HQIC Community of Practice Call

From HRO to Resiliency Engineering – The Future of Patient Safety

July 11, 2024

CMS CENTERS FOR MEDICARE & MEDICAID SERVICES | HQIC Hospital Quality Improvement Contractors
CENTERS FOR MEDICARE & MEDICAID SERVICES iQUALITY IMPROVEMENT & INNOVATION GROUP

Introduction

Shaterra Smith
Social Science Research Analyst
Division of Quality Improvement Innovation
Models Testing
iQuality Improvement and Innovations Group
Center for Clinical Standards and Quality
Centers for Medicare & Medicaid Services

Welcome!

Agenda

- Introduction
- Today's topic: From HRO to Resiliency Engineering – The Future of Patient Safety
- Presenter:
  - **Dr. Oren Guttman**, Jefferson Health
- Open discussion
- Closing remarks

As You Listen, Ponder…

- What impactful actions can you take as a result of the information shared today?
- How are you able to increase engagement within your facilities to ensure a true change in patient safety?
- Based on what you heard today, what activities do you currently have underway that can leverage immediate action over the next 30, 60 or 90 days?

Meet Your Speaker

Oren Guttman, MD, MBA
Edward Asplundh Chief Quality & Patient Safety Officer,
Jefferson Abington Health
Enterprise Vice President for High Reliability & Patient Safety,
Jefferson Health
Associate Professor of Anesthesiology
Sidney Kimmel Medical College

Advancing Patient Safety through Increasing Resiliency & Adaptive Capacity

July 11, 2024

Oren Guttman, MD, MBA

Ed Asplundh Chief Quality & Pt Safety Officer, Jefferson Abington Health

Enterprise Vice President for High Reliability & Patient Safety, Jefferson Health

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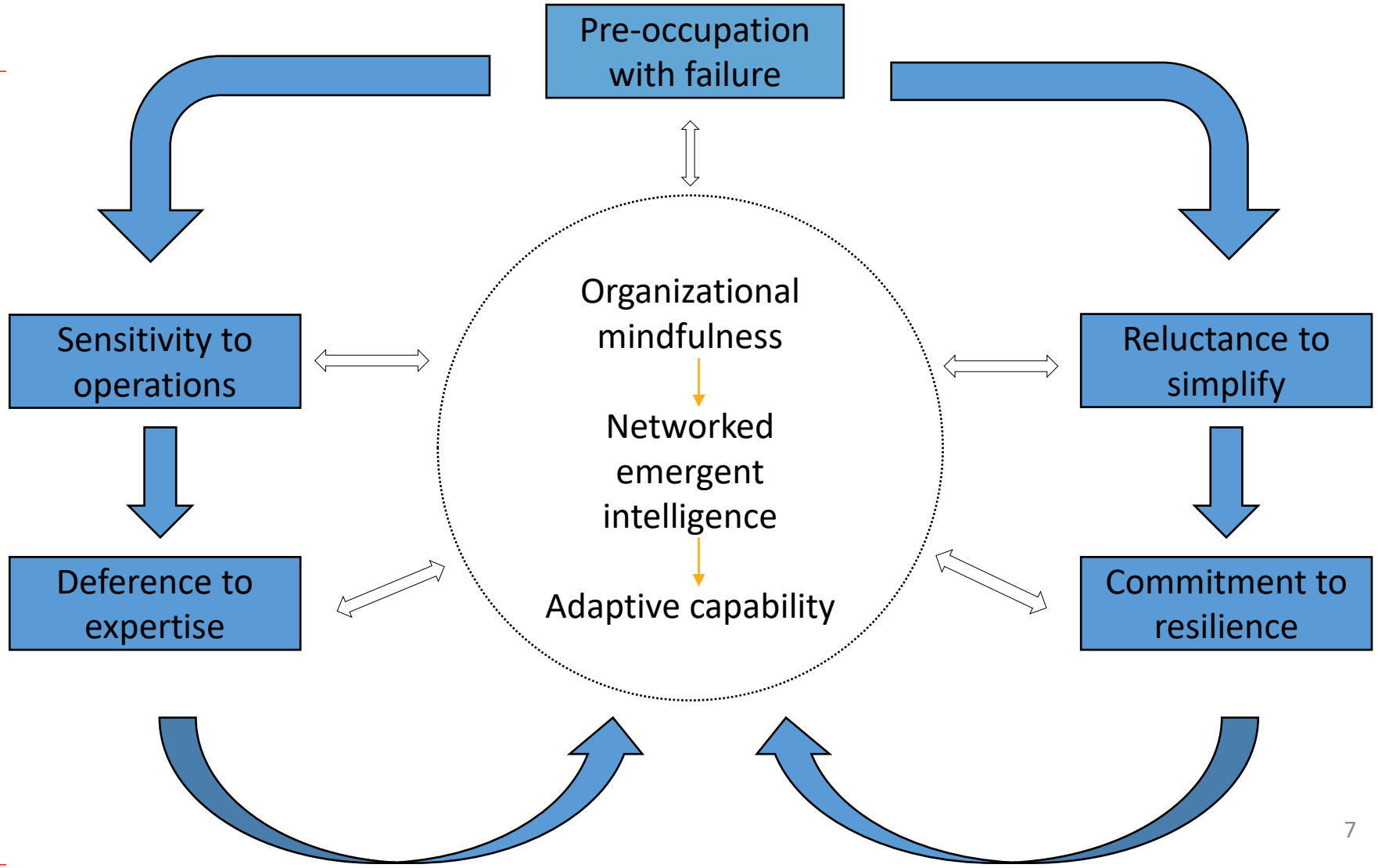
High-reliability organization → Organizing

Resiliency Adaptive Capability



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High-reliability organization → Resiliency engineering

- High reliability is not a destination, it's an ongoing journey to increase ***adaptive capability and resiliency.***
- Resiliency is the answer in complex systems that need to manage uncertainty.
  - Situational awareness…focus on small signals and mindfulness.
  - Avoidance of complacency…continuously need to organize.
  - Need to adapt, improvise and be agile.
  - Connective intelligence…property of the system, not of its parts.

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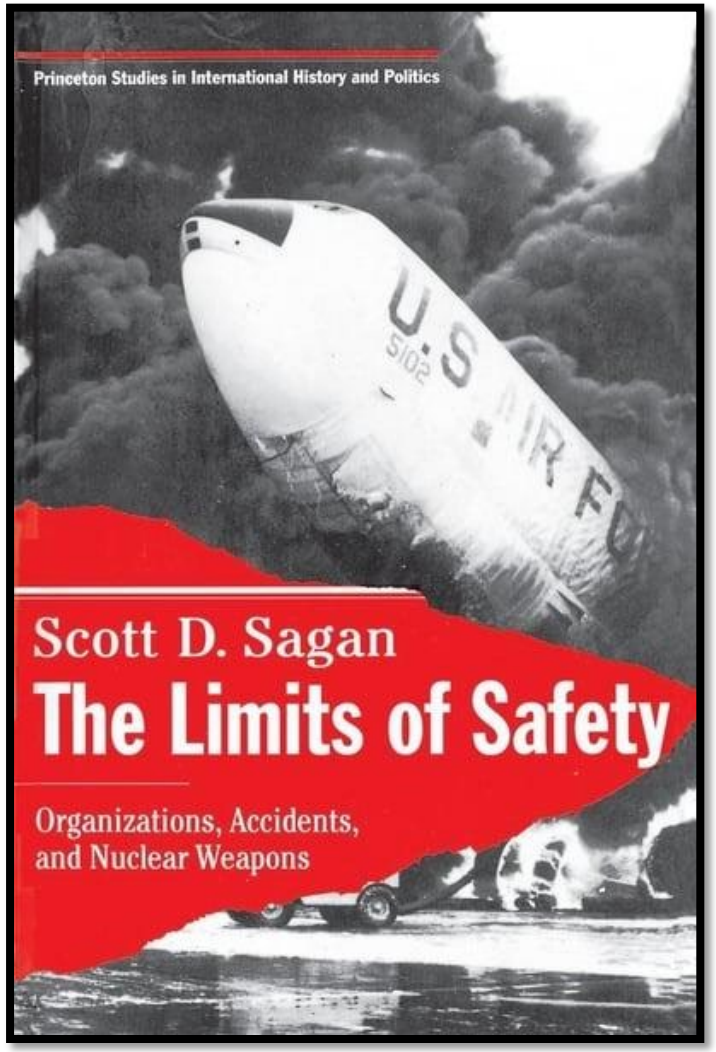
Evolution of patient safety thinking

Things that never happened before, happen all the time."

- Scott D. Sagan "The Limits of Safety"

Because things that never happened before, happen all the time," *system reliability has limits...and so focusing only on system reliability will fail to create system safety.*



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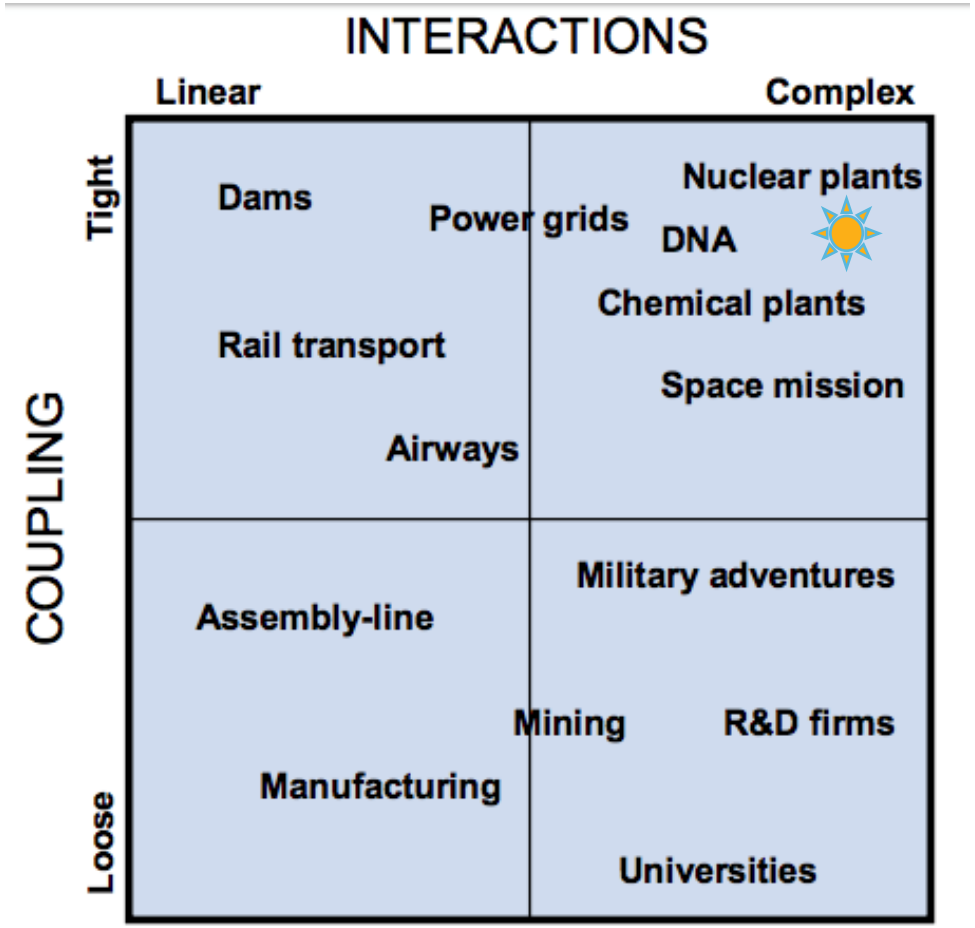
Why reliability alone won't work in health care delivery



