Making Reliability a Reality: Safety Culture and High Reliability Organizations

Munson Healthcare
29 October 2014

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This material is a proprietary document of Healthcare Performance Improvement LLC. Reproducing, copying, publishing, distributing, presenting, or creating derivative work products based on this material without written permission from Healthcare Performance Improvement is prohibited.
Quality  An objective appraisal (from a producer perspective) of safety (protection from harm) and effectiveness.

Satisfaction  A subjective appraisal (from a user perspective) of quality > expectations.

Value  A subjective appraisal of satisfaction relative to cost and time (to realization).

Reliability  A probability that a system will yield a specified result; expressed as a ratio (0.98 or 98:100 or 98%) or a frequency (1 per yr).
Death By Numbers

44,000 to 98,000 patient deaths per year from medical errors

*To Err is Human*, Institute of Medicine (1999)

James Estimate

210,000 to 440,000 patients, each year, suffer from preventable harm that contributes to their death.

Josie King – Medication Error

Eugene Riggs – Feeding tube inserted into lung

Sebastian Ferrero – Medication Error

Dr Stewart Hamilton – HAI (MRSA)

Diane McCabe – Bled to death following delivery

Mary McClinton – Injected with cleaning solution
What Will It Take?

Patient Safety WalkRounds
+ Address Patient Safety Alerts
+ Non-Punitive Approach to Reporting
+ TeamSTEPPS
+ Strategies in Targeted Outcomes

*BUT*... Will This Produce Significant Sustained Reduction in Serious Safety Events & Culture Change Across the Organization?
Anatomy of a Safety Event

**Multiple Barriers** - technology, processes, and people - designed to stop active errors (our “defense in depth”)

**Active Errors** by individuals result in initiating action(s)

**Latent Weaknesses** in barriers

**EVENTS of HARM**

**PREVENT** The Errors

**DETECT & CORRECT** The System Weaknesses

Influencing Behaviors at the Sharp End

Design of Policy & Protocol

Design of Culture

Design of Work Processes

Design of Technology & Environment

Behaviors of Individuals & Groups

Outcomes

“You have to manage a system. The system doesn’t manage itself.”
W. Edwards Deming

“A bad system will DEFEAT a good person every time.”
W. Edwards Deming

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

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"At the sharp end, there is almost always a discretionary space into which no system improvement can completely reach. Systems cannot substitute the responsibility borne by individuals within that space."

Sidney Dekker
Just Culture: Balancing Safety & Accountability (2007)
Typical Improvement Curve

- Apparent increase due to healthier event/problem reporting culture
- 80% reduction in serious preventable harm as a result of prevention activities
- Actual increase due to complacency or reverting to old habits
- Long-term improvement through sustained prevention

- Achieved in 1 to 3 years, approximately

- Start of Culture Change

- Time

- Significant Event Rate

- Hospital X
Published Cases

1. **Memorial Health University Health System** – 89% serious harm reduction, Clinical Advisory Board, 2005

2. **Sentara Healthcare** – 80% serious harm reduction overall (50% harm reduction in 18 months) - AHA Quest for Quality Award 2004, Eisenberg Quality Award 2005


4. **Children’s National Medical Center** – 70% serious harm reduction, Journal of Healthcare Risk Management, 2012

5. **Nationwide Children’s Hospital** – 83% serious harm reduction, Journal of Pediatrics, 2013

6. **Memorial Hermann Health System** – certified zero awards for harm on units, Eisenberg Quality Award, 2012

7. **Vidant Health** – 83% serious harm reduction overall, 62% HAI reduction, and 98% optimal care (core measures). TJC Eisenberg Quality Award, 2013

8. **WellStar Health System** – 90% serious patient harm reduction and 84% worker injury reduction, NPSF Annual Patient Safety Conference, 2014

9. **VCU Medical Center** – 50% serious harm reduction, AHA Quest for Quality Award 2014
Optimizing Reliability

- **Reliability Culture**
  - Safety as the core value
  - Behavior expectations for error prevention
  - Collaborative Interactive Teams
  - Leadership behaviors for reliability

- **Process, Protocol & Technology**
  - Resource allocation
  - Evidence-based practice (e.g. bundles)
  - Technology enablers

- **Behavior Accountability**
  - Human Factors

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*Design to Optimize Human Performance at the point of people interface:*

- Easy to do the right thing – *impossible* to do the wrong thing
- Intuitive design
- Mistake proofing by design (i.e. poka yoke)
## A Survey of HRO Theory

<table>
<thead>
<tr>
<th>Scientists</th>
<th>Craftsmen</th>
<th>Field Engineers</th>
<th>Integrators</th>
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<tr>
<td>Karl Weick &amp; Kathleen Sutcliffe</td>
<td>Hyman Rickover</td>
<td>Safety Governance (HPI)</td>
<td>Baldrige Criteria for Healthcare</td>
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<tr>
<td>Rene Amalberti</td>
<td>Thomas Mercer</td>
<td>Socio-Technical System (Pascal Metrics)</td>
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<td>Karlene Roberts &amp; Carolyn Libuser</td>
<td>Chong Chiu</td>
<td>The Joint Commission</td>
<td>Christine Sammer</td>
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<tr>
<td>Ron Westrum, Patrick Hudson, et al</td>
<td>Sidney Dekker</td>
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<td>Bert Slagmolen</td>
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<td>Charles Perrow</td>
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</tbody>
</table>
Westrum & Hudson 1992-2002

