Preventing Errors and Harm in Emergency Medicine

ACEP EDDA June 2023

Final

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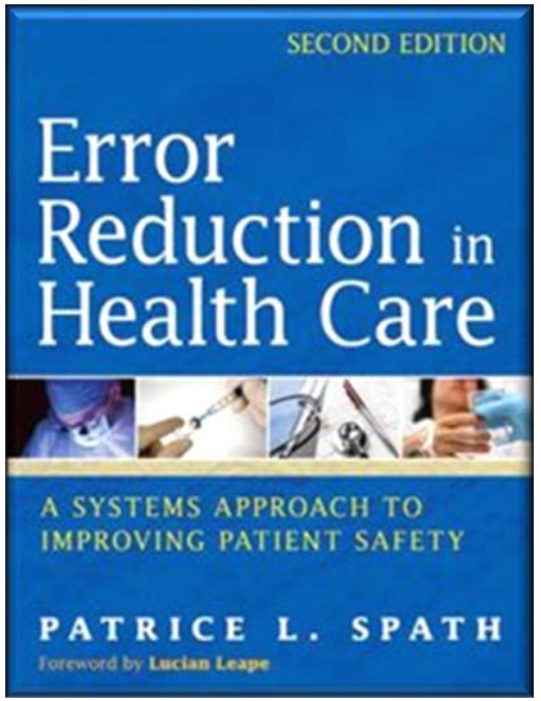
Patient Safety- Error and Harm Reduction Our Objectives:

- **Taking a Systems Approach to Risk Management, Patient Safety, and Harm Reduction..**
- **Error and Harm Proofing – An Overview of a Selection of Studies & Helpful Mental Models…**
- **Highlighting Practical and Field-Tested Strategies & Tactics…**



To Start, Lets Admit That We Work In A Challenging Environment…

There are Significant Patient Safety Challenges In Our Practices…

Sources of Error in EM:

- High levels of **diagnostic uncertainty**;
- "**Decision density**," or the volume of decisions that are made in a given amount of time;
- A high amount of **cognitive load** needed to process the large volume of data;
- **Narrow time windows** for patient assessment;
- **Multiple care transitions** for any given patient; and
- A multitude of **interruptions** and **distractions** throughout the thought process.

Patrick Croskerry, MD, PhD, Professor of Emergency Medicine, Dalhousie University, Halifax, Nova Scotia, Canada **Medscape Emergency Medicine. 2008; ©2008 Medscape Posted 07/17/2008**

The on the job mental and physical task load experienced by emergency physicians scored at the top of the charts among all physician specialties in a recent national assessment…

- Measured on the job physician task load (PTL) across four domains - **mental demands**, **physical demands**, **time demands**, & **perception of effort required** – creating a composite score using the National Aeronautics and Space Administration (NASA) Task Load Index (TLX)
  - The NASA-TLX evaluation tool was chosen due to its robust validation and use across many industries, including health care, over the past 30 years.
- Physicians tallied an overall task load score of 260.9/400, **with emergency medicine logging the highest overall mark of any physician specialty** at 295.3.

Physician Task Load and the Risk of Burnout Among US Physicians in a National Survey
Elizabeth Harry, MD, Christine Sinsky, MD, Lotte N. Dyrbye, MD, MHPE, Lindsey E. Carlasare, MBA
Colin P. West, MD, PhD, Tait D. Shanafelt, MD
October 04, 2020 The Joint Commission Journal on Quality and Patient Safety

There are high demands on working memory (cognitive load) in our healthcare environments…

- You're driving to work. A route you use every working day. The radio is on and you're singing along word for word. You really love this song. Suddenly you see there's road construction ahead and you have to go down a different route you're not familiar with. There's a tight parking spot and you need to do a three-point turn. What about the song? Now it's no longer pleasant but a distraction. It's like you don't have the head space to listen and perform your tasks. You turn the radio down. Now it all feels easier.*
- **Cognitive load** is the amount of mental resources utilized in **working memory** to perform various tasks. It is made up of three parts…*
- **Working memory** is extremely limited in both capacity and duration. Heavy cognitive load can have negative effect on **task completion**…**

*https://mcdreeamiemusings.com/blog/2019/10/15/the-good-the-bad-and-the-can-be-ugly-the-three-parts-of-cognitive-load

**Wikipedia

cognitive load

mcdreeamiemusings.com @mcdreeamie

Interruptions, Distractions, Multi-Tasking & Task-Switching in the Emergency Department:

- 6.6 interruptions per hour
- 11% of tasks interrupted
- 3.3% multiple times
- Did not return to task 18.5% of the time…

Study tracks effects of interruptions on doctors

By **Tom Watkins**, CNN
May 12, 2010 9:39 p.m. EDT

People should think more carefully before interrupting doctors, one of the study's authors says.

(CNN) -- Interruptions in the emergency room may exact an unhealthy toll on patient care, a group of Australian researchers reported Thursday.

The researchers, from the University of Sydney and the University of New South Wales, found that interruptions led emergency department doctors to spend less time on the tasks they were working on and, in nearly a fifth of cases, to give up on the task altogether.

STORY HIGHLIGHTS

- Australian study looks at 40 emergency department doctors for 210 hours
- Interruptions led doctors to spend less time on the tasks they were working on
- In nearly a fifth of cases interruptions cause them to give up on the task altogether

The researchers carried out a time-and-motion study in the emergency department of a 400-bed teaching hospital, observing 40 doctors for more than 210 hours.

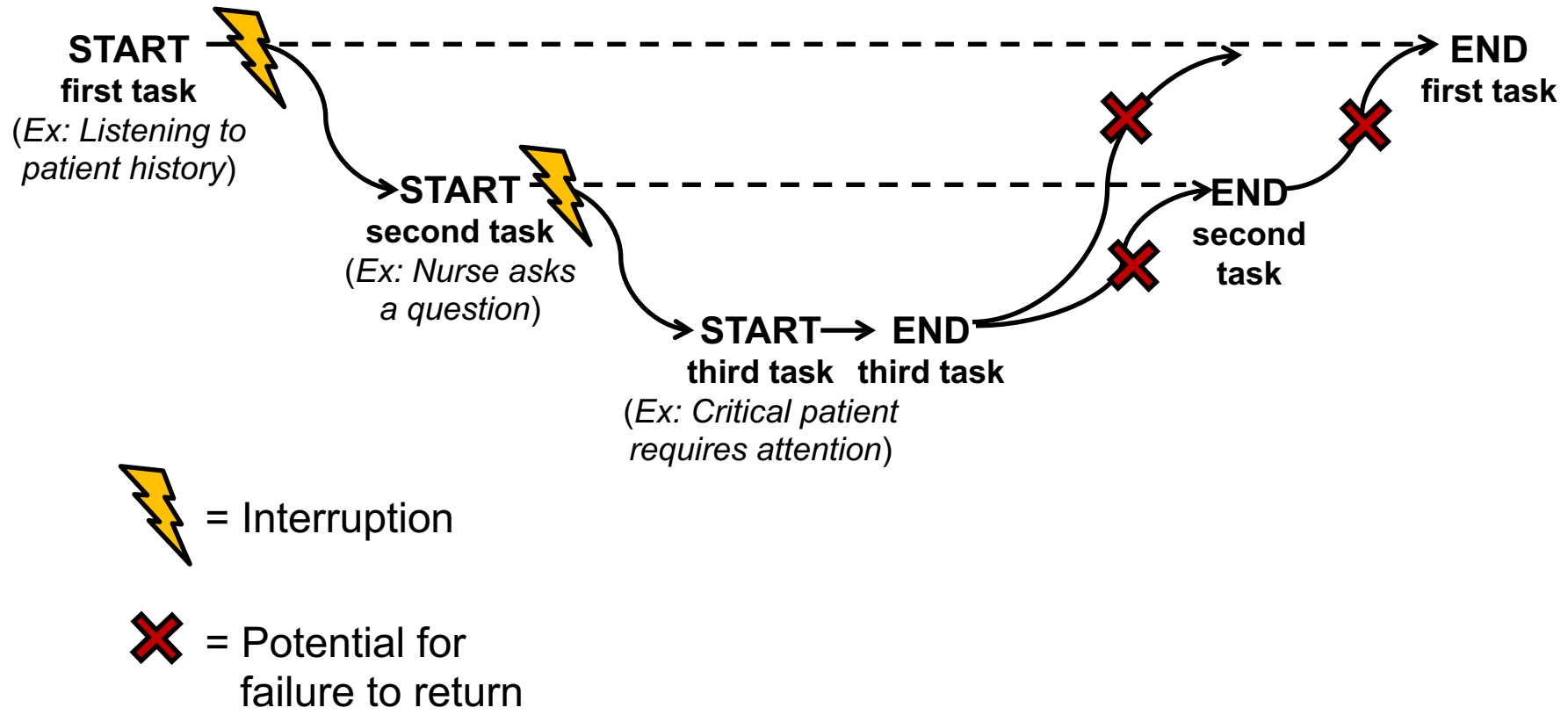
They found that each doctor was typically interrupted 6.6 times per hour; 11 percent of all tasks were interrupted, 3.3 percent of them more than once. They calculated time on task and found that physicians spent less time on interrupted tasks than on uninterrupted tasks. In addition, doctors were multitasking 12.8 percent of the time.