- ✓ Human behavior: Non-linear, variable, interdependent, performance dampening
- ✓ Information: Hidden, siloed, inferred, complex, indirectly accessed
- ✓ Rules & context: Fluctuating parts, changing conditions and unforeseen connectivity
- ✓ Resources: Limitations, time constraints

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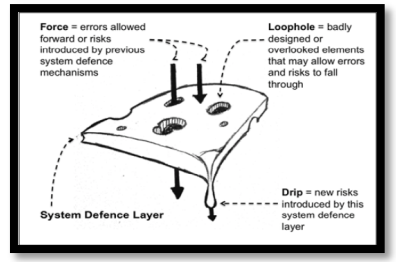
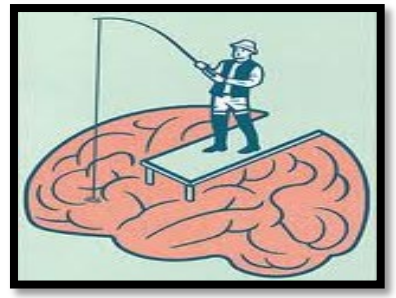
Resilience Engineering: New directions for measuring and maintaining safety in complex systems
Final Report December 2008 Sidney Dekker, Erik Hollnagel, David Woods and Richard Cook

Healthcare has irreducible complexity

- **System complexity:**
  - Pieces of the system interacting in unanticipated ways.
  - Dependency of different parts of the system on each other.
  - Coupling: one part of the system can't act without another, inter-dependence.
  - Resonance: risks are additive in a non-linear way.
  - Emergence: risks appear with scarcity.
  - Drip: safeguards themselves can be risks.
  - Human limitations in capability and capacity to do work.
  - Humans naturally drift or make micro-adjustments to account for failing systems (Safety 3, Anti-fragility).





Resiliency, not just reliability

"In complex environments (i.e. where WAD is not WAI), resilience often spells success, while even the most brilliantly engineered fixed solutions are often insufficient or counterproductive."

- Gen. Stanley McChrystal *Team of Teams, 2015*

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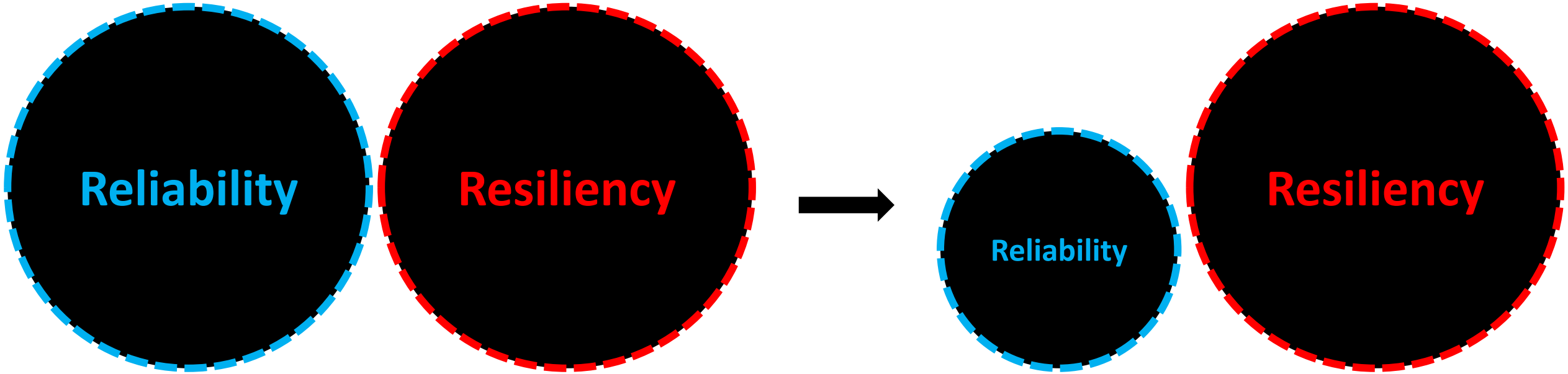
Managing system complexity requires increasing our adaptive capacity to respond and increasing system resiliency



More focus going forward

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Three types of resiliency

Human resiliency

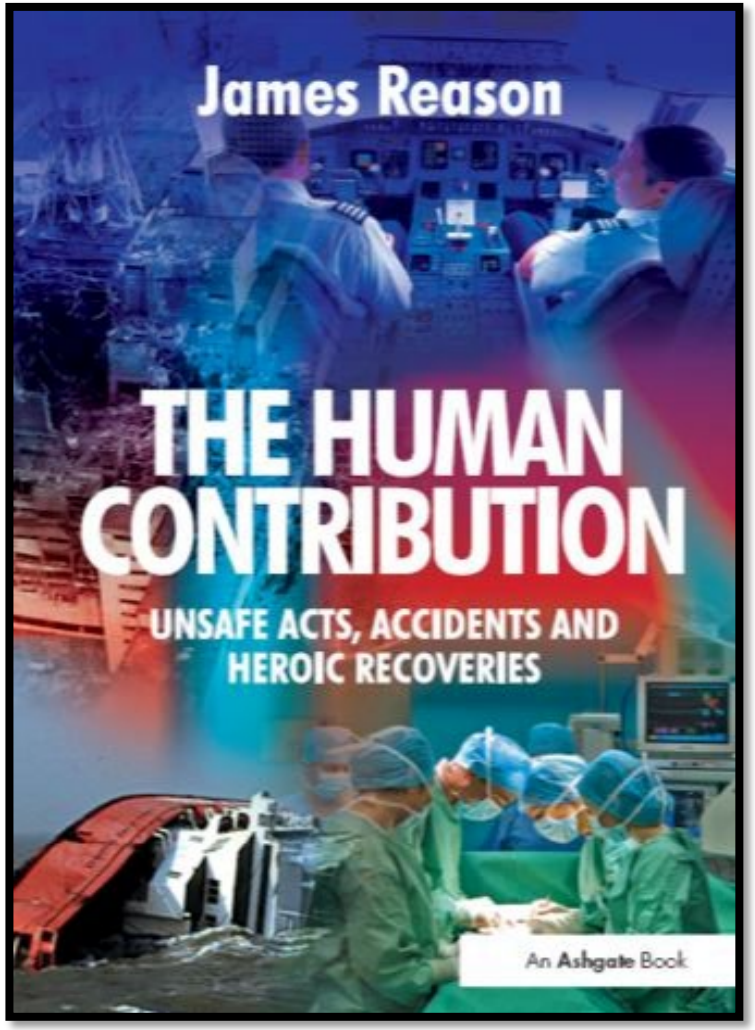
Process resiliency

Training resiliency

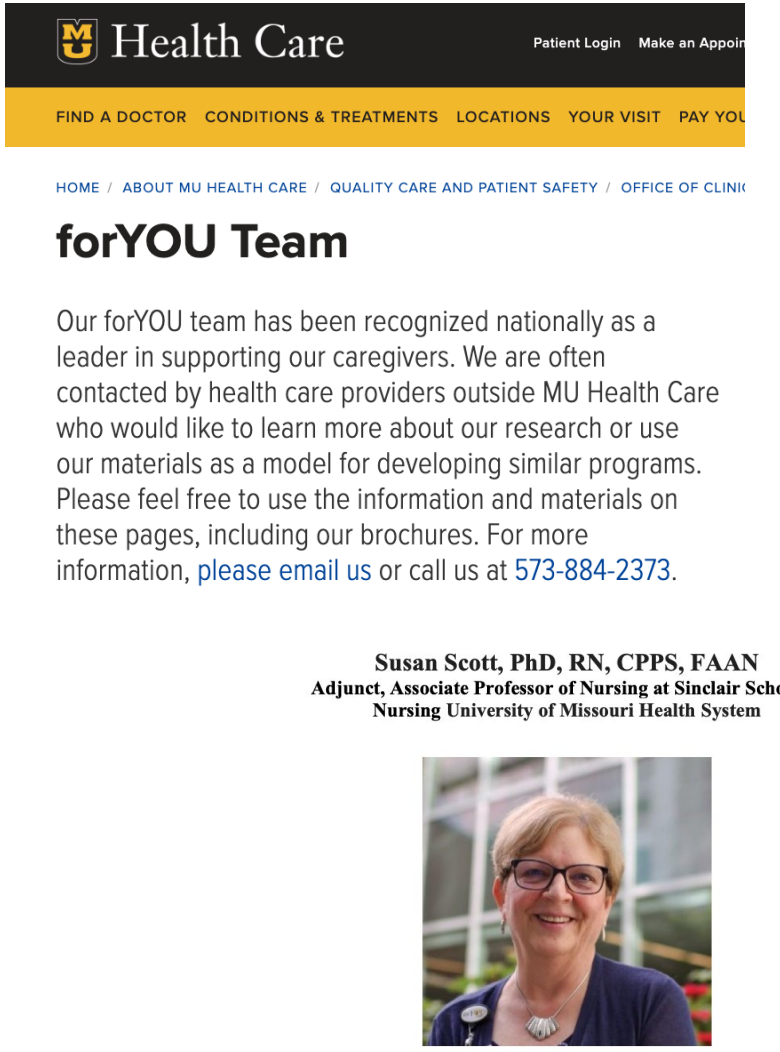
Humans are a source of system resilience

Humans are a part of the socio-technical system that is healthcare.

Their ability to recognize errors, adapt and compensate from errors turning into failure, to rescue and adjust is key to ***System Resiliency***, which enables the system to reach its outcomes.



Proactive care of the care giver—Missouri Model



- Psychological First Aid
- Resiliency In Stress Events (RISE) team
- Proactive reach out of team trained for front-line clinicians involved in safety events (Missouri Model)
- Protocolized reach out for critical events (i.e., neonatal death, suicide attempt, etc.)
- Enabled referral of colleagues to Psychological First Aid Trained Staff through our event reporting platform
- 300% increase in two years in utilization of these resources changing from reactive to proactive

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Gamification: Fun at work increases resiliency!