Safety Cultures have five elements:

1. **Communication** with high frequency, closed loops for vertical information flow and lateral integration

2. **Organisational attitudes** - based on respect - allowing leaders and staff to partner in fixing system problems

3. **Health Safety Environmental (HSE)** programs are owned by staff, safety professionals are few in advising roles

4. **Organisational behaviour** with safety equal to production, trust among leaders and staff, and frequent dialogue

5. **Working behaviour** with staff providing safe environment and leaders sharing lessons among staffs

**Assessment Tool:** Pathological, Reactive, Calculative, Proactive, Generative (HRO)
Roberts and Libuser 1995

1. Process auditing
2. Vigilance for quality degradation
3. Reward systems
4. Perception of Risk
5. Command and Control combining:
   - Migration Decision Making – deference to expertise
   - Redundancy of people and engineered systems
   - Situational Awareness – leaders who see the big picture and provide oversight (not micromanage)
   - Standardization - formal rules and procedures
   - (van Stralen addition) Authority Gradient in the positive sense with deference to expertise and a reduction in the negative sense for sharing of risk vertically.
1. **Accepting limits** on discretionary action (deference to expertise, protocol, and safety limits)

2. **Abandoning autonomy** (mindful of and coordinating with other people, activity, processes, and systems)

3. **Transition** from craftsman to **equivalent actor** (standard work based on evidence-based best practice)

4. **Sharing risk vertically** in the organization (communicate problems – looking back and looking ahead - to leaders)

5. **Managing the visibility of risk** (using systems to predict failure and adjust to prevent failure)
Weick & Sutcliffe 2007

Anticipation has three elements:

1. **Preoccupation with failure**: to avoid failure - look for early signs

2. **Reluctance to simplify interpretations**: critical thinking and looking past easy explanations provides situational awareness

3. **Sensitivity to operations**: systems are dynamic and non-linear – provide direct oversight to adjust to unpredicted interactions

Containment has two elements:

4. **Commitment to resilience**: the organization maintains function(s) during high demands. Resilience has three components:
   - Absorb demands and preserve functions
   - Maintain the ability to return to service after untoward events
   - Learn and grow from untoward events

5. **Deference to expertise**: decision-making seeks those with knowledge and experience regardless of rank or status
The Trouble with Descriptive Theories
Every one tells us what one looks like - no one tells us how to make one.

Sidney Dekker
1. Leadership safety objectives
2. Redundancy in duplication & overlap
3. Delegation & decentralized authority
4. Organizational learning

Christine Sammer et al.
1. Leadership
2. Teamwork
3. Use of evidence-based practice
4. Communications
5. Learning environment
6. Just
7. Patient centered

Reliability Culture - Genius of the AND

Safety Focus + \textit{performed as intended consistently over time} = \textit{No Harm} \quad \text{zero}

Evidence-Based Process Bundles + \textit{performed as intended consistently over time} = \text{Clinical Excellence}

Patient Centered + \textit{performed as intended consistently over time} = \textit{“Satisfaction”}

\textbf{RELIABILITY CULTURE}
\textit{“Failure Prevention”}

Financial Focus + \textit{performed as intended consistently over time} = \text{Margin}
Kina’ ole (flawlessness)

Doing the right thing in the right way, at the right time, in the right place, to the right person, for the right reason, with the right feeling, the first time.
What is Culture?

**Culture**
The shared values and beliefs of individuals in a group or organization

Culture = Shared Values & Beliefs

- Shared Values & Beliefs → Our Behaviors
- Our Behaviors → Outcomes
Changing Behaviors

Set Expectations

Educate & Build Skill

Reinforce & Build Accountability

MIND THE GAP

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More Rules or More Tools?

Focused on several known harm events
Synergy with policy & protocol

Coverage on broad range of harm events
Synergy with people, process, and technology
Non-Technical Skills

Non-technical skills describe how people interact with technology, environment, and other people. These skills are similar across a wide range of job functions. These skills include attention, information processing, and cognition.

Generic non-technical skills:
- Situational awareness
- Attention
- Communication
  - repeat backs
  - call outs
  - phonetic & numeric clarification
  - clarifying questions
  - inquiry, advocacy, assertion
- Critical thinking
- Protocol use
- Decision-making

Flin, O’Connor, and Crichton
Safety at the Sharp End
Self Checking Using STAR

**Stop:** Pause one second to focus on what you are about to do

**Think:** Think about what you are about to do - is it the right thing?

**Act:** Concentrate and perform the task

**Review:** Check for the desired result

---

**Self Checking**

The most effective way to avoid slips and lapses. It takes *only seconds* and reduces the probability of making an error by a factor of 10 or MORE!
Phonetic and Numeric Clarification

Used to differentiate sound-alike words, letters, and numbers:
- Say the word/number
- Follow with the separating word “that’s” to avoid confusion
- Say the clarifying letters/digits

Use clarifications when using leading zeros and number ranges:
- “Unit D –that’s D as in Delta.”
- “0.9 –that’s zero point nine.”
- “4 to 5 –that’s the range of four to five.”