RELATED TOPICS

Emergency Medicine

Doctors did not return to 18.5 percent of the interrupted tasks,

A Model of Multi-Tasking & Distractions in the ED



Can You Multitask? Evidence and Limitations of Task Switching and Multitasking in Emergency Medicine
Annals of Emergency Medicine, 2015. Skaugset et al.

Unfortunately, Multi-Tasking Makes Us Stupid…

Clifford Nass, PhD on Multitasking

One of his most publicized research projects was a 2009 study on multitasking. He and his colleagues presumed that people who frequently juggled computer, phone or television screens, or just different applications, would be skilled at ignoring irrelevant information, or able to switch between tasks efficiently, or possessed of a particularly orderly memory.

"**We all bet high multitaskers were going to be stars at something**," he said in an interview with the PBS program "Frontline." **"We were absolutely shocked. We all lost our bets. It turns out multitaskers are terrible at every aspect of multitasking.** They're terrible at ignoring irrelevant information; they're terrible at keeping information in their head nicely and neatly organized; and they're terrible at switching from one task to another."

He added, **"One would think that if people were bad at multitasking, they would stop. However, when we talk with the multitaskers, they seem to think they're great at it and seem totally unfazed and totally able to do more and more and more."**

With children doing more multitasking and people asked to do more of it at work, he said, **"We worry that it may be creating people who are unable to think well and clearly."**

Clifford Nass,PhD - New York Times, November 6, 2013

Excellence, Deliberate Practice and 10,000 Hours…

The Role of Deliberate Practice in the Acquisition of Expert Performance

K. Anders Ericsson, Ralf Th. Krampe, and Clemens Tesch-Romer*

"Many characteristics once believed to reflect innate talent are actually the result of intense practice extended for a minimum of 10 years."

*Psychological Review 1993, Vol. 100. No. 3, 363-406


Harvard Business Review
www.hbrreprints.org

New research shows that outstanding performance is the product of years of deliberate practice and coaching, not of any innate talent or skill.

The Making of an Expert

by K. Anders Ericsson, Michael J. Prietula, and Edward T. Cokely

Special Communication

Error in Medicine

Lucian L. Leape, MD

FOR YEARS, medical and nursing students have been taught Florence Nightengale's dictum-first, do no harm.[1] Yet evidence from a number of sources, reported over several decades, indicates that a substantial number of patients suffer treatment-related injuries while in the hospital.[2-6]

In 1964 Shimmel[2] reported that 20% of all patients admitted to a university hospital medical service suffered iatrogenic injury and that 20% of those injuries were serious or fatal. Steel et al[3] found that 36% of patients admitted to a university medical service in a teaching hospital suffered an iatrogenic event, of which 25% were serious of life threatening. More than half of the injuries were related to use of medication.[3] In 1991 Bedell et al[4] reported the results of an analysis of cardiac arrests at a teaching hospital. They found that 64% were preventable. Again, inappropriate use of drugs was the leading cause of the cardiac arrests. Also in 1991, the Harvard Medical Practice Study reported the results of a population-based study of iatrogenic injury in patients hospitalized in New York State in 1984.[5,6] Nearly 4% of patients suffered an injury that prolonged their hospital stay or resulted in measurable disability. For New York State, this equaled 98,609 patients in 1984. Nearly 14% of these injuries were fatal. If these rates are typical of the United States, then 180,000 people die each year partly as a result of iatrogenic injury, the equivalent of three jumbo-jet crashes every 2 days.

When the causes are investigated, it is found that most iatrogenic injuries are due to errors and are, therefore, potentially preventable.[4,7,8] For example, in the Harvard Medical Practice Study, 69% of injuries were due to errors (the balance was unavoidable).[8] Error may be defined as an unintended act (either of omission or commission) or one that does not achieve its intended outcome. Indeed, injuries are but the "tip of the iceberg" of the problem of errors, since most errors do not result in patient injury. For example, medication errors occur in 2% to 14% of patients admitted to hospitals,[9-12] but most do not result in injury.[13]

Aside from studies of medication errors, the literature on medical error is sparse, in part because most studies of iatrogenesis have focused on injuries (eg, The Harvard Medical Practice Study). When errors have been specifically looked for, however, the rates reported have been distressingly high. Autopsy studies have shown high rates (35% to 40%) of missed diagnoses causing death.[14-16] One study of errors in a medical intensive care unit revealed an average of 1.7 errors per day per patient, of which 29% had the potential for serious or fatal injury.[17] Operational errors (such as failure to treat promptly or to get a follow-up cult found in 52% of patients in a children with positive urine cultures.

For editorial comment see p

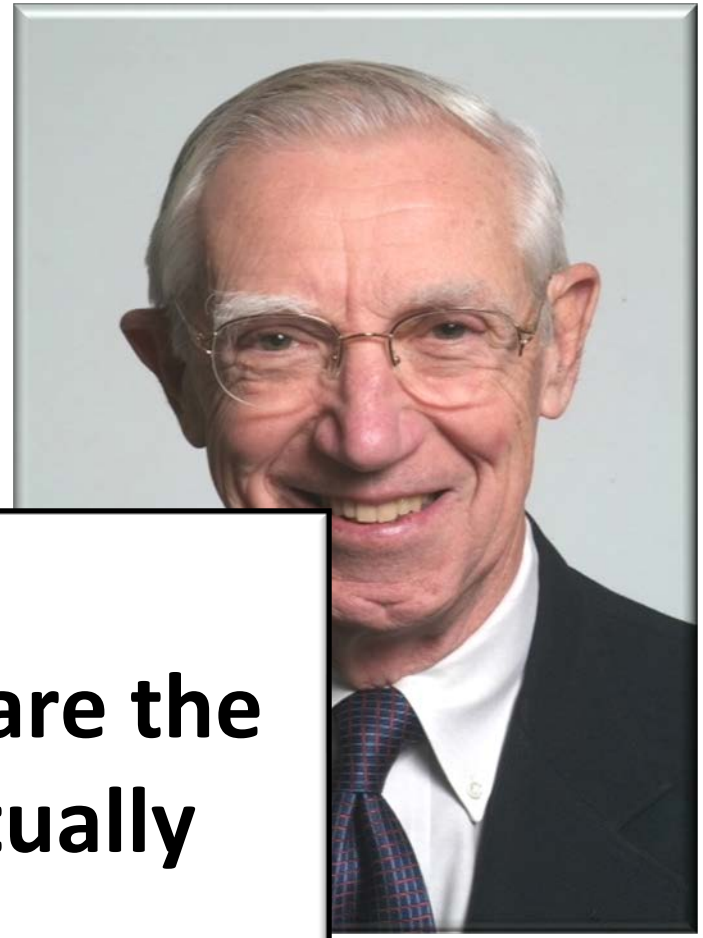
Given the complex nature of practice and the multitude of inte that each patient receives, a high er perhaps not surprising. The patien intensive care unit study, for exam the recipients of an average "activities" per day. The 1.7 errors thus indicate that hospital person functioning at a 99% level of pr However, a 1% failure rate is sub higher than is tolerated in particularly in hazardous fields aviation and nuclear power. A Deming points out (written commu November 1987), even 99.9% ma good enough: "If we had to live wit we would have: 2 unsafe plane lan day at O'Hare, 16,000 pieces of every hour, 32,000 bank checks from the wrong bank account every

WHY IS THE ERROR RATE IN THE PRACTICE OF MEDICINE SO HIGH?

Physicians, nurses, and pharmacists are trained to be careful and to function at a high level of proficiency. Indeed, they probably are among the most careful professionals in our society. It is curious, therefore, that high error rates have not stimulated more concern and efforts at error prevention. One reason may be a lack of awareness of the severity of the problem. Hospital-acquired injuries are not reported in the newspapers like jumbo-jet crashes, for the simple reason that they occur one at a time in 5000 different locations across the country. Although error rates are substantial, serious injuries due to errors are not part of the everyday experience of physicians or nurses, but are perceived as isolated and unusual events-"outliers." Second, most errors do no harm. Either they are intercepted or the patient's defenses prevent

From the Department of Health Policy and Management, Harvard School of Public Health, Boston, Mass.
Reprint requests to Department of Health Policy and Management, Harvard School of Public Health, 677 Huntington Ave, Boston, MA 02115 (Dr. Leape).

JAMA, December 21, 1994—Volume 272, No. 23



"The more expert you are the less you have to actually think"

Leape, L. *Error In Medicine*, JAMA, 1994; 272: 1851-1857.