Recognize and reward

Wheel of names: https://wheelofnames.com/

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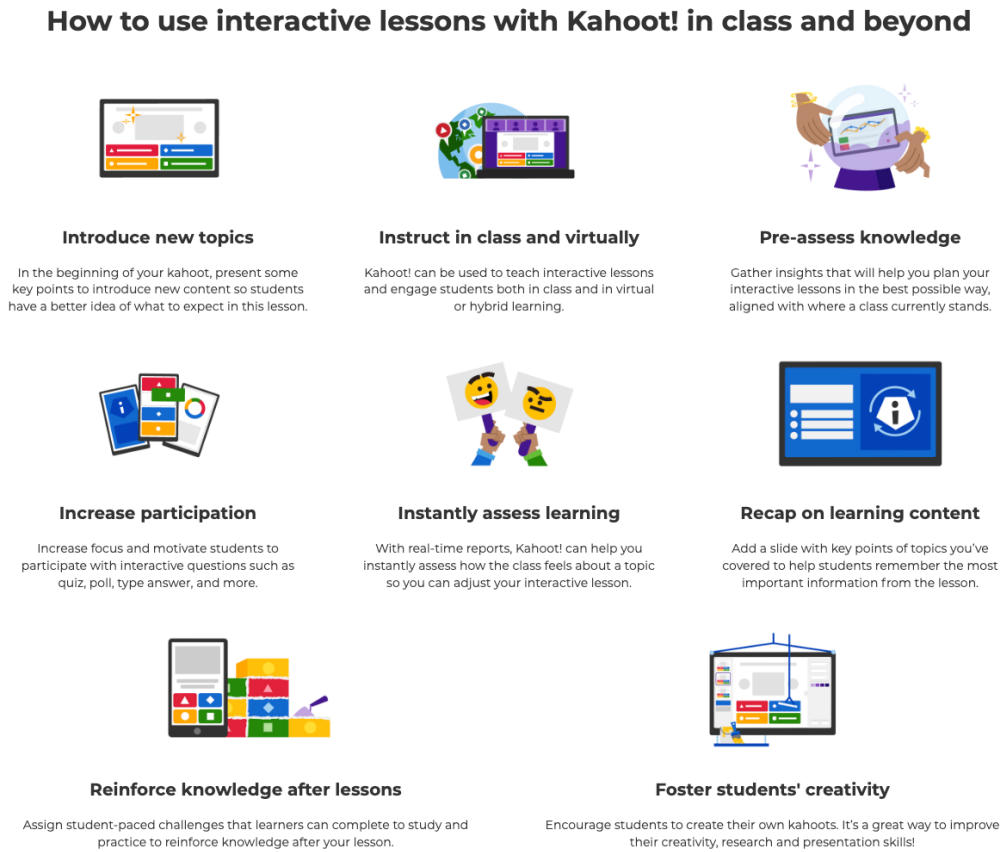
Gamification



- Focus on context to reduce rule-based errors
- Leverage competition
- Kahoot

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Three types of resiliency

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Process resiliency

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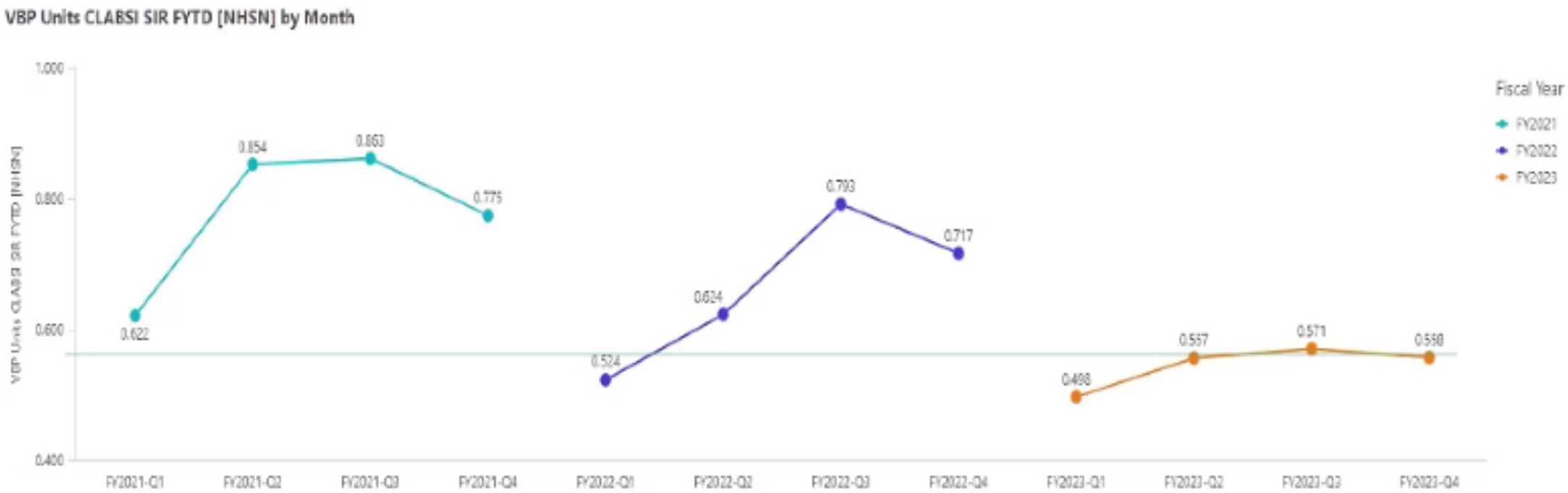
CLABSI: Sustaining Improvement



48
Less infections

$3.6M
Cost avoidance

CLABSI Cost per Case: $75K average
Observed CLABSIs: 135 | Expected CLABSIs: 182
(Jefferson EPIC Hospitals)

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Clinical risk mitigation teams

Goal is to add more resources to areas that reach saturation and overload

- Proactive teams that round to reduce clinical risk
- Units with higher risk
- Support for staff
- CLABSI: Support a CHG Bath
- CAUTI: Remove a Foley
- FALLS: Toilet a patient
- HAPI: Turn a patient

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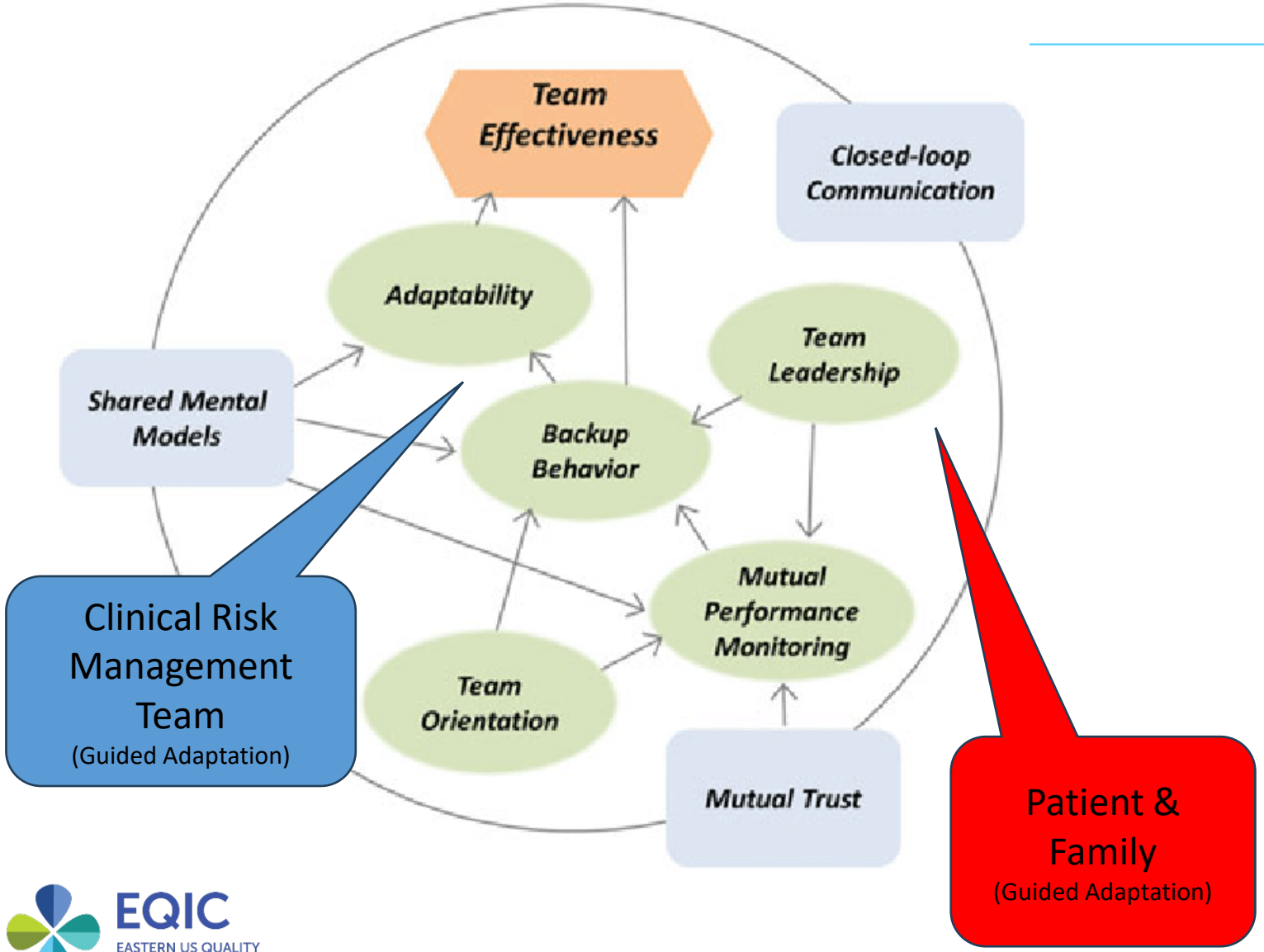
Redundancy—clinical risk mitigation teams



Enabling Redundancy

- Interprofessional Team rounds on units with more lines
- Utilizes data to go to units with more line utilization
- Chlorhexidine gluconate (CHG)
- Pull Femoral Lines
- Help with 2 person dressing change

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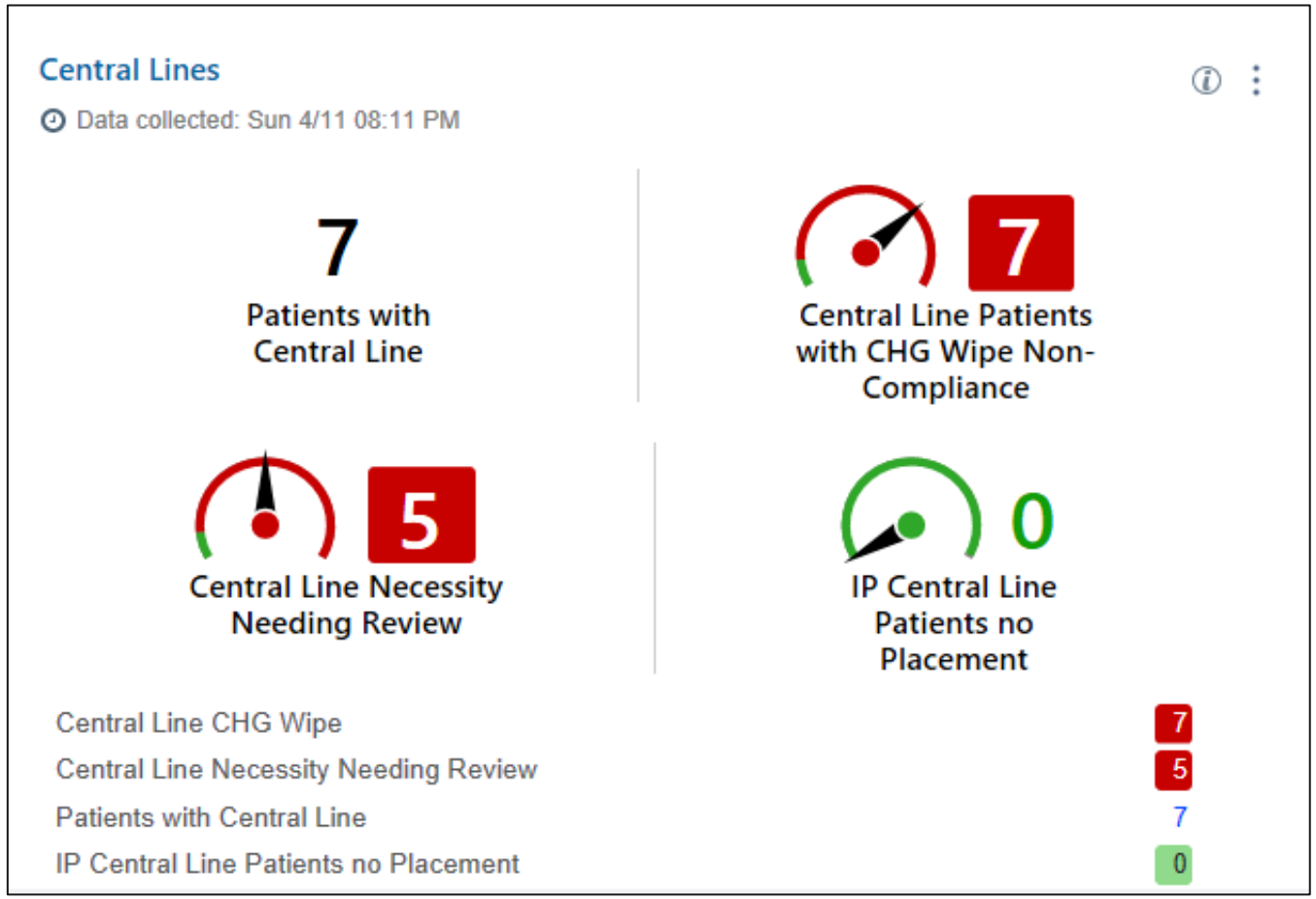
Robustness—daily safety sweep AM & PM huddle