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<th>A</th>
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<td>Mike</td>
<td>Z</td>
<td>Zulu</td>
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Questioning Attitude
with Validate & Verify Technique

**Validate:** Does it make sense to me?

**Verify:** Check with an independent, qualified source

- Patient
- Medical Record Documentation
- Technology
- Professionals
- Procedures & References
Cross Monitoring

**Peer Checking**
Watching-out for each other. Peers share situational awareness and provide on-the-spot second opinions.

**Peer Coaching**
Involves feedback. Peers provide a 5:1 ratio of positive to negative feedback to reinforce good habits, extinguish poor habits, and build better practice habits.

**Multiply Your Error Probability**
0.001 \times 0.001 = 10^{-6}

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PEER REVIEWS MAKE A DIFFERENCE

WELL, IT STARTED AS A JOKE, BUT WE’VE HAD 36 PERCENT FEWER TRANSIENTS SINCE I STUCK THAT ON HIM.

Request peer checks for critical tasks.
Most teams require some degree of authority gradient; otherwise roles are blurred and decisions cannot be made in a timely fashion.

The perceived steepness – not necessarily the real – as seen by the subordinate.

Balance of decision-making power or the steepness of command hierarchy. Members of a team with a domineering, overbearing, or dictatorial team leader experience a steep authority gradient. Expressing concerns, questioning, or even simply clarifying instructions would require considerable determination...
Power Distance

The *perceived* difference – not necessarily the real difference – as seen by the *subordinate*

**Small Distance**
- Relations are consultative and democratic
- Relate as equals regardless of formal positions

**Large Distance**
- Relations are autocratic and paternalistic
- Power acknowledged based on formal, hierarchical positions

Collegial Interactive Teams (CIT) = Tone + Tools

Setting the tone…

- “You had me from Hello”
  - Greetings – include first names
  - Cordiality, openness
  - Eye contact and body language

- Team goals
  - Use “we” and “us” vs. “I” and “you”
  - What’s best for the patient...

- Invite a Questioning Attitude
  - Leaders set the tone for the flow of information
  - “If any member of the team sees anything that is unsafe, I expect you to speak up...”
Making it Stick:
“It’s Hawthorne Until Habit”

Awareness

Skill Acquisition

Novice - Advanced Beginner - Competent - Proficient - Expert
Source: Patricia Benner, From Novice to Expert (1984)

Habit Formation

Unconsciously incompetent - Consciously incompetent - Consciously competent - Unconsciously competent
“Four Stages of Learning,” a theory posited by 1940’s psychologist Abraham Maslow

Performance

Event Rate

Time

2 Years

100%

20%
### Culture Embedding Mechanisms

*From Organizational Culture & Leadership, by Edgar Schein*

**Primary Embedding Mechanisms**
- What leaders **pay attention to**, measure, and control on a regular basis
- How leaders **react to critical incidents** and organizational crises
- Observed criteria by which leaders **allocate scarce resources**
- Deliberate **role modeling**, teaching, and coaching
- Observed criteria by which leaders **allocate rewards and status**
- Observed criteria by which leaders **recruit, select, promote, retire, and excommunicate** organizational members

**Secondary Articulation & Reinforcement Mechanisms**
- Organizational design and structure
- Organizational systems and procedures
- Organizational rites and rituals
- Design of physical space, facades, and buildings
- Stories, legends, and myths about people and events
- Formal statements of organizational philosophy, values, and creed
High Reliability is the right mix of *Blunt End* behavior shaping factors.

Culture is not just one of the spaces

Culture makes the other shaping factors work as intended.

*Culture is also the space between the other spaces*

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

Message the Mission
Safe + Effective + Patient Centered + Efficient
High Reliability Organization

Design Reliable Systems
Process to Process + People to Human Factors
People think – machines do

Lead Learning
Internal / external, success / failure
Prospective / retrospective

Maintenance of Competency
Hiring for fit / building skills
Managing drift / managing change
Accountability (engagement) of staff

Operational Leadership
Work load / resource mismatch
Infrequent / complex work
Anticipate to avoid events

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

A safety message is a five-minute communication about safety:

1. Share your convictions relative to patient safety or personal safety
2. Explain how safety contributes to our mission
3. Explain how our policy & practice contribute to safety
4. Tell a story about something good that we did
5. Tell a story about something bad that happened to us
6. Tell a story about harm in another healthcare system
7. Tell a story about another system preventing harm
8. Read a Safety Success Story from your people
9. Read a Safety Success Story from your system
10. Review our safety behaviors
11. Teach applications of our safety behaviors to our jobs
12. Discuss the importance of reporting problems
13. Discuss the importance of speaking-up for safety
14. Ask staff to be safe, and explain how
15. Thank staff for practicing / working safely
7 Elements of Story
Story cuts through the clutter to connect mission to meaning

1. Who is the **protagonist**?
2. What is the hook?
3. What keeps it interesting?
4. Where is the **conflict**?
5. Have you included telling details?
6. What is the **emotional** hook?
7. Is the **meaning** clear?