SYSTEM 1

Intuition & instinct

95%

Unconscious
Fast
Associative
Automatic pilot

SYSTEM 2

Rational thinking

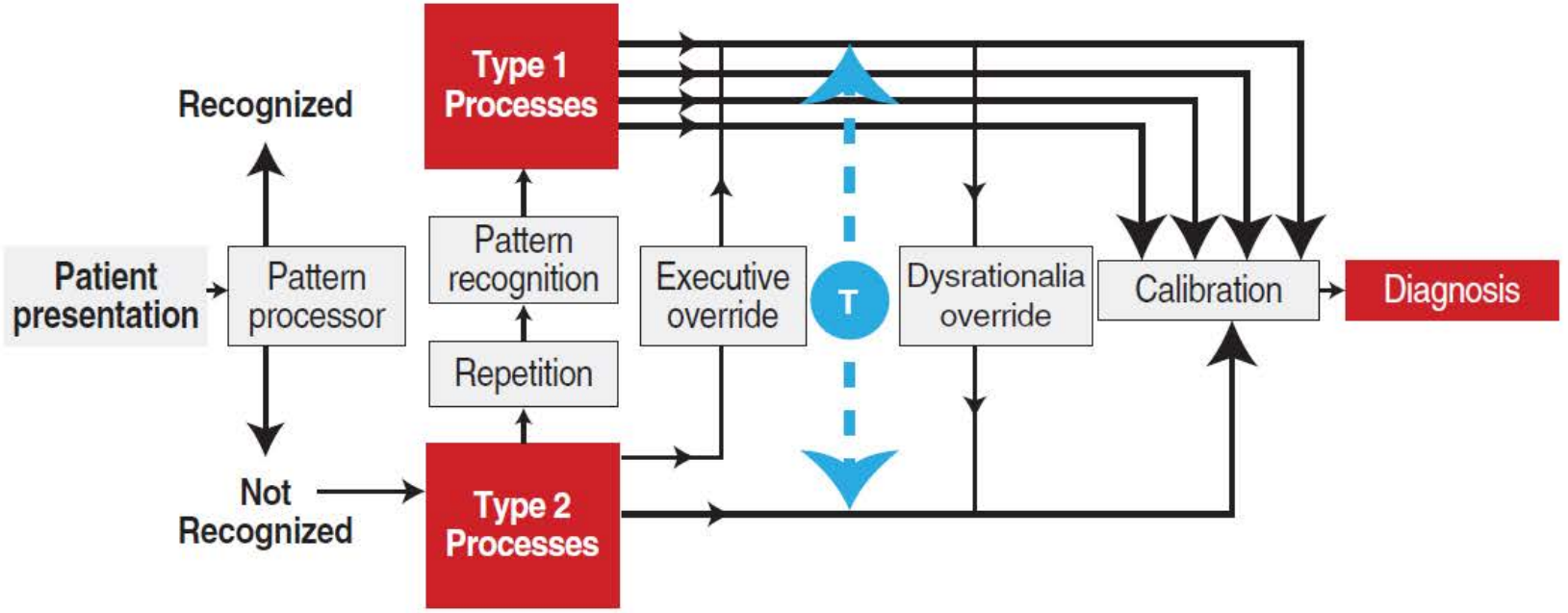
5%

Takes effort
Slow
Logical
Lazy
Indecisive

Source: Daniel Kahneman

Thinking About Thinking…Going Deeper…

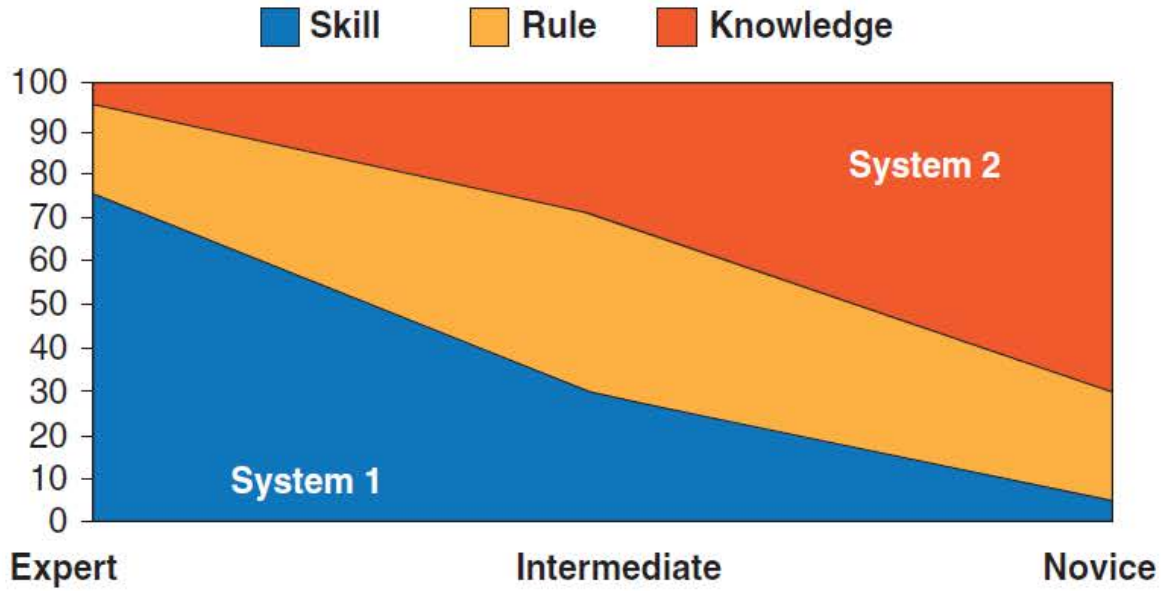
FIGURE 80.3 ■ A Universal Model of Reasoning



Promoting Rational Thinking: An Ethical Imperative - Thom A. Mayer, Pat Croskerry
Chapter 80 in **Strauss and Mayer's Emergency Department Management *Second Edition*** – *October 2021*

The More Expert We Are The Less We Have To Think…

FIGURE 80.4 ■ Experts Versus Novices



Promoting Rational Thinking: An Ethical Imperative - Thom A. Mayer, Pat Croskerry
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A Warning - "Kind" Vs "Unkind" Learning Environments":

- In "kind" learning environments patterns repeat over and over and feedback is extremely accurate and often rapid…
  - e.g. Chess, poker, golf, firefighting…

- In "unkind" environments, or "wicked domains", the rules of the game are often unclear or incomplete, there may or may not be repetitive patterns, the patterns may not be obvious, and feedback is often delayed, inaccurate or both…
  - e.g. College administrators assessing student potential, psychiatrists predicting patient performance, human resource professionals predicting who will succeed in job training, business professionals predicting economic performance…

- Unkind domains tend to involve human behavior or patterns that do not clearly repeat. Experience does not necessarily lead to expertise…feedback is often delayed, inaccurate, or both…

"For example, a hospital emergency room, where doctors and nurses do not automatically find out what happens to a patent after their encounter. They have to find ways to learn beyond practice, and to assimilate lessons that might even contradict their direct experience…"

Range – Why Generalists Triumph in a Specialized World – David Epstein

Take a Moment to Read This…

Take a look at this paragraph. Can you read what it says? All the letters have been jumbled (mixed). **Only the first and last letter of each word is in the right place:**

I cnduo't bvleiee taht I culod aulaclty uesdtannrd waht I was rdnaieg. Unisg the icndeblire pweor of the hmuan mnid, aocdcrnig to rseecrah at Cmabrigde Uinervtisy, it dseno't mttaer in waht oderr the lterets in a wrod are, the olny irpoamtnt tihng is taht the frsit and lsat ltteer be in the rhgit pclae. The rset can be a taotl mses and you can sitll raed it whoutit a pboerlm. Tihs is bucseae the huamn mnid deos not raed ervey ltteer by istlef, but the wrod as a wlohe. Aaznmig, huh? Yaeh and I awlyas tghhuot slelinpg was ipmorantt! See if yuor fdreins can raed tihs too.

Don't Sell Yourself Short…

I couldn't believe that I could actually understand what I was reading. Using the incredible power of the human brain, according to research at Cambridge University, it doesn't matter in what order the letters in a word are, the only important thing is that the first and last letter be in the right place. The rest can be a total, mess and you can read it without a problem. This is because the human mind does not read every letter by itself, but the word as a whole. Amazing, huh? Yeah and I always thought spelling was important! See if your friends can read this too!

“All humans err frequently…”

and

“Systems that rely on error free performance are doomed to fail…”

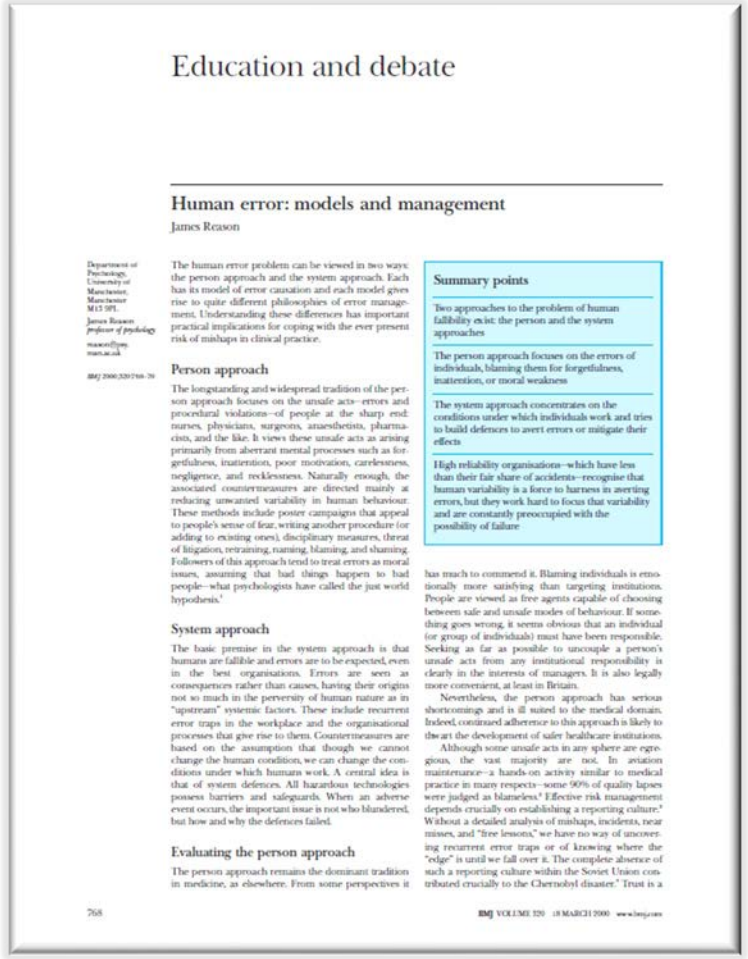
Lucien Leape, MD

Leape, L. “Error In Medicine”, *JAMA*, 1994; 272: 1851-1857.