Enabling Robustness

- Ability to withstand small or moderate disturbances without failing or degrading significantly
- Real time data (30 min refresh)
- Preventing omission error (No CHG, No Dressing change, Fem Line)→ from becoming failure (CLABSI)
- Containing failure from spreading (Line SEPSIS)

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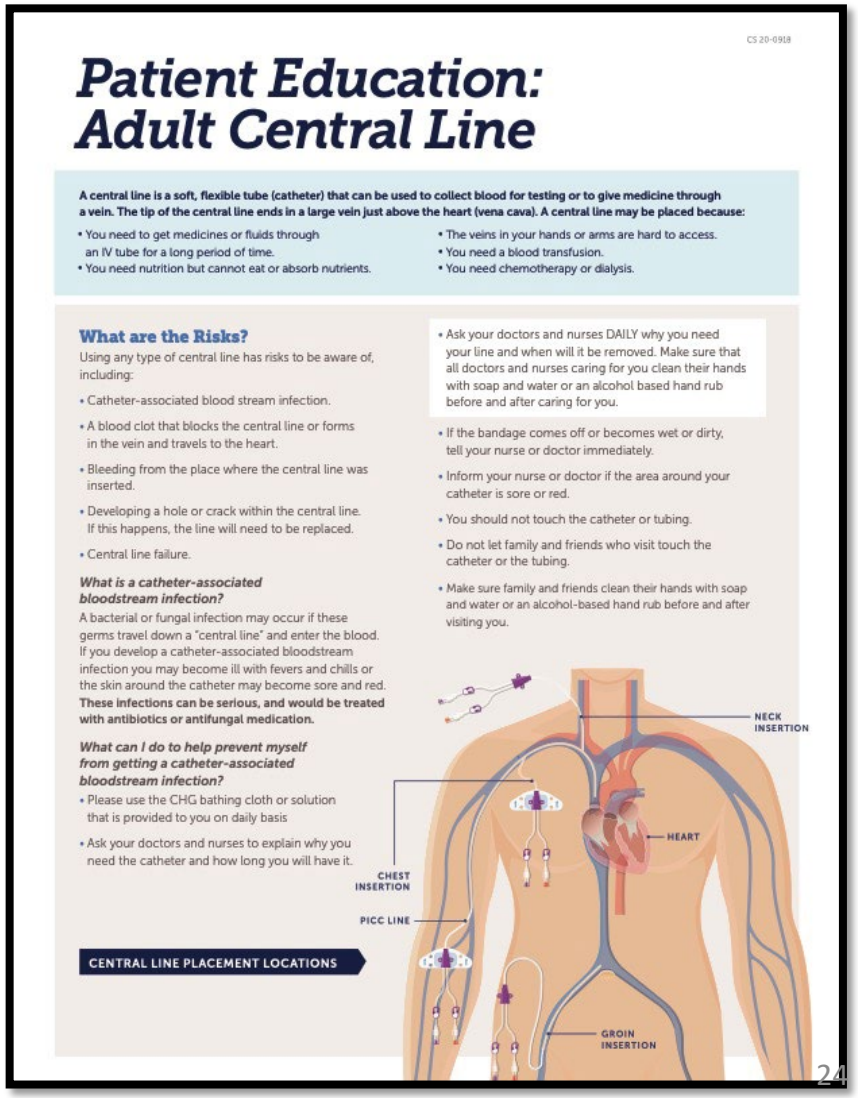
Leverage patients and families in rescue

- Ask your doctors and nurses DAILY why you need your line and when will it be removed. Make sure that all doctors and nurses caring for you clean their hands with soap and water or an alcohol based hand rub before and after caring for you.



CS 20-0918

Patient Education: Adult Central Line

A central line is a soft, flexible tube (catheter) that can be used to collect blood for testing or to give medicine through a vein. The tip of the central line ends in a large vein just above the heart (vena cava). A central line may be placed because:

- You need to get medicines or fluids through an IV tube for a long period of time.
- You need nutrition but cannot eat or absorb nutrients.
- The veins in your hands or arms are hard to access.
- You need a blood transfusion.
- You need chemotherapy or dialysis.

What are the Risks?

Using any type of central line has risks to be aware of, including:

- Catheter-associated blood stream infection.
- A blood clot that blocks the central line or forms in the vein and travels to the heart.
- Bleeding from the place where the central line was inserted.
- Developing a hole or crack within the central line. If this happens, the line will need to be replaced.
- Central line failure.

What is a catheter-associated bloodstream infection?

A bacterial or fungal infection may occur if these germs travel down a "central line" and enter the blood. If you develop a catheter-associated bloodstream infection you may become ill with fevers and chills or the skin around the catheter may become sore and red. **These infections can be serious, and would be treated with antibiotics or antifungal medication.**

What can I do to help prevent myself from getting a catheter-associated bloodstream infection?

- Please use the CHG bathing cloth or solution that is provided to you on daily basis
- Ask your doctors and nurses to explain why you need the catheter and how long you will have it.
- Ask your doctors and nurses DAILY why you need your line and when will it be removed. Make sure that all doctors and nurses caring for you clean their hands with soap and water or an alcohol based hand rub before and after caring for you.
- If the bandage comes off or becomes wet or dirty, tell your nurse or doctor immediately.
- Inform your nurse or doctor if the area around your catheter is sore or red.
- You should not touch the catheter or tubing.
- Do not let family and friends who visit touch the catheter or the tubing.
- Make sure family and friends clean their hands with soap and water or an alcohol-based hand rub before and after visiting you.

CENTRAL LINE PLACEMENT LOCATIONS

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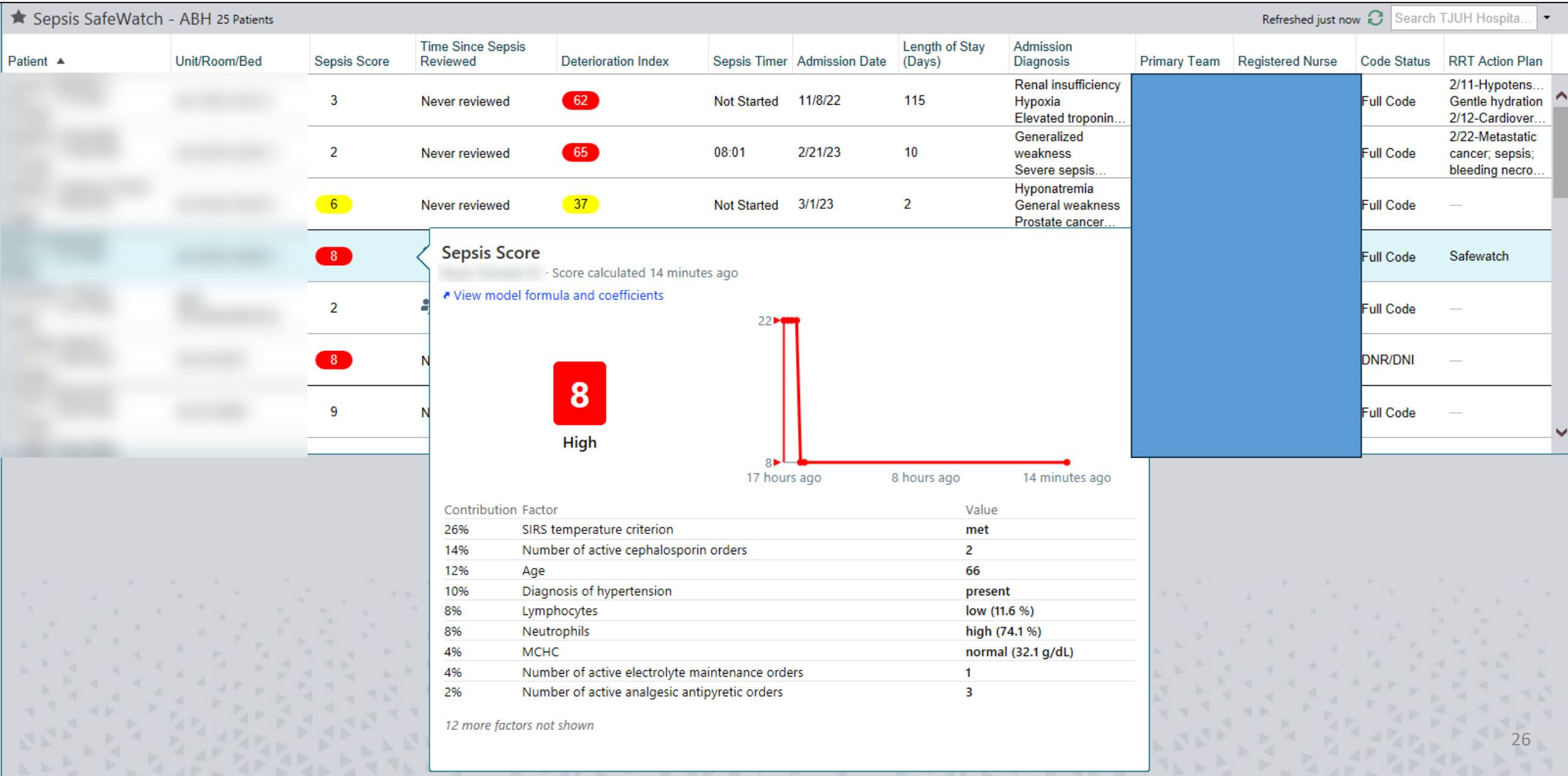
Create a safe night “watcher” program