*Seven Questions to Sharpen Your Stories, Andy Goodman, 2003.*
3 Part Structure
Story cuts through the clutter to connect mission to meaning

1. State the lesson of the story.
   - “I would to share a message about the importance of speaking-up as an advocate for a patient.”

2. Deliver the message.
   - (insert message here)

3. Return to the lesson for emphasis.
   - “And that is why it’s important that everyone speak-up for patient every time.”
“Talking about safety should not be an event.”
Barbara Summers, President of Community Hospital North

- 9:00-9:15 AM, Monday thru Friday
- Held via conference call
- All departments, all directors
- 100% attendance expectation
- “step out of meeting to attend”
- Facilitated by senior leader

Daily Check-In Agenda

1. LOOK BACK – Significant safety or quality issues from the last 24 hours/last shift
2. LOOK AHEAD – Anticipated safety or quality issues in next 24 hours/next shift
3. Follow up on Start-the-Clock Safety Critical Issues

Daily Check-In for Safety, PS&QH September/October 2011
Unit-Based Learning System *Tools*

**Cause Solving**
Process mapping, task analysis, ask why five times, A3 Action Plan

**Process Improvement Guide**
Solutions for human error in the Generic Error Modeling System (GEMS), human factors, protocol, and process

**Learning Boards**
Visual management of new, working, and solved problems
Learning Boards
local focus for local results

What Is It?
A method for identifying local system issues that impact safe, effective, and patient centered care.
Unit leaders – and shared governance - identify and implement solutions.

Why It Works
Focuses efforts of staff at unit level.
Gives a shared understanding of problems, causes, and solutions.
Creates momentum for more solving of local system issues.

Notes
for smaller problems

A3 Action Plans
for larger problems
But to understand failure

- Questions are **not**
  - Where did they screw up?
  - Why didn’t they notice what we find important now?
- Question is:
  - Why did it make sense for them to do what they did?

Why did it make sense?

- To understand why people did what they did...
- Reconstruct the world in which they found themselves at the time

Sidney Dekker
Associate Professor
Centre for Human Factors in Aviation
Linköping Institute of Technology
Sweden
## Learning Behaviors of Cause Solving

<table>
<thead>
<tr>
<th>When I face:</th>
<th>Traditional Behavior:</th>
<th>Learning Behavior:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Missing material or information</td>
<td>➢ Fix it without bothering managers or others</td>
<td>✓ Remedies immediate situation but also lets the manager and others know when the system has failed</td>
</tr>
<tr>
<td>Other’s errors</td>
<td>➢ Seamlessly correct the error for others – without confronting the other person about their error</td>
<td>✓ Lets others know when they have made a mistake with the intent of creating learning, not blame</td>
</tr>
<tr>
<td>My errors and problems</td>
<td>➢ Creates an impression of never making mistakes</td>
<td>✓ Lets manager and others know when they have made a mistake so others can learn from their error</td>
</tr>
<tr>
<td></td>
<td></td>
<td>✓ Communicates openness to hearing about their errors discovered by others</td>
</tr>
</tbody>
</table>
| Subtle opportunities to improve the system | ➢ Committed to the current way of doing business  
➢ understands that’s the way things work around here | ✓ Questions why do we do things this way? Is there a better way of providing the service to the patient? |

Adapted from Anita Tucker & Amy Edmondson, *Why Hospital’s Don’t Learn From Failures*, (UC Berkeley School of Business, 2003)
What is Human Factors?

- The science of understanding the properties of human capability (Human Factors Science).
- The application of this understanding to the design and development of systems (Human Factors Engineering).
- The practice of applying Human Factors Engineering to a system (sometimes referred to as Human Factors Integration).
Poor Human Factors
Patient: SYDNEY

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<th>Test</th>
<th>Results</th>
<th>Reference Range</th>
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<tbody>
<tr>
<td>ALKP</td>
<td>85 U/L</td>
<td>23 - 212</td>
</tr>
<tr>
<td>ALT</td>
<td>23 U/L</td>
<td>10 - 100</td>
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<td>BUN</td>
<td>16.6 mg/dl</td>
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<tr>
<td>CREA</td>
<td>0.77 mg/dl</td>
<td>0.50 - 1.80</td>
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<tr>
<td>GLU</td>
<td>130.6 mg/dl</td>
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<td>TP</td>
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<tr>
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<td>149.9 mmol/l</td>
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<tr>
<td>K</td>
<td>4.44 mmol/l</td>
<td>3.50 - 5.80</td>
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<tr>
<td>Cl</td>
<td>116.9 mmol/l</td>
<td>109.0 - 122.0</td>
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What about this one?