James Reason - An Early Pioneer in Human Cognition, Error, and Safety - Embracing a Systems Approach To Error, Safety, and Culture…

Human Error: Models and Management **- Summary points:**

- Two approaches to the problem of human fallibility exist: the person and the system approaches
- The person approach focuses on the errors of individuals, blaming them for forgetfulness, inattention, or moral weakness
- The system approach concentrates on the conditions under which individuals work and tries to build defences to avert errors or mitigate their effects
- High reliability organisations - which have less than their fair share of accidents - recognise that human variability is a force to harness in averting errors, but they work hard to focus that variability and are constantly preoccupied with the possibility of failure



Education and debate

Human error: models and management

James Reason

Summary points

Two approaches to the problem of human fallibility exist: the person and the system approaches

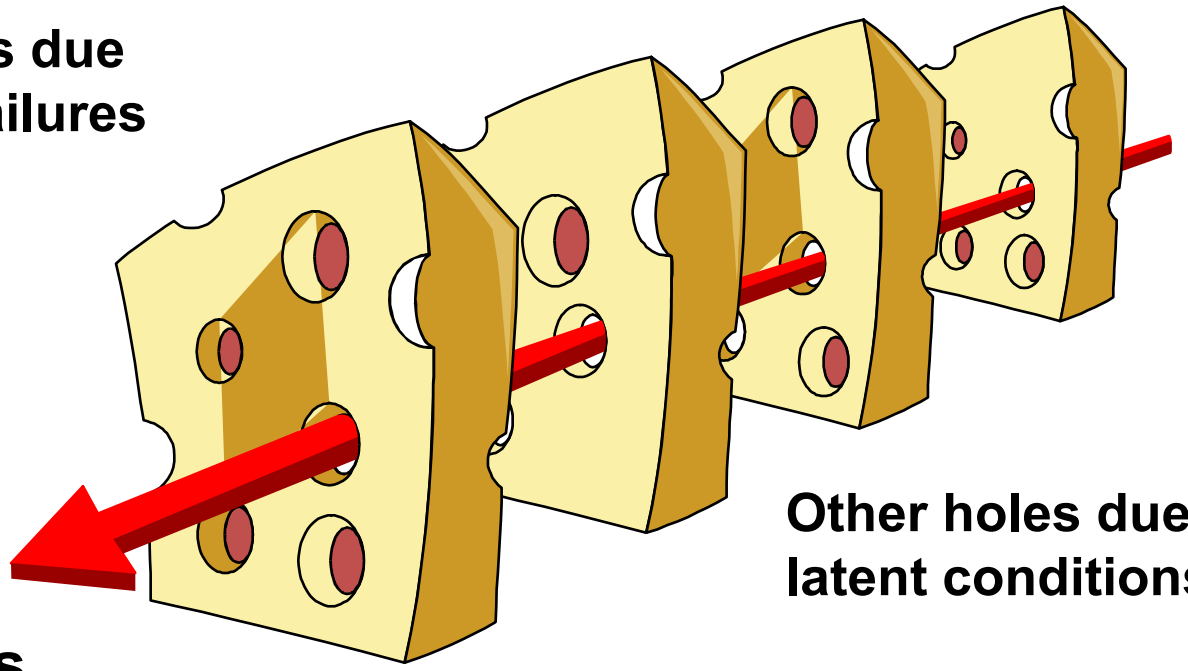
The person approach focuses on the errors of individuals, blaming them for forgetfulness, inattention, or moral weakness

The system approach concentrates on the conditions under which individuals work and tries to build defences to avert errors or mitigate their effects

High reliability organisations—which have less than their fair share of accidents—recognise that human variability is a force to harness in averting errors, but they work hard to focus that variability and are constantly preoccupied with the possibility of failure

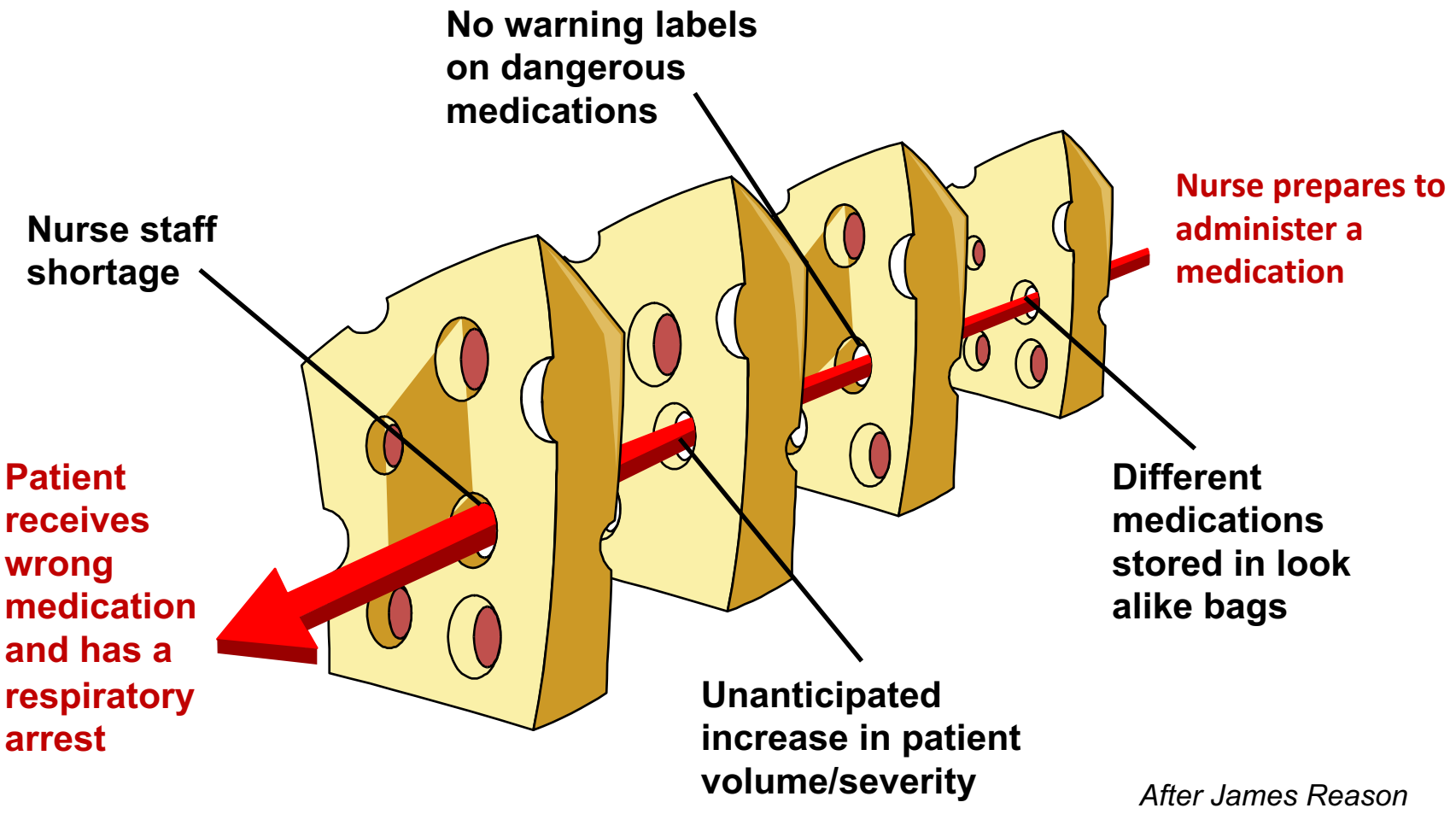
Human error: models and management James Reason, professor of psychology
BMJ. 2000 Mar 18; 320(7237): 768–770