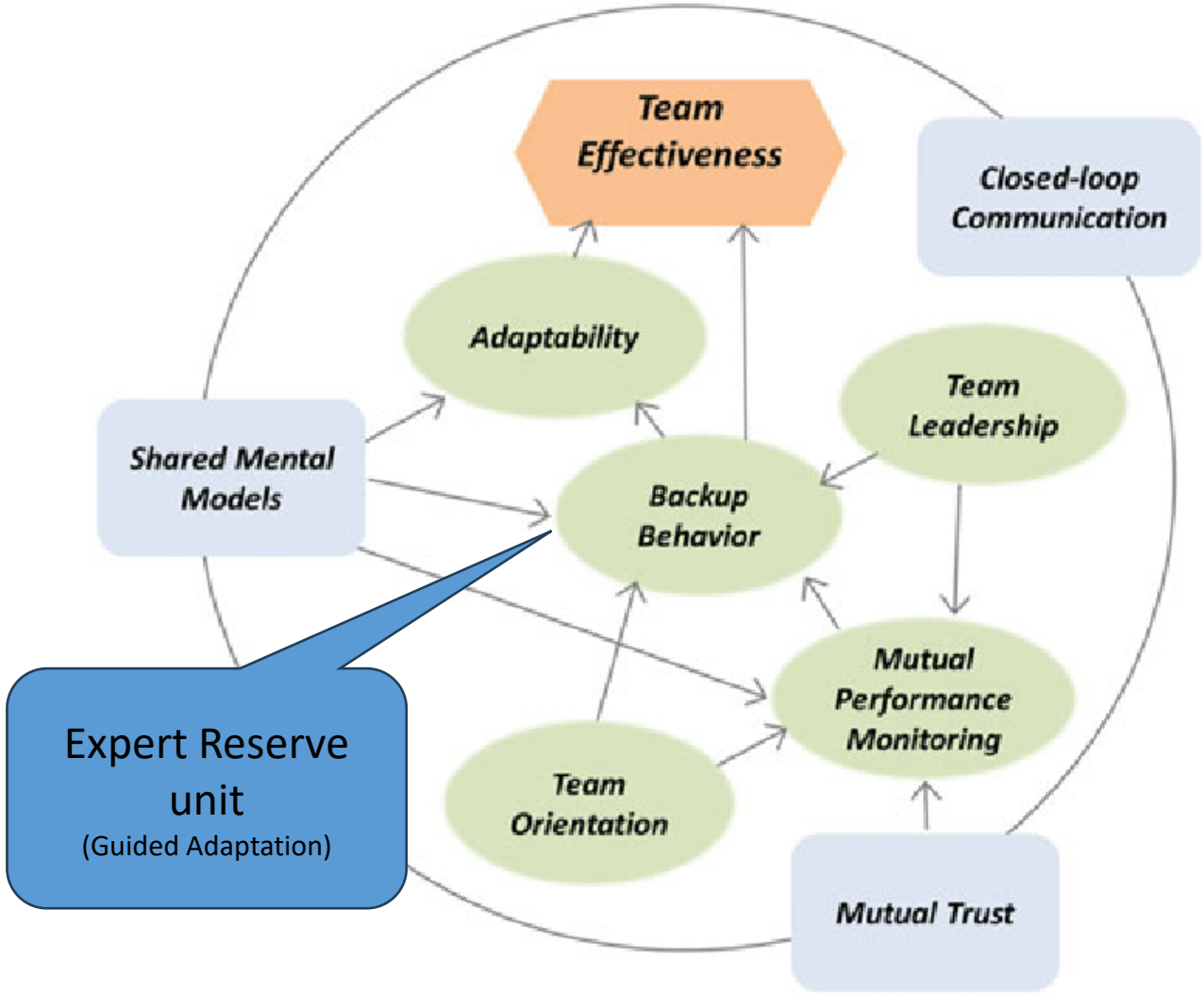
- Evidence-based system to identify risk overnight
  - One study: The observed/ expected mortality ratio fell from 1.04 to 0.76.
- At sign out, patients are determined to be watchers in the EMR
- At midnight, a clinical team reviews in person all watcher patients
- Mitigate clinical risk in real time

https://patientsafety.pa.gov/psj/Pages/2020-3-5.aspx

Sepsis safe watch program



Resilience—expert “reserve” unit



Enabling Rescue

- Embedded expertise
- Designating a specific unit with “super users” experts available for consultation
- Available for questions
- Just in Time application support

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Unit-based practices to advance resiliency

Unit-based resiliency

- Buddy systems
- Cross-unit rounding
- Geographic modeling
- Unit group chat

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Three types of resiliency

Human resiliency

Process resiliency

Training resiliency

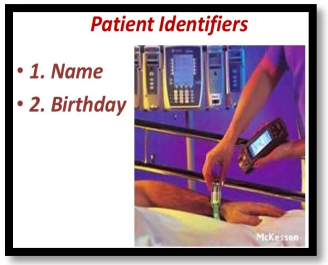
Resiliency engineering in training

System reliability

Error avoidance

Redundancy

Forced functions



Constraints

Prevent errors

System resiliency

Error management

Rescue

Restrict

Reverse

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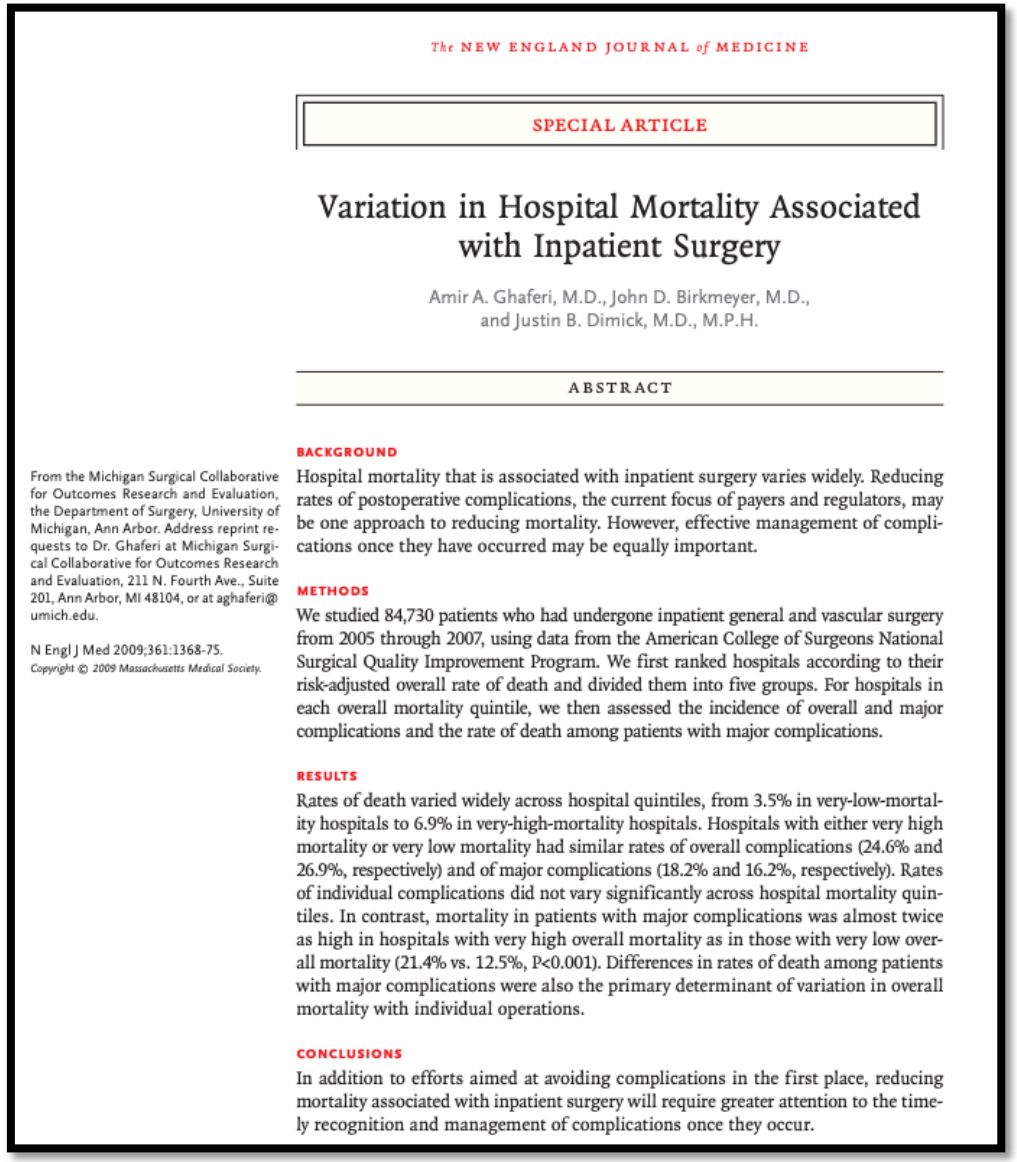
Resiliency is about rescue

Resiliency

- Same complication rates
- Different surgical outcomes
- Attributed to the ability to ***rescue*** patients from complications



The NEW ENGLAND JOURNAL of MEDICINE

SPECIAL ARTICLE

Variation in Hospital Mortality Associated with Inpatient Surgery

Amir A. Ghaferi, M.D., John D. Birkmeyer, M.D., and Justin B. Dimick, M.D., M.P.H.

From the Michigan Surgical Collaborative for Outcomes Research and Evaluation, the Department of Surgery, University of Michigan, Ann Arbor. Address reprint requests to Dr. Ghaferi at Michigan Surgical Collaborative for Outcomes Research and Evaluation, 211 N. Fourth Ave., Suite 201, Ann Arbor, MI 48104, or at aghaferi@umich.edu.

N Engl J Med 2009;361:1368-75.

ABSTRACT

BACKGROUND

Hospital mortality that is associated with inpatient surgery varies widely. Reducing rates of postoperative complications, the current focus of payers and regulators, may be one approach to reducing mortality. However, effective management of complications once they have occurred may be equally important.

METHODS

We studied 84,730 patients who had undergone inpatient general and vascular surgery from 2005 through 2007, using data from the American College of Surgeons National Surgical Quality Improvement Program. We first ranked hospitals according to their risk-adjusted overall rate of death and divided them into five groups. For hospitals in each overall mortality quintile, we then assessed the incidence of overall and major complications and the rate of death among patients with major complications.

RESULTS

Rates of death varied widely across hospital quintiles, from 3.5% in very-low-mortality hospitals to 6.9% in very-high-mortality hospitals. Hospitals with either very high mortality or very low mortality had similar rates of overall complications (24.6% and 26.9%, respectively) and of major complications (18.2% and 16.2%, respectively). Rates of individual complications did not vary significantly across hospital mortality quintiles. In contrast, mortality in patients with major complications was almost twice as high in hospitals with very high overall mortality as in those with very low overall mortality (21.4% vs. 12.5%, P<0.001). Differences in rates of death among patients with major complications were also the primary determinant of variation in overall mortality with individual operations.

CONCLUSIONS

In addition to efforts aimed at avoiding complications in the first place, reducing mortality associated with inpatient surgery will require greater attention to the timely recognition and management of complications once they occur.

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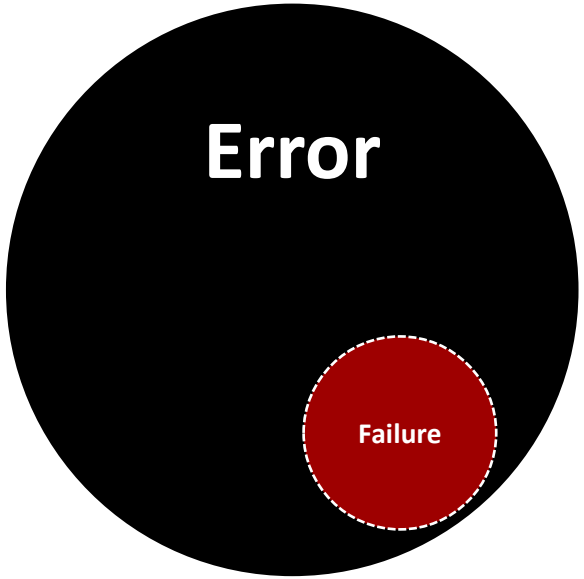
Rescue errors from becoming failures



- The ability to recover, “bounce back” and sustain required operations under both expected and unexpected conditions.
- Property of the *relationships among components* rather than in the components themselves.
- Something a system *does* rather than something a system *has*.
- Very much a result of human expertise, not experience, in recognizing error, rescuing error from turning into failure and containing the effects of failure.