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More than Ergonomics

- Human factors is anything and everything that affects human performance.
- Healthcare people tend to use the word in this very broad sense.
- Engineering people tend to use the term in the more narrow person-machine interface sense.
- Perhaps a better way to say human factors is human performance in complex systems.
Self-Checking Using STAR

Stop  Pause one second
Think  Visualize the act
Act    Perform the task
Review Check response

Actual Error Reduction Factor: 10 to 100
*Source: Jefferson Center for Character Education, 1974

Skill-Based (Familiar, routine)
Such as:
- Suturing
- Taking vital signs

ClearRxSM system by Target Pharmacy
Estimated error reduction: Factor of 2 - 3

Hit the Books

...and take a lesson.

## T&E Failure Modes

<table>
<thead>
<tr>
<th>Failure Mode</th>
<th>What Does This Mean?</th>
<th>Case Example</th>
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<tbody>
<tr>
<td><strong>Input / Output</strong></td>
<td>Visual display, alarms, control configuration is design in a way that makes it difficult to differentiate signals</td>
<td>Keyboard buttons that lack tactile and auditory feedback (difficult to know the key was pushed)</td>
</tr>
<tr>
<td><strong>Human Capability</strong></td>
<td>Symbols, codes, anthropometry, devices, human control, and physical work difficult for humans to do and/or do reliably</td>
<td>IV drips that require continual human intervention to adjust rate with a roller clamp</td>
</tr>
<tr>
<td><strong>Arrangement</strong></td>
<td>Physical arrangement of the work space or facility negatively impacts performance</td>
<td>PPE equipment stored in a central supply cabinet rather than at the entry to the patient room</td>
</tr>
<tr>
<td><strong>Environment</strong></td>
<td>Lighting, noise, temperature, or motion negatively impacts performance</td>
<td>Physician missed a small skin lesion due to poor lighting in clinic exam room</td>
</tr>
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Space and Physical Constraints
Lighting

What visual issues can you identify in this picture?
Lighting Characteristics

*Illumination* - Light that falls onto a surface

*Luminance* - Light reflecting from a surface; also perceived brightness of a surface given a viewing angle

*Reflectance* - Reflective ability of a surface

*Glare* - Is the reflectance of bright light off a surface that reduces visual contrast and impairs visibility
Lighting and Performance

- Medication errors were lower when work-surface lights were at higher illumination
- Visual performance depends on the nature of the task
  Care often involves tasks with small visual elements and the contrast is low between figure and background (dimly lit patient room)
- Our Eyes Change As We Age
  Consider combination of illumination and pint quality to offset changing eyesight for older workers
Color & Contrast

- **Color** - is not useful in low light environments. Because of this variability color should be used only as a redundant instead of a primary signal ON/OFF

- **Contrast** – Extremely low or high contrast affects visual acuity. (i.e. dark text on a dark background or a computer monitor against a window on a sunny day)
Color & Contrast

- The use of color as a primary signal can have detrimental effects.
- Look for those raised letter no contrast warnings and instructions. Extremely difficult to read.
Facts About Noise

- Noise in Hospital ICUs is higher than WHO recommendation. Typical levels in ICU 50-75 peak to 85db. WHO recommendations at 40-45db day and 35db night.
- Noise can increase heart rate, subjective stress, and annoyance; and, impair task performance, concentration, and complex problem solving task performance.
- Difficult tasks that place high demands on perceptual-motor skills and/or information processing (e.g. team communication during high risk emergency procedures) may be most affected by noise (Sanders & McCormick, 1993).
- Noise influences response bias; people tend to think an auditory signal is present only when they are absolutely sure they heard the signal.
More About Noise

Additional Facts

- Rock Concert 85-140db
- Air conditioner -
- IV Alarm – 77
- Ventilator – 78
- Monitor Alarm – 79
- Television - 79
- Ventilator Alarm - 79
- Telephone – 79
- Nebulizer – 80
- Oximeter Alarm – 81
- Intercom - 83
- Beeper – 84
- Talking – 85
- Jet Engine – 140 +

Factors To Consider

- **Noise.** Quiet vs. audible for purposes of providing feedback as a safety measure (hospital bed should make a whirring noise when in use as a means to help protect against harm that could come from inadvertent bed motion).
- **Auditory signal frequency** Auditory signals should have frequencies between 500-3000 Hz because the ear is most sensitive to the middle ranges
- **Get users’ attention, then provide useful information**
- **Consistency**
- **Consistency with learned meanings**
- **Auditory signal usability testing** - All auditory signals should undergo usability testing with users for detection and discrimination in the intended use environments
- **Reliable Detection**
- **Audible Alarms**
- **Visual Alarms**
- **Tactile Alarms**
Functionality of Controls

- Is it obvious what each button, dial or switch will do?
- Do buttons really look like buttons?
- Do any non-functional features of the device look like buttons or controls?
Feedback and Displayed Messages

