healthcare System-CT
- Virtua
- Wake Forest Baptist
- Wentworth-Douglass

Current State of Quality

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RPI Delivers Results

“One-size-fits-all” best practice is inadequate
Complex processes require more sophisticated problem-solving methods (RPI)
Three crucial and consistent findings:
• Many causes of the same problem
• Each cause requires a different strategy
• Key causes differ from place to place

RPI: producing next generation best practices; solutions customized to your causes

Some Important Causes of Hand Hygiene Failures
1. Faulty data on performance
2. Inconvenient location of sinks or hand gel dispensers
3. Hands full
4. Ineffective education of caregivers
5. Lack of accountability

► Each requires a very different strategy to eliminate
Causes Differ by Hospital

<table>
<thead>
<tr>
<th>Main Causes of Failure to Clean Hands (across all participating hospitals)</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ineffective placement of dispensers or sinks</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hand hygiene compliance data are not collected or reported accurately or frequency</td>
<td></td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Lack of accountability and just-in-time coaching</td>
<td></td>
<td></td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Safety culture does not stress hand hygiene at all levels</td>
<td></td>
<td></td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Ineffective or insufficient education</td>
<td></td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hands fall</td>
<td></td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Wearing gloves interferes with process</td>
<td></td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perception that hand hygiene is not needed if wearing gloves</td>
<td></td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Health care workers forget</td>
<td></td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Distractions</td>
<td></td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Notes: Not all of the main causes of failure appear in every hospital. The chart above represents the validation of the root causes across hospitals. This underscores the importance of understanding hospital-specific root causes so that appropriate solutions can be targeted.

RPI Drives Major Improvements

<table>
<thead>
<tr>
<th>Center Projects</th>
<th>Results(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hand hygiene</td>
<td>71↑</td>
</tr>
<tr>
<td>Hand-off communication failures</td>
<td>56↓</td>
</tr>
<tr>
<td>Wrong site surgery risks</td>
<td></td>
</tr>
<tr>
<td>• Scheduling</td>
<td>46↓</td>
</tr>
<tr>
<td>• Pre-op</td>
<td>63↓</td>
</tr>
<tr>
<td>• Operating Room</td>
<td>51↓</td>
</tr>
<tr>
<td>Colorectal SSIs</td>
<td>32↓</td>
</tr>
<tr>
<td>Falls with injury</td>
<td>62↓</td>
</tr>
</tbody>
</table>
Targeted Solutions Tool (TST)

- Web-based tools: secure extranet channel
  - Available to all accredited customers now
  - No added cost, voluntary, confidential
- Educational, no jargon, no special training
- Coaches available to guide users to solutions
- Targeting only your causes means you don’t use resources where they aren’t needed
- 2010: hand hygiene; 2012: safe surgery, hand-off communication; 2015: falls
Hand Hygiene TST: 3 Years

849 projects are using interventions

- **Baseline** = 58% (n = 110,255)*
- **Improve** = 84% (n = 584,025)*

<table>
<thead>
<tr>
<th>Unit</th>
<th>Baseline</th>
<th>Improve</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adult critical care</td>
<td>62%</td>
<td>80%</td>
</tr>
<tr>
<td>Emergency dept.</td>
<td>51%</td>
<td>80%</td>
</tr>
<tr>
<td>Adult med-surg</td>
<td>51%</td>
<td>84%</td>
</tr>
<tr>
<td>Long term care</td>
<td>61%</td>
<td>86%</td>
</tr>
</tbody>
</table>

20% have improved to greater than 90%
Impact of Hand Hygiene TST on Typical US Hospital

TST improves HH, reduces HAIs by 35%

300 Beds
- Expect 555 HAIs/yr
- Annual impact:
  - 194 fewer HAIs
  - 12 lives saved
  - $3.7M cost avoided

600 Beds
- Expect 1100 HAIs/yr
- Annual impact:
  - 388 fewer HAIs
  - 24 lives saved
  - $7.5M cost avoided

Cleveland MetroHealth Medical Center increases hand washing, reduces infections

Published: Saturday, September 03, 2011, 5:50 AM  Updated: Saturday, September 03, 2011, 7:44 AM

By Sarah Jane Tribble, The Plain Dealer

CLEVELAND, Ohio — Who would have thought that Mom could be so right?

They are called, began making their rounds in January. Bloodstream infections at the hospital have dropped to one-third what they were for all of last year.

Used TST to achieve >95% hand hygiene compliance

Bloodstream infections fell by 2/3
MRSA Rate Decreases as Hand Hygiene Improves

Hand Hygiene Compliance Rate (%)

MRSA Cases (per 1000 patient days)

MEMORIAL HERMANN HAND HYGIENE COMPLIANCE RATES: 11 HOSPITALS

Hand Hygiene Compliance Rate (%)

Baseline

Improve

Control

MONTHS FROM START

2011 2012 2013 2014
System - Ventilator Associated Pneumonias: All Adult ICUs

TST Leads to Decreases in HAIs at Memorial Hermann

<table>
<thead>
<tr>
<th>Time</th>
<th>Months</th>
<th>HH (%)</th>
<th>CLABSI</th>
<th>VAP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline</td>
<td>8</td>
<td>58.1</td>
<td>0.83</td>
<td>1.04</td>
</tr>
<tr>
<td>Improve</td>
<td>18</td>
<td>84.4**</td>
<td>0.63</td>
<td>0.57*</td>
</tr>
<tr>
<td>Control 1</td>
<td>13</td>
<td>94.7**</td>
<td>0.58</td>
<td>na</td>
</tr>
<tr>
<td>Control 2</td>
<td>12</td>
<td>95.6**</td>
<td>0.42*</td>
<td>na</td>
</tr>
</tbody>
</table>

ICU CLABSI ↓ by 49%; VAP ↓ by 45%

** p<.001  * p<.05
Joint Commission, RPI and High Reliability

- We must have much more ambitious goals for healthcare improvement: zero harm
- Current methods will not get us there
- Lean, six sigma, and change management (RPI) have far greater promise
- Some hospitals and systems making real progress; showing that zero is achievable
- Joint Commission has tools to help