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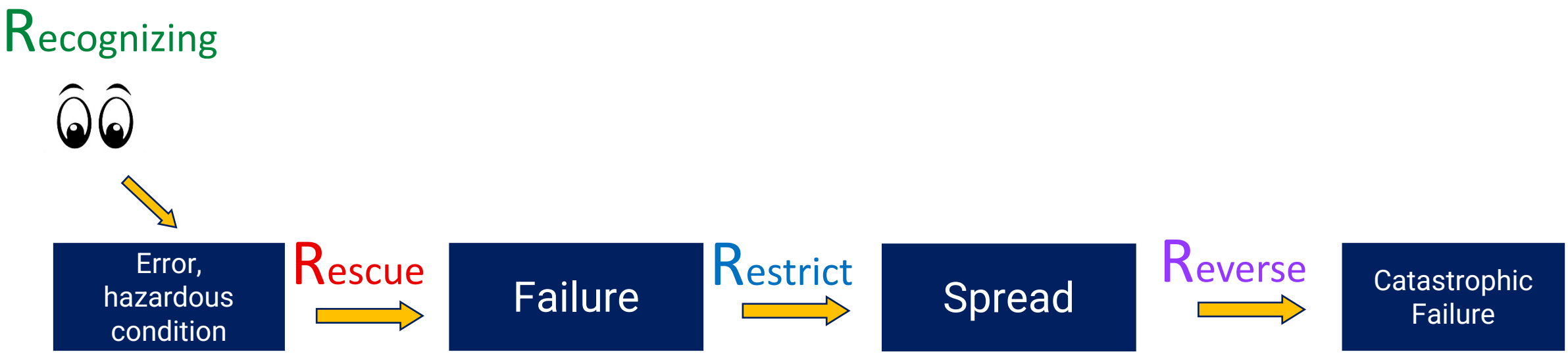
Resilience Engineering: New directions for measuring and maintaining safety in complex systems
Final Report December 2008 Sidney Dekker, Erik Hollnagel, David Woods and Richard Cook

Resiliency engineering and 4 Rs



Early Recognition and Rescue are the key to advancing safety in complex systems

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Error management training

- A learning strategy where the learner focuses on correct actions and does not pay much attention to error recognition.
- Examples of this are sequential, step-by-step instructions or conventional tutorials.
- This approach aims to eliminate errors before they occur by placing barriers (forced functions, two-step verification, redundancy of critical resources, checklists) between steps that contribute to an error.
- In this model, errors are dealt with mostly after they have occurred, where recovery may or may not be discussed at all, and if so, is only focused on in relation to cataclysmic errors.
- Weaknesses:
  - Learners receive little training on how to recognize they are getting close to making errors or actual errors.
  - Learners receive little support in rescuing from failure and/or containing error.

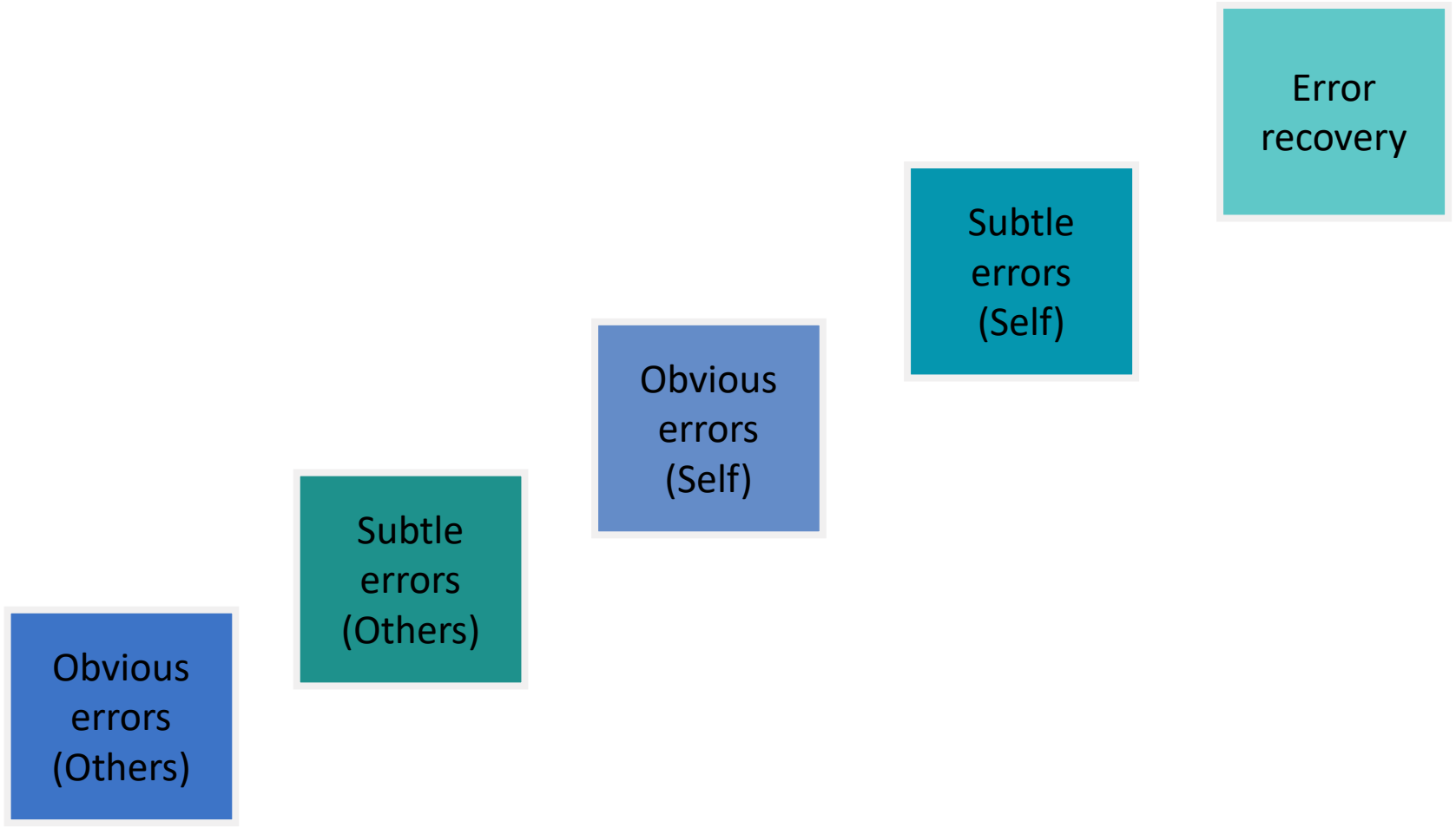
Error management theory

- EMT is a brain-based learning strategy that utilizes active exploration and explicit encouragement of learners to make errors during training as an approach to more successful and resilient long-term learning.
- It sensitizes learners to what leads to error and what error looks like in its various forms so it can be recognized earlier, faster and more efficiently.
- Enables a framework to rescue error → failure and how to contain failure.
- This theory exploits the fact that learners are motivated to understand and learn from their mistakes.

Error management theory cont'd

- Learning strategy that promises to improve long-term retention, emotional resiliency and contextualization of learning.
- Rather than avoid errors, learners are asked to embrace errors as part of the initial events of learning.
- Learners are asked to understand what "wrong" is or identify errors, ***error recognition***, and how best to manage the error, or ***error recovery.***
- ***Increases Level 3 Situational Awareness (Projection, Anticipation)***

Error management learning paradigm



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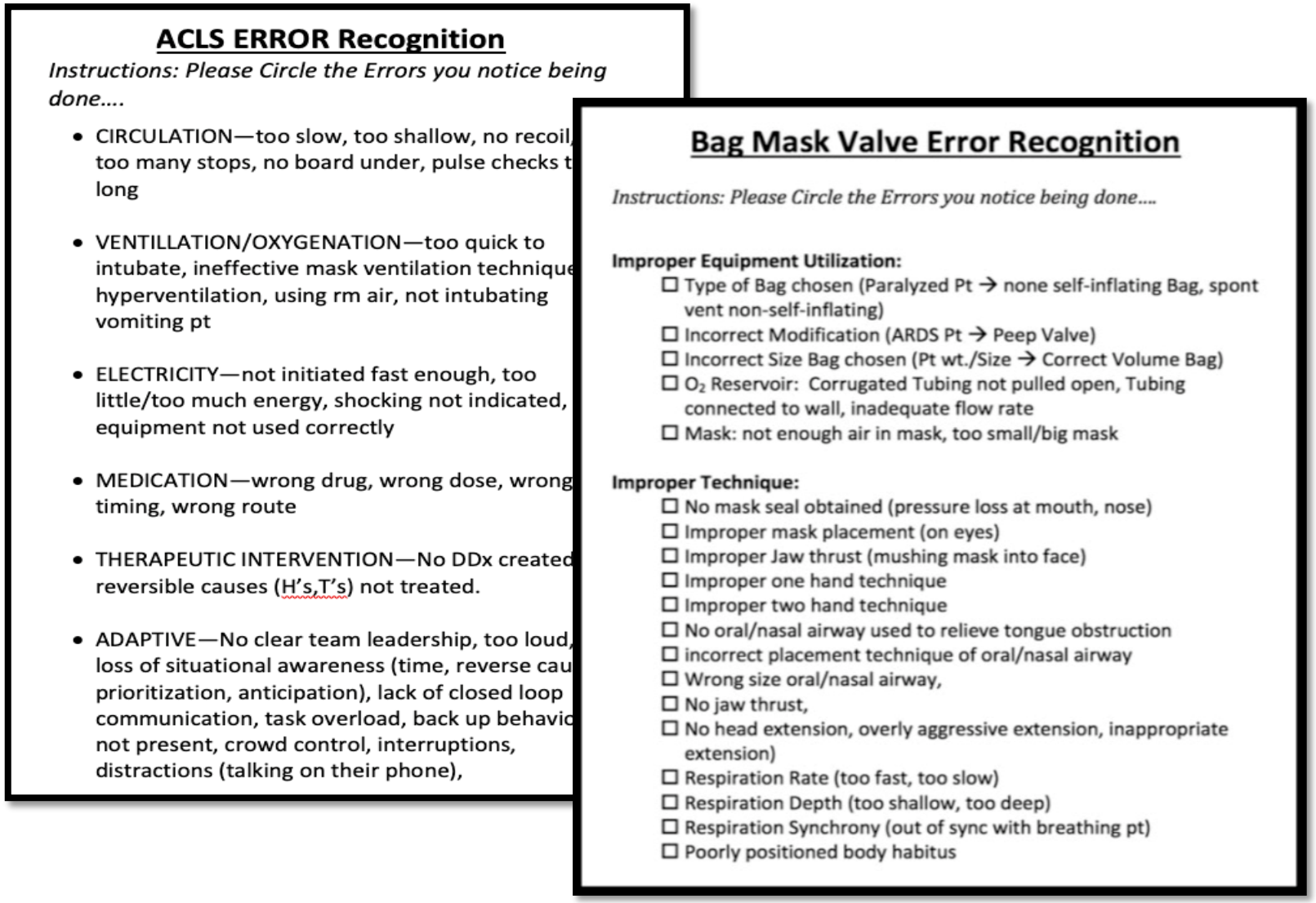
Dror I. Medical Teacher, 2011, 33:1, 34-38

EMT: Practical approach

- Just-in-time videos
- Simulation
- EMT checklist
  - obvious errors
  - subtle errors
- Recognition and rescue
- Contain



ACLS ERROR Recognition

Instructions: Please Circle the Errors you notice being done….