Reason's 'Swiss Cheese' Model of Organisational Accidents



Successive layers of defences

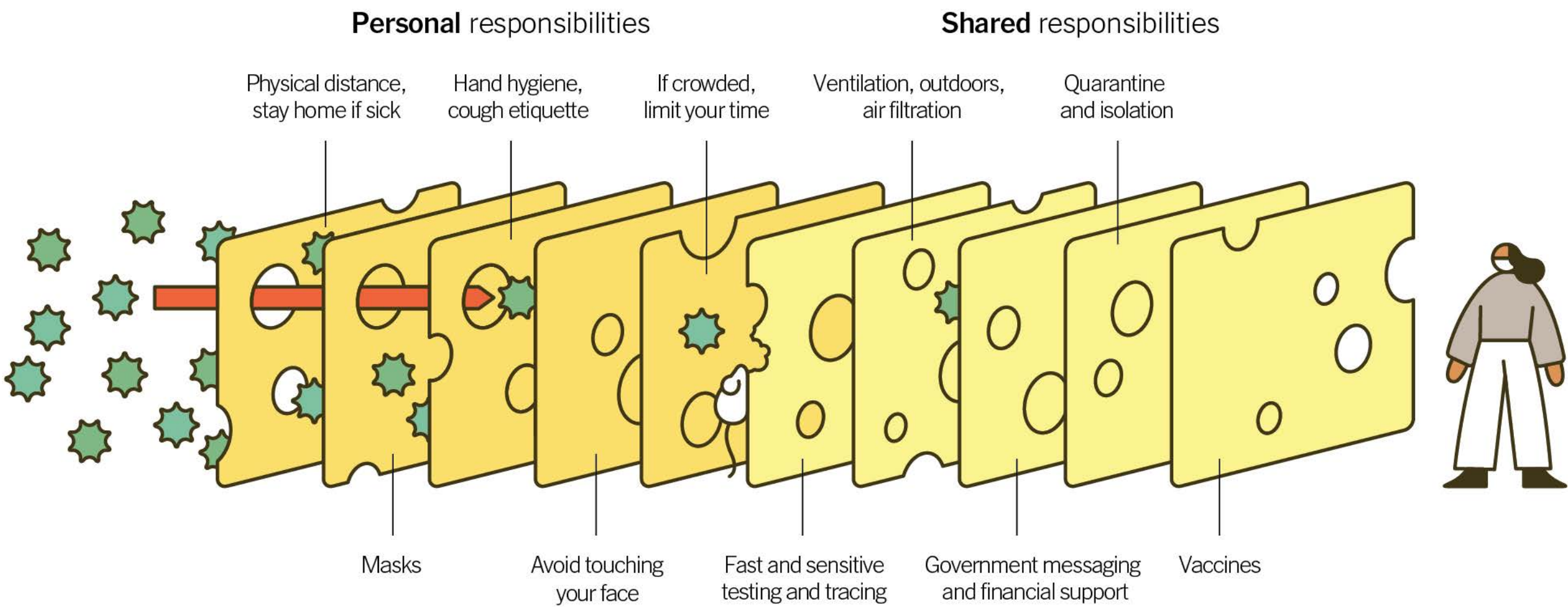
The ‘Swiss Cheese’ Theory of System Error



After James Reason

Multiple Layers Improve Success

The Swiss Cheese Respiratory Pandemic Defense recognizes that no single intervention is perfect at preventing the spread of the coronavirus. Each intervention (layer) has holes.



Source: Adapted from Ian M. Mackay (virologydownunder.com) and James T. Reason. Illustration by Rose Wong

Preventing Errors: The Impact of Probability & Complexity

Probability of Performing Perfectly

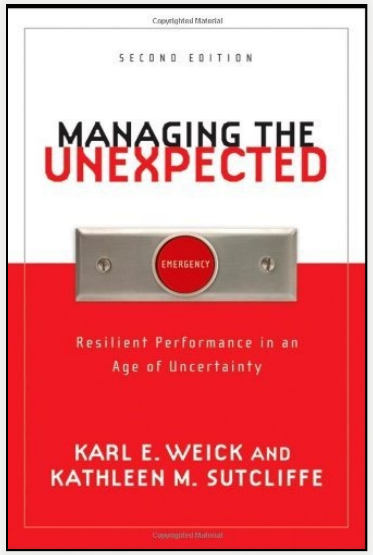
Number of Elements	Probability of Success (Each Element)			
	0.95	0.990	0.999	0.999999
1	0.95	0.990	0.999	0.999999
25	0.28	0.78	0.98	0.998
50	0.08	0.61	0.95	0.995
100	0.006	0.37	0.90	0.99

Perspective-Living with 99.9%

- 84 unsafe landings/day
- 1 major plane crash every 3 days
- 16,000 items of lost mail/hr
- 37,000 ATM errors/hr

High Reliability Organizations (HROs):
Taking a Systems Approach to Patient Safety

There are five characteristics of **High Reliability Organizations** that have been identified as responsible for the "**mindfulness**" that keeps them working well when facing unexpected situations:



Preoccupation with Failure	**Reluctance to Simplify Interpretations**	**Sensitivity to Operations**	**Commitment to Resilience**	**Deference to Expertise**

Reliability – A Definition…

"Reliability is defined as failure free operation over time, from the point of view of the patient." *

"Put another way, it is the capability of a process, procedure or health service to perform its intended function in the required time under existing conditions." **

*Improving the Reliability of Health Care,Nolan T, Resar R, Haraden C, Griffin F Innovation Series 2004 Whitepaper, Institute for Healthcare Improvement, Available at www.ihi.org

**The Concept of Reliability in Emergency Medicine Shari Welch MD,FACEP, Kirk Jensen, MD,FACEP,MBA Am J Med Qual. Jan-Feb 2007;22(1):50-85


Aviation
-No Fault Reporting
-Root Cause Analysis
-Teamwork
-Standard Procedures
-After Action Reviews
-Simulation Training

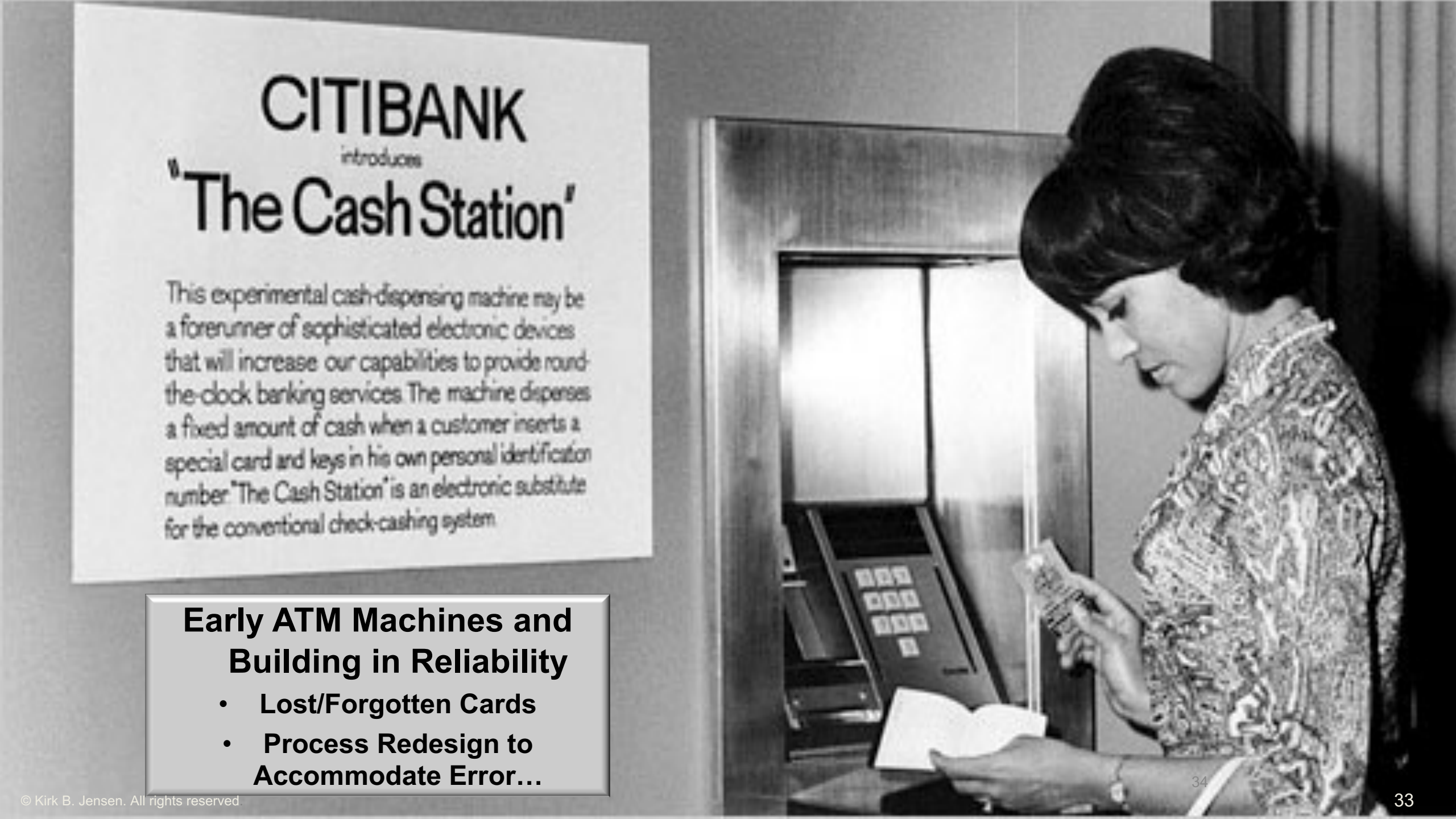
“When a plane crashes,” says James Bagian, M.D. and former astronaut, **“they ask, ‘What happened?’**
In medicine they ask: ‘Whose fault was it?’”