- Is it easy to tell what the device is doing at any given moment?
- If you hand the device to someone, can they figure out where you’ve left off and what they need to do next?
- Can you understand the meaning of the messages, symbols, sounds, or lights that are displayed?
Labels and Warnings

- Can you easily see all important labels and warnings?
- Is the language understandable?
- Are symbols meaningful? Or do you need special knowledge to interpret it?
- Do any labels create visual clutter that might cause confusion?
Technology in Healthcare

- Tremendous Impact on Clinical Work
- Rarely assessed before implementation
- Risk of failure/harm remains high
  - Opaque to the designers, purchasers and users
  - Lack obvious clinical correlation – distant from patient
Information Technology Track Record

What has happened in other industries when information technology was introduced?

Mixed Results…

• Some Errors Eliminated
• Some Errors Created

Likely “Net Benefit”

Not surprising that it is reported many large IT projects are less than successful – late, over budget and do not attain overall goals.
The Concept of ‘Brittleness’

- Small Failures are less common
- Failures are more likely to be catastrophic
- No warning or graceful degradation
  - “Instead of getting one dose of the wrong patient’s medication…”
  - Such as one patient gets that patient’s entire regimen
  - Or the entire floor gets another floor’s medications
### P&P Failure Modes

<table>
<thead>
<tr>
<th>Failure Mode</th>
<th>What Does This Mean?</th>
<th>Case Example</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Lacking or Informal</strong></td>
<td>Is missing or incomplete</td>
<td><strong>Patient identification procedure requiring “two identifiers” does not specify which identifiers to use or how to resolve duplicate matches</strong></td>
</tr>
<tr>
<td><strong>Usability</strong></td>
<td>Of poor presentation or information depiction; low credibility; or poor access</td>
<td><strong>On-call schedule contains out-of-date information and is confusing</strong></td>
</tr>
<tr>
<td><strong>Understandability</strong></td>
<td>Difficult to comprehend because detail is lacking or inadequate for the knowledge and/or skill level of the user</td>
<td><strong>Protocol uses non-standard terminology</strong></td>
</tr>
<tr>
<td><strong>Knowledge in the Environment</strong></td>
<td>Has inadequate or under-utilized job aids or documentation forcing functions</td>
<td><strong>Formulary does not provide clear guidance on dosing protocol</strong></td>
</tr>
</tbody>
</table>

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Processes & Procedures Today

How do we \textit{transform} our work processes and procedure documentation to achieve better outcomes??
What Is Optimal Process Detail?

Focus & Simplify

Fewer rules... more tools!!

Reliability

Volume of Policy, Procedure, & Protocol

Lacks Detail
- Poor tracking
- Wrong rule error
- Knowledge-based error

Excess Detail
- Poor tracking
- Non-compliance
- Misapplication error

Focus & Simplify

What Is Optimal Process Detail?
Minimizing Policy Burden

<table>
<thead>
<tr>
<th>Complex Task/Activity</th>
<th>Safety Critical Task/Activity (High Reliability Required)</th>
<th>Less-Critical Task/Activity (Lower Reliability Required)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Detailed Procedure with Verbatim Compliance</td>
<td>Guideline Without Verbatim Compliance</td>
<td></td>
</tr>
<tr>
<td>Standing Order or Checklist with Verbatim Compliance</td>
<td>Common Sense or Skill-of-the-Craft</td>
<td></td>
</tr>
</tbody>
</table>
Documentation Differentiation

Policy
- High level expectation mandated by a regulatory requirement or self-imposed requirement

Procedure
- Step-by-step required actions in column one, with supplemental guidance in column two
- Job aids referenced within action steps
- Adherence to required actions = policy compliance

Job Aids ("More Tools")
- Tools needed in the workplace to effectively carry out the procedure and work in the process
- Provide memory aids for infrequent tasks
- Warn of hazards
**Complications of IV Therapy**

**Infiltration**
- The inadvertent administration of a non-vesicant solution of medication into surrounding tissue as a result of catheter deployment.

**Preventive Measures**
- Pay Attention to Detail & Have a Questioning Attitude
- Regular monitoring of IV sites
- Choice of correct access device/dressing and appropriate vein/vein site

**Grading Scale & Clinical Criteria**

**Grade 0**
- No symptoms

**Grade 1**
- Skin blanched, cool to touch
- Edema <1 inch in any direction
- With or without pain

**Grade 2**
- Skin blanched, cool to touch
- Edema 1 to 6 inches in any direction
- With or without pain

**Grade 3**
- Skin blanched, transverse cool to touch
- Gross edema >6 inches in any direction
- Mild to moderate pain
- Possible “tension” cited by patient

**Grade 4**
- Skin blanched, transverse, hot, leathery
- Skin discolored, bruised, swollen
- Gross edema >6 inches in any direction; deep pitting tissue edema
- Circulatory impairment
- Moderate to severe pain
- Infiltration of any amount of blood products, irritant, or vesicant

**Extravasation**
- Infiltration of a vesicant solution, such as IV fluid, or medication into the subcutaneous tissue. Affected site breaks down, resulting in the formation and/or separation of necrotic tissue from viable tissue.