- CIRCULATION—too slow, too shallow, no recoil, too many stops, no board under, pulse checks t long
- VENTILLATION/OXYGENATION—too quick to intubate, ineffective mask ventilation technique hyperventilation, using rm air, not intubating vomiting pt
- ELECTRICITY—not initiated fast enough, too little/too much energy, shocking not indicated, equipment not used correctly
- MEDICATION—wrong drug, wrong dose, wrong timing, wrong route
- THERAPEUTIC INTERVENTION—No DDx created reversible causes (H's,T's) not treated.
- ADAPTIVE—No clear team leadership, too loud, loss of situational awareness (time, reverse cau prioritization, anticipation), lack of closed loop communication, task overload, back up behavio not present, crowd control, interruptions, distractions (talking on their phone),

Bag Mask Valve Error Recognition

Instructions: Please Circle the Errors you notice being done….

Improper Equipment Utilization:

- ☐ Type of Bag chosen (Paralyzed Pt → none self-inflating Bag, spont vent non-self-inflating)
- ☐ Incorrect Modification (ARDS Pt → Peep Valve)
- ☐ Incorrect Size Bag chosen (Pt wt./Size → Correct Volume Bag)
- ☐ O_2 Reservoir: Corrugated Tubing not pulled open, Tubing connected to wall, inadequate flow rate
- ☐ Mask: not enough air in mask, too small/big mask

Improper Technique:

- ☐ No mask seal obtained (pressure loss at mouth, nose)
- ☐ Improper mask placement (on eyes)
- ☐ Improper Jaw thrust (mushing mask into face)
- ☐ Improper one hand technique
- ☐ Improper two hand technique
- ☐ No oral/nasal airway used to relieve tongue obstruction
- ☐ incorrect placement technique of oral/nasal airway
- ☐ Wrong size oral/nasal airway,
- ☐ No jaw thrust,
- ☐ No head extension, overly aggressive extension, inappropriate extension)
- ☐ Respiration Rate (too fast, too slow)
- ☐ Respiration Depth (too shallow, too deep)
- ☐ Respiration Synchrony (out of sync with breathing pt)
- ☐ Poorly positioned body habitus

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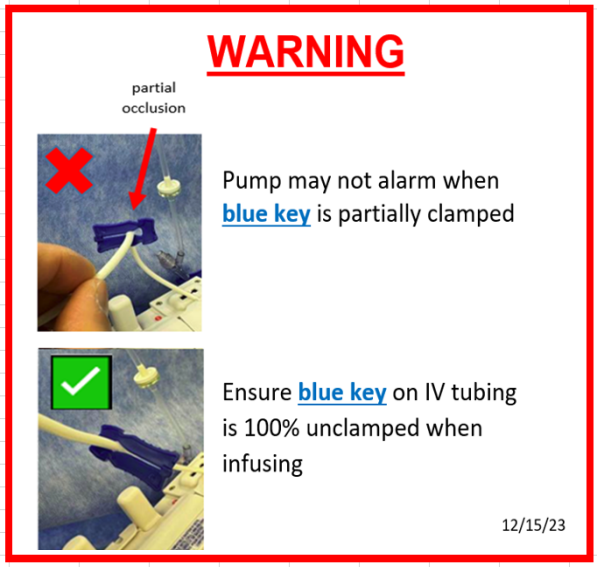
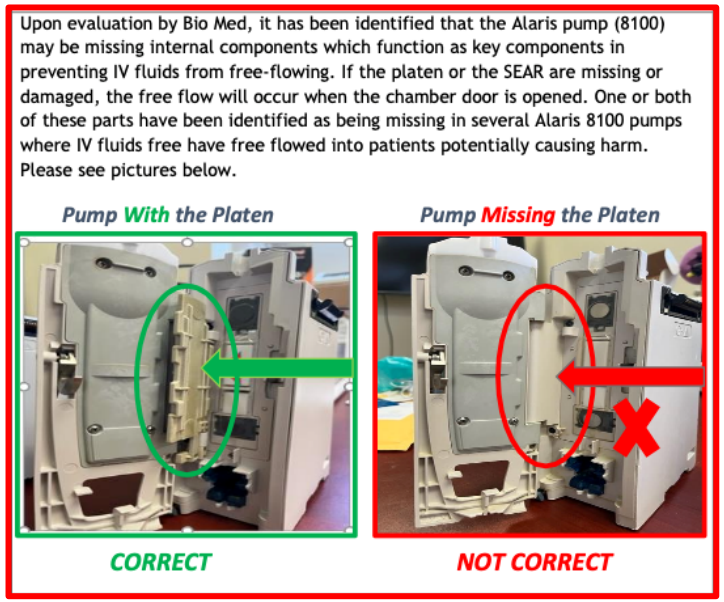
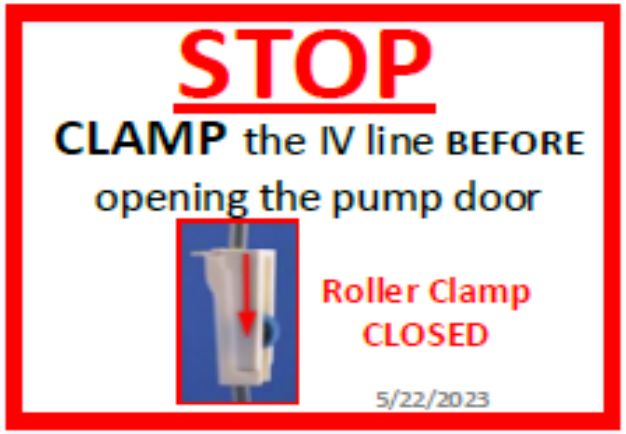
Resiliency in communication

Describe how to Recognize error





Describe how to Rescue from failure



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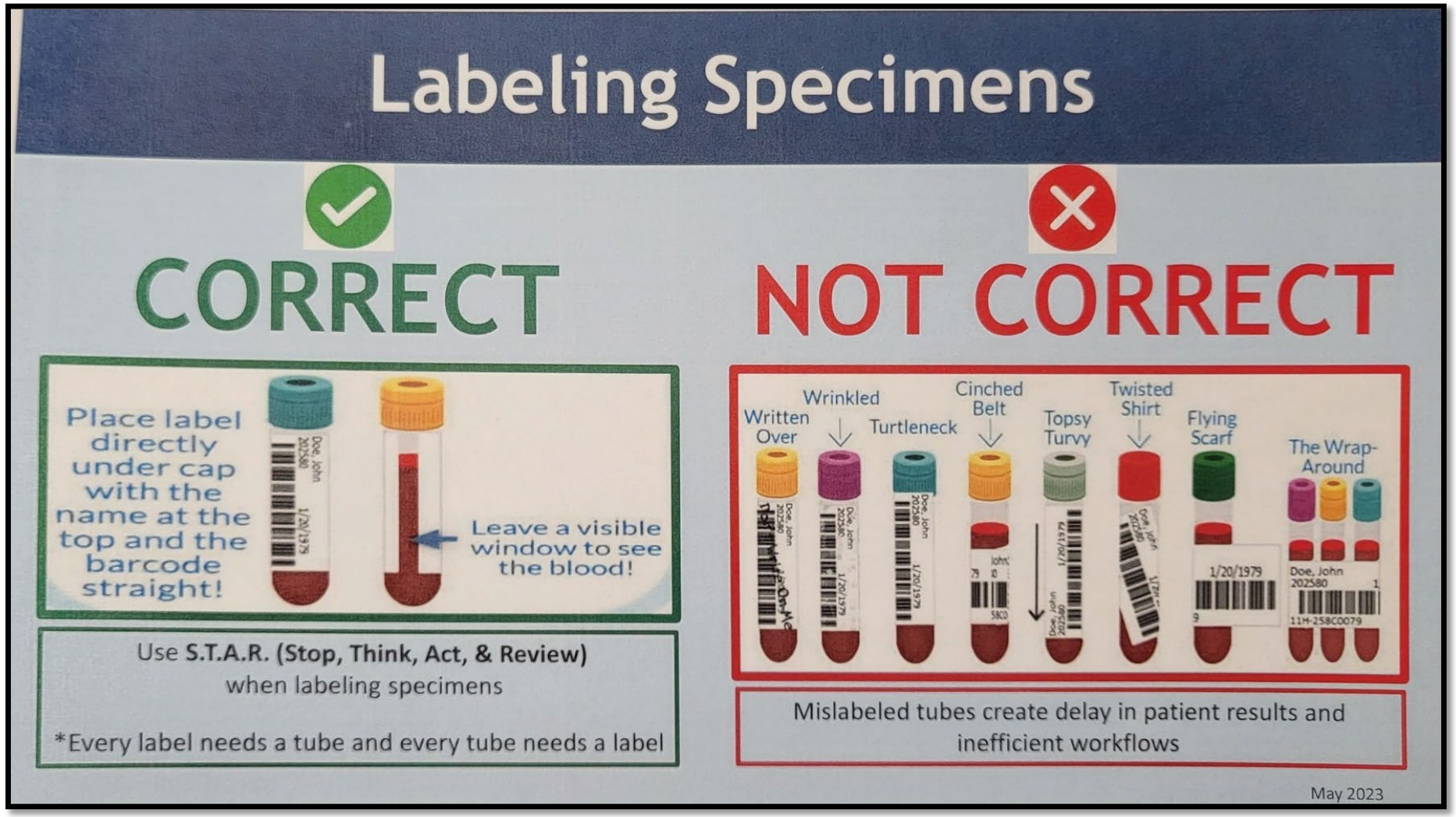
Resiliency in communication



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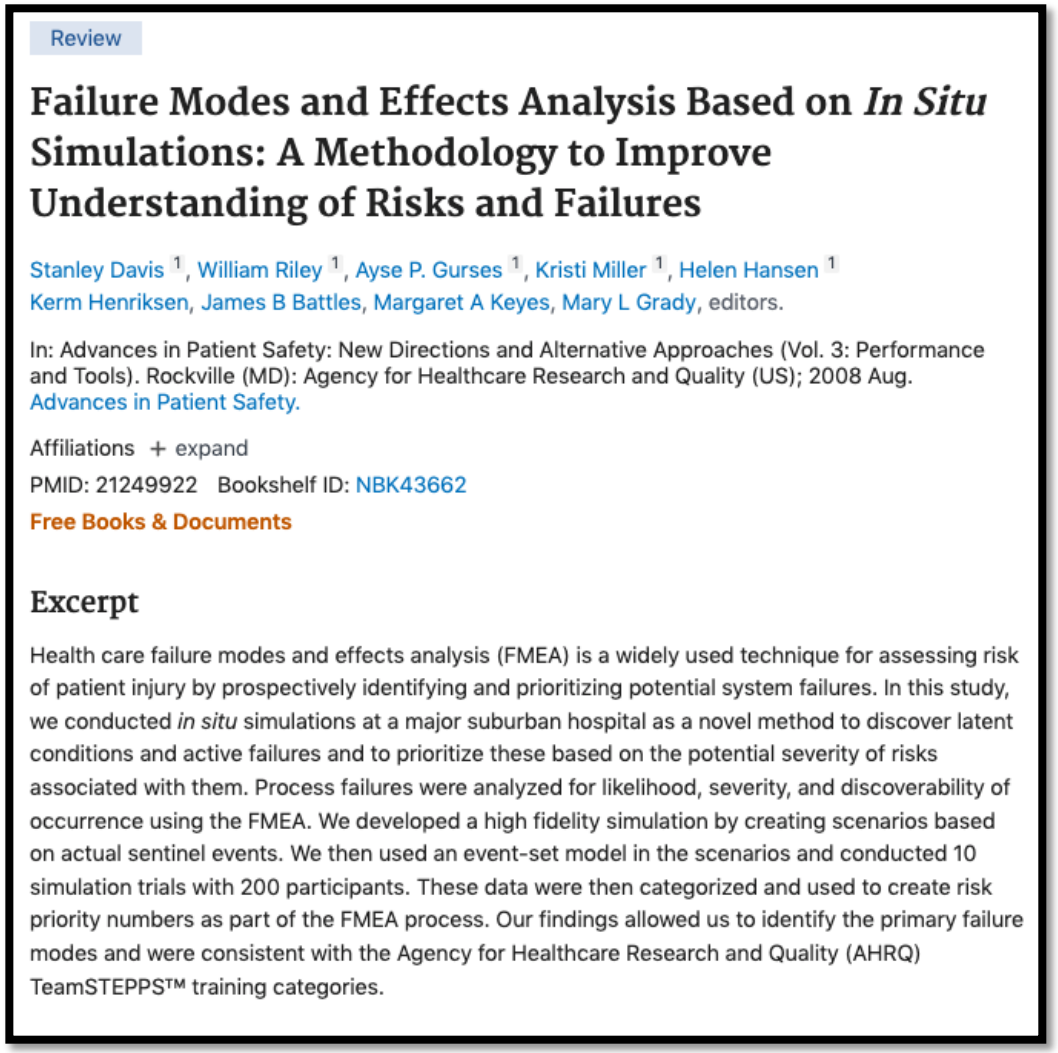
In-situ simulation FMEA