This contrasts sharply with the airline industry…

As quoted by Tom Peters in Notes to Hospital CEOs derived from a Keynote Presentation to HCA Hospital CEOs on 2 April 2012*

Dr.Bagian is currently the Director of the Center for Healthcare Engineering and Patient Safety at the University of Michigan.

Leveraging Lessons From Psychological & Human Factors Research



Early ATM Machines and Building in Reliability

- Lost/Forgotten Cards
- Process Redesign to Accommodate Error…

Human Factors and Reliability Science: Three Principles for the Design of Safe Care

1. **<u>Prevent</u> Errors** - Design the system to prevent errors,

2. **Make Errors <u>Visible</u>** - Make errors visible so they can be intercepted, and

3. **<u>Mitigate</u> the Effects of Errors** - Develop mitigation strategies to reduce the impact of errors.

High Leverage Patient Safety Strategies:

- Human Resource Strategies
- Operations Management and Patient Flow
- Teamwork and Communication
- Emphasizing a Culture of Reliability
- Risk Surveillance and Outcomes Measurement
- Managing High Risk Presentations

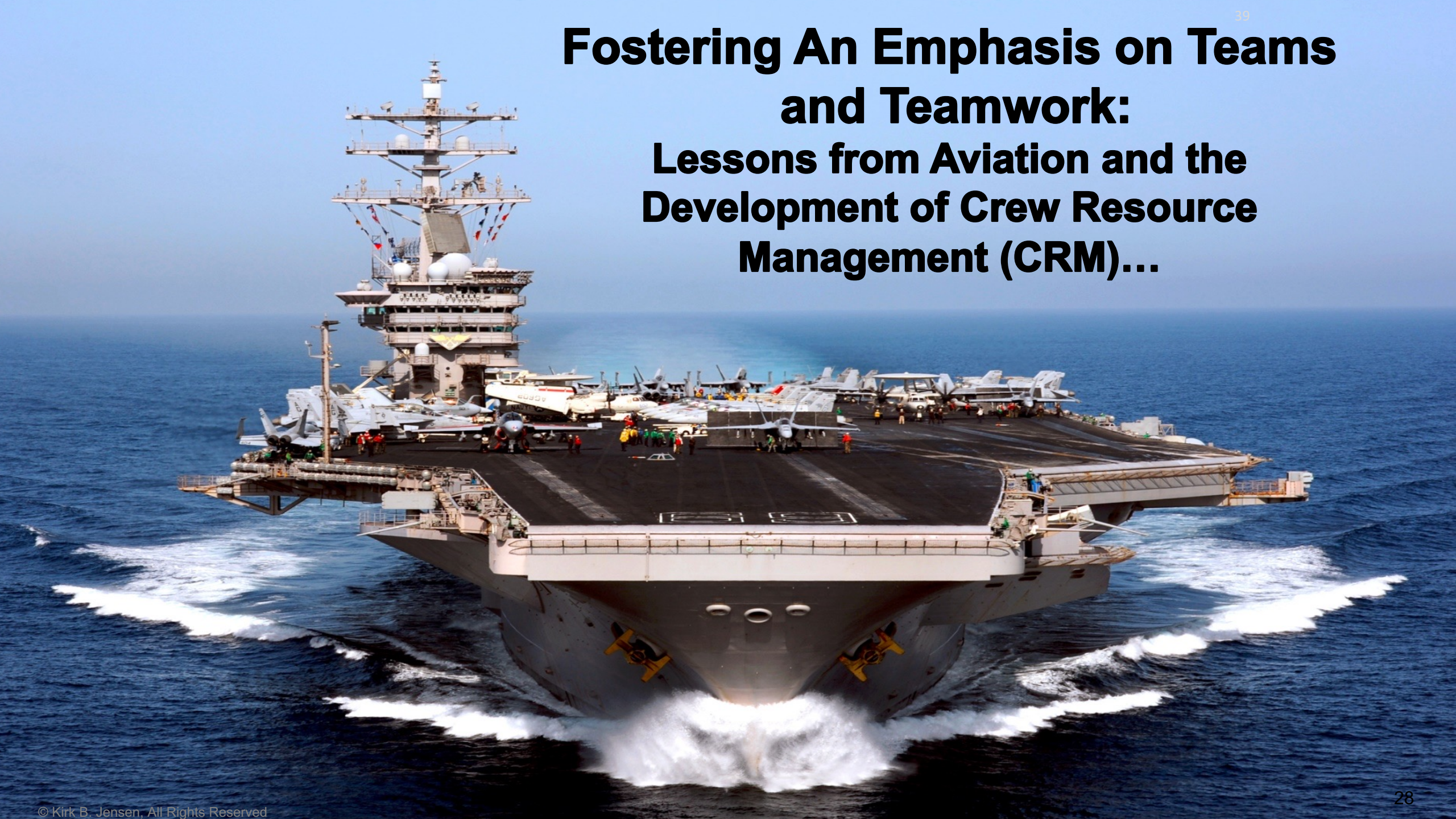
With an Emphasis on Approaches That We Can Actually Implement…

Hire Right…Recruit and Retain…

Maintaining a Relentless Focus on Operations…

Fostering An Emphasis on Teams and Teamwork:

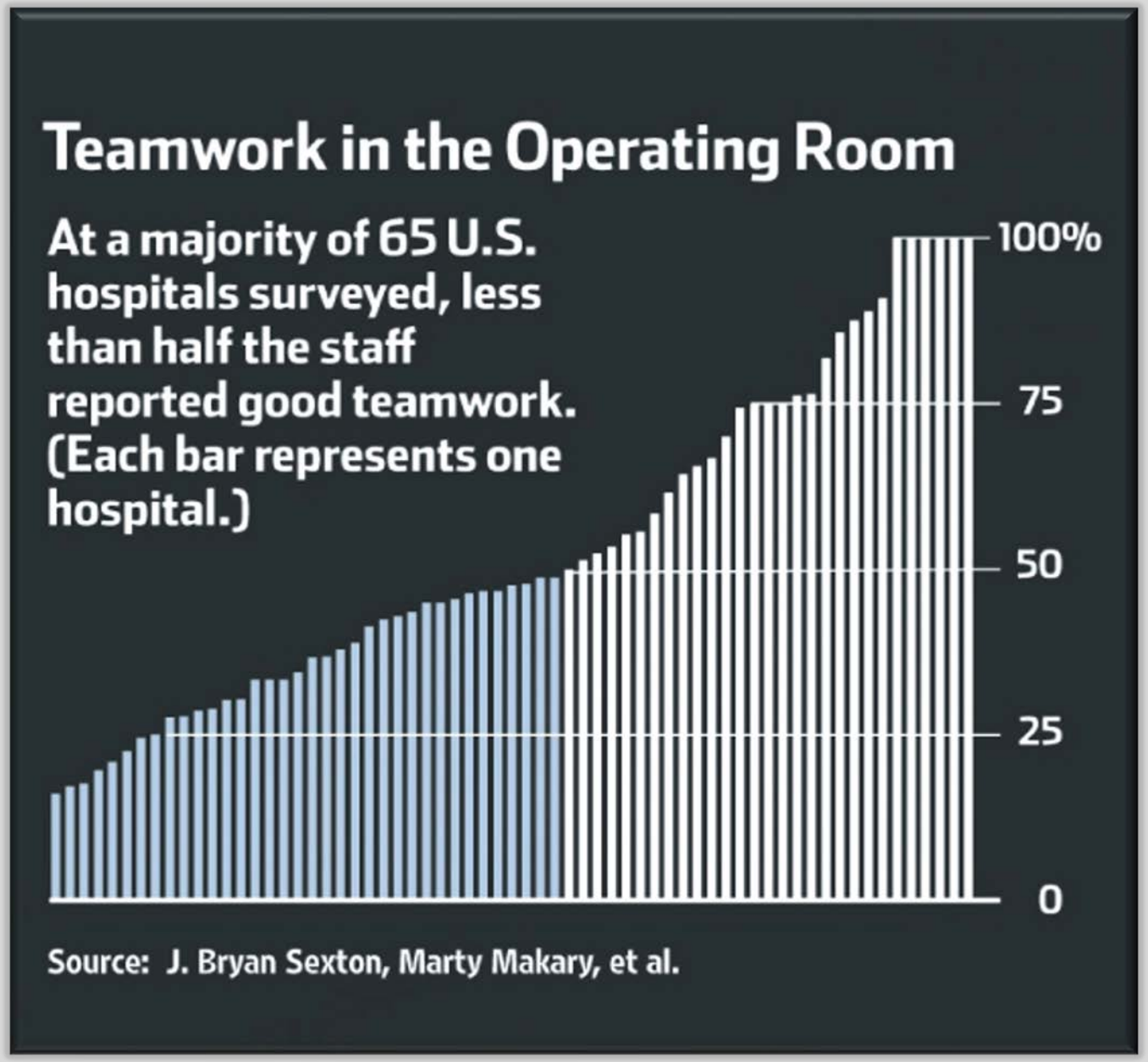
Lessons from Aviation and the Development of Crew Resource Management (CRM)…



AIG Study: Top Hospital Safety Threats: Poor Teamwork, Communication or Culture...