**Preventive Measures**
- Pay Attention to Detail & Have a Questioning Attitude
- Infiltration Grade
  - Grade 4
  - High Risk Patients
    - Elderly, children, and coexisting medical problems
    - Patient who cannot communicate the symptom of pain that they are experiencing due to infiltration
  - Agents & Mechanisms of Tissue Necrosis
    - Caused by Extravasation
      - High concentration of dyes (TPN, electrolytes)
      - Acidosis (blood pH)
      - Vascular constriction (vasoconstrictors)
      - Cellular toxicity (chemotherapy)
      - Irritants (antibiotics, chemotherapy, pimecrolimus)

**Phlebitis**
- Inflammation of the vein associated with irritation of irritants (fluids, medication, mechanical irritation, or bacterial infection).

**Preventive Measures**
- Pay Attention to Detail & Have a Questioning Attitude
- Careful and regular monitoring of IV access sites

**Grading Scale & Clinical Criteria**

**Grade 0**
- No symptoms

**Grade 1**
- Erythema (redness) at access site, with or without pain

**Grade 2**
- Pain at access site with erythema and/or edema

**Grade 3**
- Pain at access site with erythema and edema
  - Streak formation
  - Palpable vein cord

**Grade 4**
- Pain at access site with erythema and/or edema
  - Streak formation
  - Palpable vein cord >1 inch in length
  - Pus/staph drainage
Form Fits Function

- Two columns for novice-to-expert application
  - “Required Action Steps” for all
  - “Supplemental Guidance” when further information is needed
- Three columns for multi-actor procedure
- Sequential action steps written as clear, concise phrases beginning with an action word
- Cautions and Notes placed before the step to which they apply
- Job Aids referenced with related action steps
Procedure Writing Right

- Terms to convey compliance expectations

  **Shall:** Individual must follow the directive exactly and in all situations. STOP if the directive cannot be met.

  **Should:** Directive is highly recommended, but there may be extenuating circumstances that make the action inappropriate for the situation at hand. Consult with manager before choosing not to perform the action.

  **May:** Individual discretion or professional judgment is used to determine if the action is appropriate.

- No unsafe, or undefined, abbreviations
- No vague terms or phrases
## Avoid Vague Terms & Phrases

<table>
<thead>
<tr>
<th>Term</th>
<th>Vague Use</th>
<th>A Better Way To Say It</th>
</tr>
</thead>
<tbody>
<tr>
<td>And/Or</td>
<td>If heart rate <em>and/or</em> respiration rate…</td>
<td>When either heart rate or respiration rate…</td>
</tr>
<tr>
<td>Appropriate</td>
<td>Notify the physician if <em>appropriate</em>…</td>
<td>Notify the physician when one or more of the following conditions exist…</td>
</tr>
<tr>
<td>Approximately</td>
<td>The freezer temperature must be <em>approximately</em> 28 degrees Fahrenheit…</td>
<td>The freezer temperature must be between 25 and 30 degrees Fahrenheit…</td>
</tr>
<tr>
<td>As Soon As</td>
<td><em>As soon as</em> the patient is admitted…</td>
<td>Within 10 minutes after the patient is admitted…</td>
</tr>
<tr>
<td>Determine</td>
<td><em>Determine</em> the cause of the patient’s behavior…</td>
<td>Assess the following conditions as a cause of the patient’s behavior…</td>
</tr>
</tbody>
</table>
## Avoid Vague Terms & Phrases

<table>
<thead>
<tr>
<th>Term</th>
<th>Vague Use</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Erratic</td>
<td>When the heart rate is <em>erratic</em>…</td>
<td>When the heart rate fluctuates more than 10 beats per minute…</td>
</tr>
<tr>
<td>If Desired</td>
<td><em>If desired</em>…</td>
<td>If the following conditions exist…</td>
</tr>
<tr>
<td>Periodically</td>
<td><em>Periodically</em> monitor the patient’s vital signs…</td>
<td>Monitor the patient’s vital signs every 15 minutes…</td>
</tr>
<tr>
<td>Relevant</td>
<td>Check all <em>relevant</em> vital signs..</td>
<td>The following vital signs must be checked…</td>
</tr>
<tr>
<td>Sufficient</td>
<td>If oxygen saturation is <em>sufficient</em>…</td>
<td>If oxygen saturation is greater than 95%…</td>
</tr>
</tbody>
</table>
Human Factors in Protocols

- **Fog Index (corresponds to grade level)**
  - Protocol or flow sheet, target 6-8
  - Warning or caution, target 4

- **Complexity Index (actions per step)**
  - Target 1 action per step
  - Accept a mean of 1.5 actions per step

- **Specificity Index (actions meeting criteria*)**
  - 90% for routine
  - 100% for critical

*Criteria:
1. Action identified
2. Quantified limits
3. Unique identification
Example Fog Index

“Keep this medicine and all medicines out of reach of children. In case of accidental overdose or if someone else takes this medicine, consult a physician immediately.”