- Pre-occupation with failure by challenging assumptions (work as imagined ‘WAI’ vs work as done ‘WAD’).
- Deference to expertise by utilizing front-line staff as opposed to midlevel or senior leadership.
- Sensitivity to operations (run in the actual environment of care, unearthing more latent safety threats).
- Reluctance to simplify (captures system complexity like emergence and resonance).
- Commitment to resiliency by building in rescue mechanisms.



Review

Failure Modes and Effects Analysis Based on *In Situ* Simulations: A Methodology to Improve Understanding of Risks and Failures

Stanley Davis [1], William Riley [1], Ayse P. Gurses [1], Kristi Miller [1], Helen Hansen [1]
Kerm Henriksen, James B Battles, Margaret A Keyes, Mary L Grady, editors.

In: Advances in Patient Safety: New Directions and Alternative Approaches (Vol. 3: Performance and Tools). Rockville (MD): Agency for Healthcare Research and Quality (US); 2008 Aug.
Advances in Patient Safety.

Affiliations + expand

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Excerpt

Health care failure modes and effects analysis (FMEA) is a widely used technique for assessing risk of patient injury by prospectively identifying and prioritizing potential system failures. In this study, we conducted *in situ* simulations at a major suburban hospital as a novel method to discover latent conditions and active failures and to prioritize these based on the potential severity of risks associated with them. Process failures were analyzed for likelihood, severity, and discoverability of occurrence using the FMEA. We developed a high fidelity simulation by creating scenarios based on actual sentinel events. We then used an event-set model in the scenarios and conducted 10 simulation trials with 200 participants. These data were then categorized and used to create risk priority numbers as part of the FMEA process. Our findings allowed us to identify the primary failure modes and were consistent with the Agency for Healthcare Research and Quality (AHRQ) TeamSTEPPS™ training categories.

Facilitator questions

- What is the downtime procedure for this step? (Actually get out the downtime material and do the step. Note your questions along the way.)
- What is the next step or steps that happen in parallel? (Be granular.)
  - Is there a difference between what we think we will do vs. what we actually will do?
- What are the hazardous or “at-risk” conditions, and current workarounds in place that could quickly fail during downtime and become ”fault” conditions?
- At each process step, ask:
  - How could this downtime step fail?
  - How would we know if this step is failing?
  - What would we do to recover if this step failed?
  - Could we contain failure if necessary?
  - If it is a critical task; is there redundancy built in?

How do we measure resiliency?

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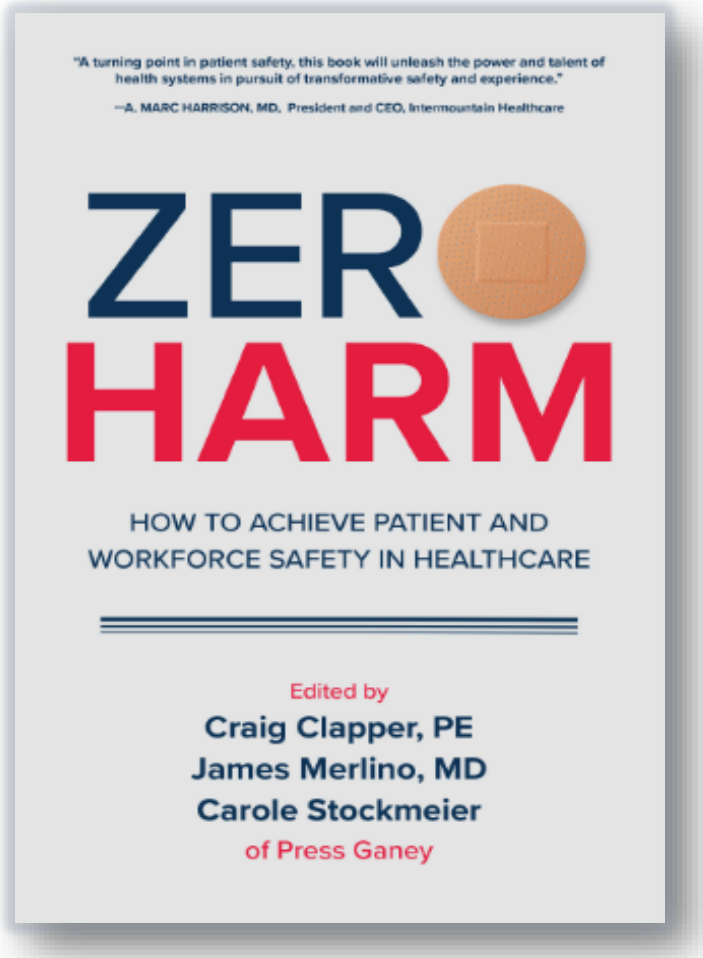
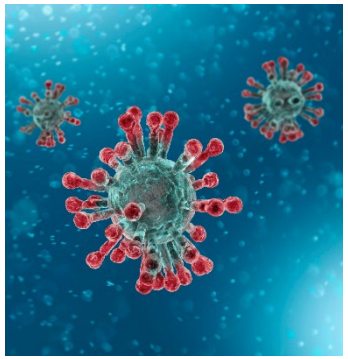
Time to rethink zero…





EDITORIAL

The harms of promoting 'Zero Harm'

Eric J Thomas

McGovern Medical School at The University Texas Health Science Center at Houston, Houston, Texas, USA

Correspondence to
Dr Eric J Thomas, McGovern Medical School at The University Texas Health Science Center at Houston, Houston, TX 77030, USA; eric.thomas@uth.tmc.edu

Accepted 20 September 2019
Published Online First 9 October 2019

In this issue, Amalberti and Vincent[1] ask 'what strategies we might adopt to protect patients when healthcare systems and organizations are under stress and simply cannot provide the standard of care they aspire to'. This is clearly a critical and much overdue question, as many healthcare organisations are in an almost constant state of stress from high workload, personnel shortages, high-complexity patients, new technologies, fragmented and conflicting payment systems, over-regulation, and many other issues. These stressors put mid-level managers and front-line staff in situations where they may compromise their standards and be unable to provide the highest quality care. Such circumstances can contribute to low morale and burn-out.

The authors provide guidance for addressing this tension of providing safe care during times of organisational stress, including principles for managing risk in difficult conditions, examples for managing this tension in other high-risk industries, and a research and development agenda for healthcare. Leaders at all levels of healthcare organisations should read this article.

These authors join others[2] who advise that we should shift our focus from creating absolute safety (meaning the elimination of error and harm) towards doing a better job of actively managing risk. I want to expand on this point to explore how an excessive focus on absolute safety may paradoxically reduce safety.

Striving for absolute safety—often termed 'zero harm'—is encouraged by some consultants, patient safety experts and regulators. Take for example the recently published book, *'Zero Harm: How to Achieve Patient and Workforce Safety in Healthcare'*,[3] edited by three leaders of Press Ganey, a large organisation that works with over 26 000 healthcare organisations with the mission of helping organisations improve patient experience, including improving safety. The book states, 'We will only reduce serious safety events, and improve organizations' overall performance, if every US healthcare system commits to zero harm as a sacred core value' (Harm, p254).[3] The book is commendable for presenting many accepted and effective practices for improving patient safety (many of which do not explicitly seek or argue for zero harm goals). Nine well-known leaders of exemplary US healthcare systems endorse the book. However, when I reflect on the field of patient safety research and my experience as a leader of efforts to improve patient safety, I can identify not only challenges, but potential harms of overemphasising zero harm goals.

Before I discuss these potential harms, I will first review the types of harms in healthcare and point out that some harms are inevitable and impossible to eliminate. This alone should cause reconsideration of zero harm goals. The patient safety movement began with studies that classified harms as either unpreventable or preventable (including negligent) adverse events.[4 5] *Unpreventable harms* include harms that are actually intended and necessary to treat disease—for example, the harm from a surgical incision to remove a ruptured appendix, and harms such as adverse drug reactions in a patient who has never received the medication before, or postoperative complications that we currently do not have the knowledge to prevent. Of course today's unpreventable harm may with more research be tomorrow's preventable harm. But nevertheless, at any given moment in history, there are harms for which we do not have the knowledge to prevent. It is primarily the responsibility of researchers and improvement experts, not the typical clinician or healthcare organisation, to understand how to prevent the unpreventable.

Preventable harms historically included those due to human errors, such as slips and lapses, negligent care, and those for which interventions have been tested and proven effective at preventing them, such as central line bloodstream infections,

Linked

► http://dx.doi.org/10.1136/bmjqs-2019-009443

Check for updates

To cite: Thomas EJ. *BMJ Qual Saf* 2020;**29**:4–6.

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Counting for resiliency…

EDITORIAL

The harms of promoting 'Zero Harm'

Eric J Thomas

McGovern Medical School at The University Texas Health Science Center at Houston, Houston, Texas, USA

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Check for updates

To cite: Thomas EJ. *BMJ Qual Saf* 2020;**29**:4–6.

- Preventative Harm, Not Zero Harm
- Metrics:
  - Days with rescue
  - Utilization metrics
  - Time for system issue resolution
  - # Rescue moments (reassignments)
  - # System fixes
  - Great catches (S-T failures)
  - Great saves (Vigilance & Saves)
  - % GC/Total event reporting
  - Grading of action items

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Questions

Oren Guttman, MD, MBA
Vice President for Patient Safety & High Reliability | Jefferson Health
Ed Asplundh Chief Patient Safety and Quality Officer | Jefferson Health Abington
Associate Professor of Anesthesiology
Sidney Kimmel Medical College
(C) 310-595-6642

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Discussion

- What impactful actions can you take as a result of the information shared today?
- How are you able to increase engagement within your facilities to ensure a true change in patient safety?
- Based on what you heard today, what activities do you currently have underway that can leverage immediate action over the next 30, 60 or 90 days?

Final Thoughts

Join Us for the Next Community of Practice Call!

Join us for the next
Community of Practice Call on August 8, 2024
from 1:00 – 2:00 p.m. ET

We invite you to register at the following link:
https://zoom.us/webinar/register/WN_ASl_l3p_TEyx_VY_YYFFeA

You will receive a confirmation email with login details.

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