Bloomberg News (4/19/2013, Tracer) reported a study by insurer American International Group Inc. found **"patient safety at U.S. hospitals is hampered by inadequate teamwork and communication, as well as a negative culture."** The New York-based company said in a statement that over **"half of hospital risk managers and 42 percent of executives surveyed"** said **"the top safety threat was tied to teamwork, communications or culture."**

The study found **"other impediments to patient safety include so-called handoffs of patients among hospital staff, burdens tied to documentation and the perception that nurses fear retribution if they discuss safety."**



WSJ 9-22-2012

The Importance of Teams and Teamwork -
The Value of Teamwork in Clinical Medicine

Definition Of A Team:

- Two or more people who achieve a mutual goal through ***interdependent*** and ***adaptive*** actions.
- Not a “group” which achieves its goal through ***independent, individual*** contributions.

Essential Elements Of Teams:

- Common Purpose and Shared Goals
- Interdependent Actions
- Accountability
- Collective Effort

Formal Teamwork Training & Programs - A Brief History of Crew Resource Management (CRM)

1978 **Poor teamwork** is identified as **causal** in many aircraft accidents in a military inspector general report.

1979 A **NASA workshop** coins the term "**Crew Resource Management.**"

1980 United Airlines becomes the **first major commercial airline** to **develop a CRM** training program for its flight crews.

1989 **All three military services** have incorporated some type of **CRM** training.

1997 CRM training is **required by the FAA** of all commercial carriers.

1999

- **The Department of Defense (DOD) funds the development of a CRM program in medicine - Emergency Medicine**
- **In 1999 the MedTeams Crew Resource Management (CRM) Program results are published in *Annals of Emergency Medicine***

Currently TeamSTEPPS® @ AHRQ.GOV & AHA

Teamwork Behaviors - Starbucks Does It…

Ordering Coffee-

"Order up Please"

- Call Outs
- Check Backs
- Situation awareness
- Cross monitoring
- Huddles
- Situational leadership

Teamwork, CRM, Patient Safety, and Medicine

Crew Resource Management (CRM) and Medicine:

- **Teamwork behaviors and skills are teachable**
  - MedTeams Program
  - AHRQ/AHA TeamSTEPPS Program
- **Teams** and teamwork behaviors **do not replace clinical skills**
- It **should not be assumed** that ED staff know how to work in core teams or use standard teamwork behavior
- **Superb individual clinical skills do not guarantee effective team performance** in care delivery

Compare and Contrast - Aviation And Medical Safety Models

Aviation:

- **There are similarities between aviation and medicine**:
  - Carefully selected and highly trained professionals
  - A commitment to maintain externally and internally imposed high standards
  - High tech equipment
  - Participants exercise a high level of cognitive skills in a complex domain with a percentage of unknown factors
- **There are important differences between aviation and medicine:**
  - **There is a substantial measure of uncertainty in medicine**
  - **There are a number and variety of disease states**
  - **The inherent unpredictability of the human organism**
- **System design**: assume errors and failures inevitable, so design systems to absorb them
- **Standardized procedures** to maximum extent possible
- **An institutionalized approach to safety** including anonymous reporting of errors & near-misses

Medicine:

- Safety activities are focused on **incidents and individuals**
- **When errors are examined** the cause of the error is identified and corrected
- **Root causes**, and **underlying system failures**, are rarely sought
- **Accident prevention** has not been a primary focus
- **System designers** do not assume that errors and failures are inevitable and do not design systems that prevent or absorb them
- **Standardization** and **task design** vary widely
- An emphasis on **education and training** but the idea of **periodically testing performance** is not accepted
- Safety in medicine has not been **institutionalized**

A Note of Concern:
Observations on the Impact of Newness on Teams & Teamwork

"So, newness in teams and team members is a liability?"

- **"Absolutely. 73% of commercial airplanes incidents** in the National Transportation Safety Board's database **occurred on a crew's first day of flying together**, before people had experience operating as a team. **44% of those incidents took place on a crew's very first flight**. Also, a NASA study found that **fatigued crews with a history of working together made about half as many errors as crews composed of rested pilots who had not flown together before."**

"So why don't airlines stick to the same crews?"

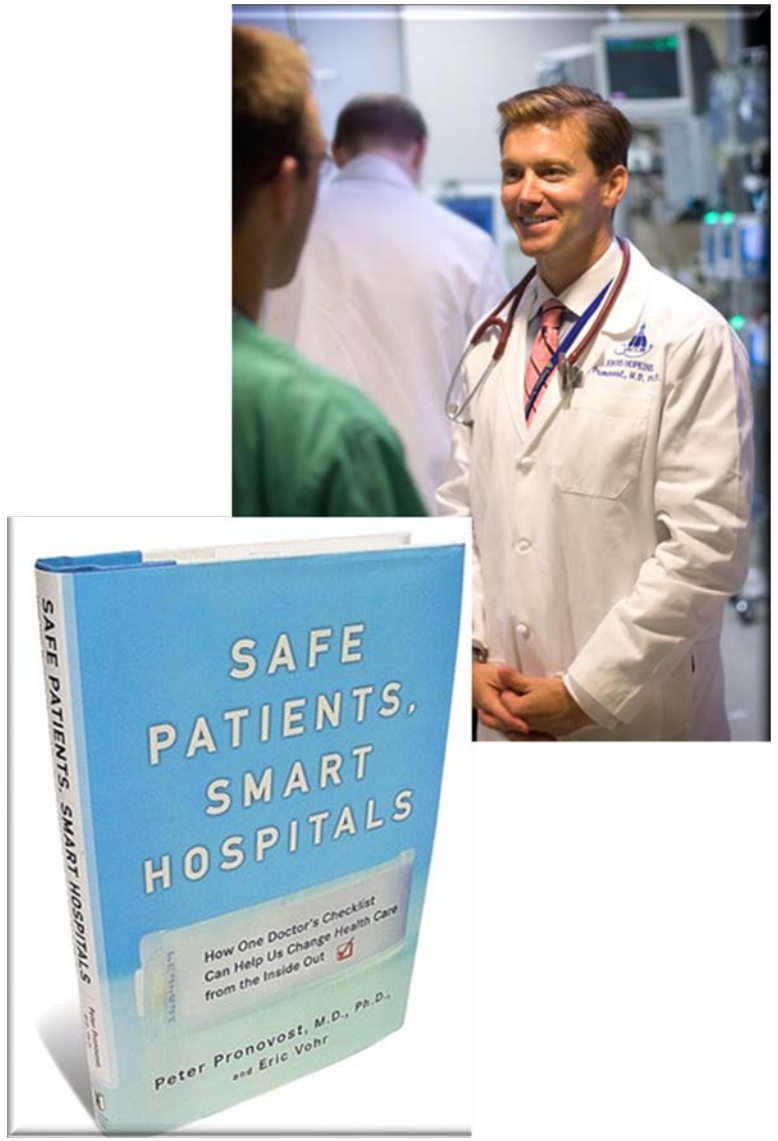
- "Because it's not efficient from a financial perspective**. Financially, you get the most from capital equipment and labor by treating each airplane and each pilot as an individual unit, then using an algorithm to maximize their utilization**. Thus, a pilot may fly two or three different aircraft with two or three different crews in the course of a single day. **An airline operations researcher estimated that 5-6 years may elapse between the times two crew members would work the same flight."**

Why Teams Don't Work - An Interview with J. Richard Hackman **by Diane Coutu - Harvard Business Review 1/27/13**

Communication Skills and Patient Safety…

"When I was in medical school, I spent hundreds of hours looking into a microscope - a skill I never needed to know or ever use. Yet I didn't have a single class that taught me **communication** or **teamwork skills** - something I need every day I walk into the hospital."

Dr. Peter Pronovost
Safe Patients, Smart Hospitals



- **65% of ED Physicians receive one lawsuit by age 45****
- **90% of ED Physicians receive one lawsuit by age 60**

****Reference - Julie Mederos, JD – Personal Communication**

THE PRACTICE OF EMERGENCY MEDICINE/ORIGINAL RESEARCH

Provider and Practice Factors Associated With Emergency Physicians' Being Named in a Malpractice Claim

Jestin N. Carlson, MD, MS; Krista M. Foster, MS; Jesse M. Pines, MD, MBA; Christopher K. Corbit, MD; Michael J. Ward, MD, PhD; Muhammad Zia Hydari, PhD; Arvind Venkat, MD*

*Corresponding Author. E-mail: arvind.venkat@ahn.org.

Study objective: We examine the association between emergency physician characteristics and practice factors with the risk of being named in a malpractice claim.

Methods: We used malpractice claims along with provider, operational, and jurisdictional data from a national emergency medicine group (87 emergency departments [EDs] in 15 states from January 1, 2010, to June 30, 2014) to assess the relationship between individual physician and practice variables and being named in a malpractice claim. Individual and practice factors included years in practice, emergency medicine board certification, visit admission rate, relative value units generated per hour, total patients treated as attending physician of record, working at multiple facilities, working primarily overnight shifts, patient experience data percentile, and state malpractice environment. We assessed the relationship between emergency physician and practice variables and malpractice claims, using logistic regression.