Flesch-Kincaid Grade Level 11.2

“Keep out of reach of children. Call poison control for accidents.”

Flesch-Kincaid Grade Level 4.7
Laboratory Proficiency Testing

6 department procedures...

**General Information**

- Proficiency specimens are received on a regular schedule throughout the calendar year. It is the responsibility of all staff to ensure that the specimens are properly stored when received, that the date of receipt is indicated on the paperwork, and that the POCT staff is informed of the arrival of the survey material.

- All instructions needed to perform the survey are included with each shipment. Specimens will be designated to a specific nursing unit to ensure that all testing personnel participate in the proficiency program. In some instances due to the large number of units performing testing, it may be necessary for multiple units to perform the same survey. In this case, a single unit will be designated as the primary unit and their results will be retained in the POCT office. Proficiency survey specimens are to be handled in the same manner as patient specimens. No proficiency testing specimens may be referred to another laboratory. For each analyte performed, the appropriate information is to be recorded on the Proficiency Survey Information Sheet. The healthcare professional performing the proficiency testing must sign the attestation statement on the original documentation that verifies that the specimens were treated in the same manner as patient samples. The results are transmitted and reviewed by the POCT Senior Technician prior to sending the original forms to the provider. The transcribed results are double-checked by one other person. The Medical Director or designee signs the final documentation before being mailed. All original survey results must be mailed/faxed to the provider within the time frame indicated for the analyte. There must not be any interlaboratory communication on proficiency testing data before results are submitted.

- Approximately four to six weeks after the results are received by the provider, a summary of results and interlaboratory comparison is returned to the laboratory for review and any necessary corrective action. At this time, the POCT staff will also evaluate the results of any additional units that performed the survey and determine if corrective action is required.

- The proficiency program assigns to each result a standard deviation index to describe how far a result is from the group mean as measured in standard deviation units. Results are reviewed and validated transcribed results. The remaining specimens should be stored appropriately based on the type of specimen (frozen or refrigerated) in the designated freezer or refrigerator until results are obtained from the provider and it is determined that no further analysis is necessary. The individual that mails the survey is responsible for making sure that the specimens are stored properly.

**Checklist**

<table>
<thead>
<tr>
<th>Required Action Steps</th>
<th>Completed by</th>
<th>2nd Checks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Receive kit. Initiate External Proficiency Testing Checklist.</td>
<td>Tech No._________</td>
<td>Date:_________</td>
</tr>
<tr>
<td>2. Date &amp; store kit.</td>
<td>Tech No._________</td>
<td></td>
</tr>
<tr>
<td>3. Notify appropriate person. Hand off checklist to Process Owner.</td>
<td>Tech No._________</td>
<td></td>
</tr>
<tr>
<td>4. Make copy of paperwork.</td>
<td>Tech No._________</td>
<td></td>
</tr>
<tr>
<td>5. Order in Cerner.</td>
<td>Tech No._________</td>
<td></td>
</tr>
<tr>
<td>6. Assign to testing personnel. Schedule follow up with testing personnel.</td>
<td>Date due:_________</td>
<td>Scheduled f/u (date)_________</td>
</tr>
<tr>
<td>7. Prepare &amp; perform testing.</td>
<td>Tech No._________</td>
<td></td>
</tr>
<tr>
<td>8. Enter test results on forms. Deliver to Process Owner.</td>
<td>Tech No._________</td>
<td></td>
</tr>
<tr>
<td>10. Validate transcribed results. (2nd independent check)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. File result forms with checklist.</td>
<td>Tech No._________</td>
<td></td>
</tr>
</tbody>
</table>

**References**

- Policy: List primary guiding Policy
- Procedures: External Proficiency Testing

**Key Process, If Applicable:**

- Key Process
### What Senior Leaders Can Do To Promote Safety Culture

**Set the tone:**
- Message on safety, quality, and satisfaction
- Establish expectations for tones and tools (non-technical skills)
- Say, “Thank you” when someone reports an event or error. Then say, “Let’s understand how that happened…”
- Ask your direct reports to let you know when one of their people reports an event or error – go thank that person.
- Ask about events and errors during Daily Check-In.
- Observe and coach operational leaders in their response(s)

### What Operational Leaders Can Do To Promote Safety Culture

**Reinforce safe practice:**
- Tell your safety story
- 5:1 feedback for safe practice – especially non-technical skills
- Diagnoses the cause of human error…and respond in a fair and just way:
  - Fix system problems causing error
  - Console and coach for unintended human error
  - Apply fair consequence for non-compliance
- Lead the local learning system

### What Staff & Physicians Can Do To Promote Safety Culture

**Personal commitment to safety:**
- Put safety first
- Practice non-technical skills – the tools and tones
- Report events and errors
- Offer suggestions for improving the systems and processes
- Be eager to learn and apply lessons from experience of others