Results: Of 9,477,150 ED visits involving 1,029 emergency physicians, there were 98 malpractice claims against 90 physicians (9%). Increasing total number of years in practice (adjusted odds ratio 1.04; 95% confidence interval 1.02 to 1.06) and higher visit volume (adjusted odds ratio 1.09 per 1,000 visits; 95% confidence interval 1.05 to 1.12) were associated with being named in a malpractice claim. No other factors were associated with malpractice claims.

Conclusion: In this sample of emergency physicians, 1 in 11 were named in a malpractice claim during 4.5 years. Total number of years in practice and visit volume were the only identified factors associated with being named, suggesting that exposure to higher patient volumes and longer practice experience are the primary contributors to malpractice risk. [Ann Emerg Med. 2018;71:157-164.]

Please see page 158 for the Editor's Capsule Summary of this article.

Readers: click on the link to go directly to a survey in which you can provide **feedback** to *Annals* on this particular article.
A **podcast** for this article is available at www.annemergmed.com.

0196-0644/$-see front matter

http://dx.doi.org/10.1016/j.annemergmed.2017.06.023

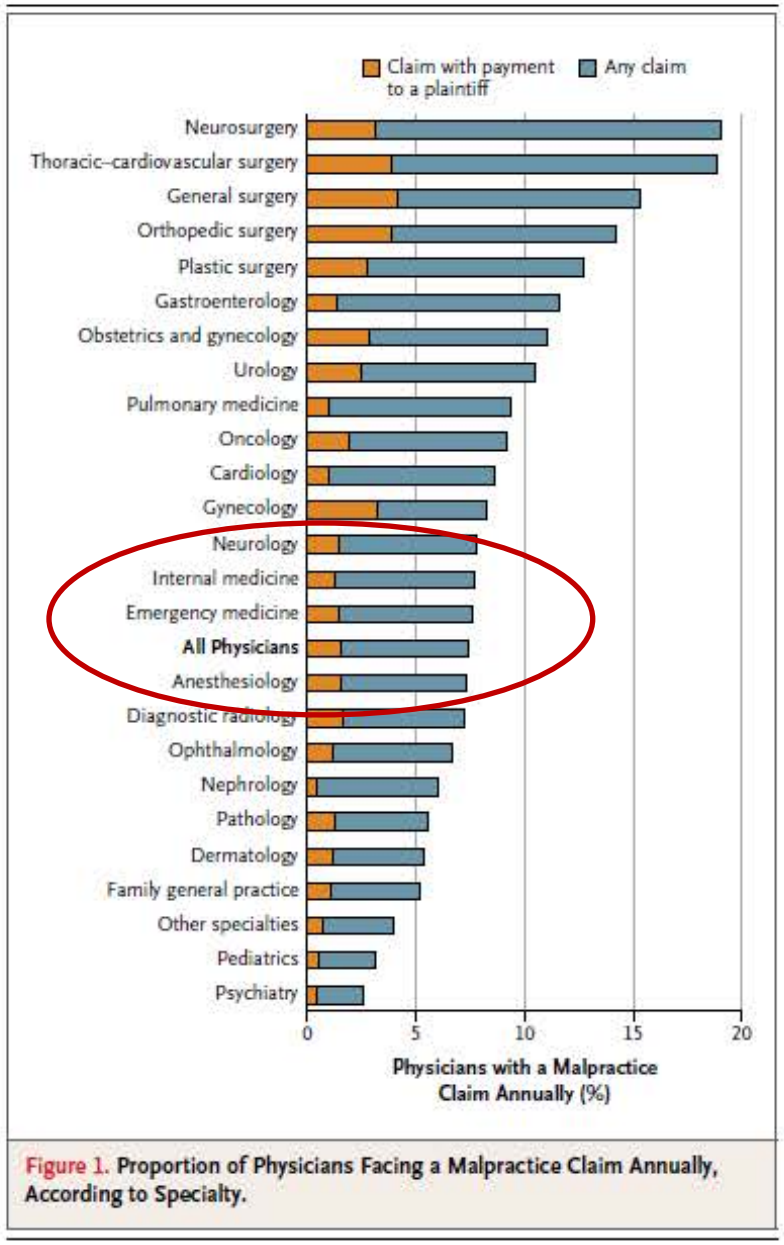


Figure 1. Proportion of Physicians Facing a Malpractice Claim Annually, According to Specialty.

The High Cost of Poor Communication In Malpractice Claims

Communication problems were an underlying cause of patient injuries in these percentages of Doctors Co.'s closed malpractice claims from 2005-2010.

21%
Cardiology

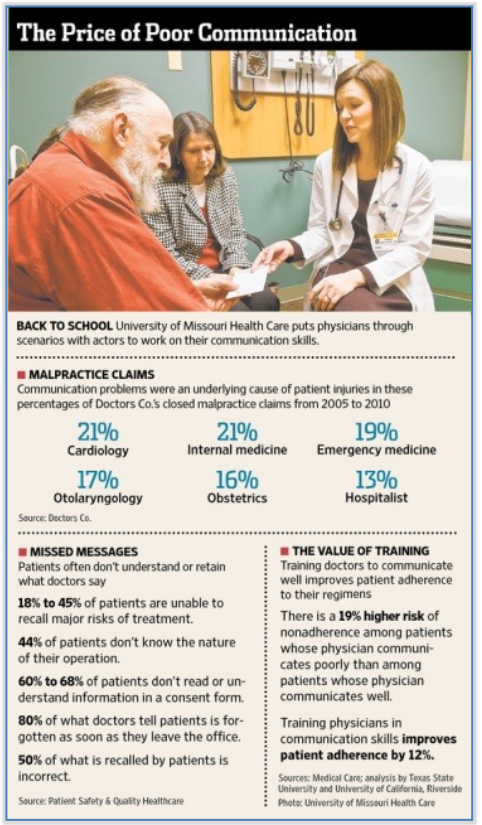
21%
Internal medicine

19%
Emergency medicine

17%
Otolaryngology

16%
Obstetrics

13%
Hospitalist



The Price of Poor Communication

BACK TO SCHOOL University of Missouri Health Care puts physicians through scenarios with actors to work on their communication skills.

MALPRACTICE CLAIMS
Communication problems were an underlying cause of patient injuries in these percentages of Doctors Co.'s closed malpractice claims from 2005 to 2010

21% Cardiology
21% Internal medicine
19% Emergency medicine
17% Otolaryngology
16% Obstetrics
13% Hospitalist

Source: Doctors Co.

MISSED MESSAGES
Patients often don't understand or retain what doctors say

18% to 45% of patients are unable to recall major risks of treatment.

44% of patients don't know the nature of their operation.

60% to 68% of patients don't read or understand information in a consent form.

80% of what doctors tell patients is forgotten as soon as they leave the office.

50% of what is recalled by patients is incorrect.

Source: Patient Safety & Quality Healthcare

THE VALUE OF TRAINING
Training doctors to communicate well improves patient adherence to their regimens

There is a **19% higher risk** of nonadherence among patients whose physician communicates poorly than among patients whose physician communicates well.

Training physicians in communication skills **improves patient adherence by 12%.**

Sources: Medical Care; analysis by Texas State University and University of California, Riverside

Photo: University of Missouri Health Care

wsj 4-9-2013

Communication

Joint Commission Journal on Quality and Patient Safety

National Patient Safety Goals

SBAR:
A Shared Mental Model for Improving Communication Between Clinicians

Kathleen M. Haig, R.N.
Staci Sutton, R.N.
John Whittington, M.D.

Department Editors: Marcia M. Piotrowski, R.N., M.S., Peter Angood, M.D., Paula Griswold, M.S., Gina Pugliese, R.N., M.S., Sanjay Saint, M.D., M.P.H., Susan E. Sheridan, M.I.M., M.B.A., Kaveh G. Shojania, M.D.
Readers may submit National Patient Safety Goals inquiries and submissions to Steven Berman (sberman@jcaho.org) and Marcia Piotrowski (marcia.piotrowski@med.va.gov).

Breakdowns in verbal and written communication between health care providers are a major concern in the delivery of care. Suboptimal communication is not only a common occurrence but is also associated with untoward events. The Joint Commission on the Accreditation of Healthcare Organizations notes that 65% of sentinel events,[1] and 90% of root cause analyses conducted at OSF St. Joseph Medical Center (Bloomington, Illinois) include communication as a contributing factor. On January 1, 2006, a new requirement went into effect, associated with the Joint Commission's National Patient Safety Goal 2, which strives to improve the effectiveness of communication among caregivers.[2] This new requirement (2E) states that facilities must implement a standardized approach to hand-off communications, including an opportunity to ask and respond to questions.

Communication handoffs are critically important in creating a shared mental model around the patient's condition. Without a good shared model, we lose situational awareness. This loss of situational awareness has led to well-known tragedies.[3] Daily experience in health care has taught us that there are many opportunities for improving the passage of information during handoffs.

Many barriers can potentially contribute to communication difficulties between clinicians. A lack of structure and standardization for communications, uncertainty about who is responsible for the patient's

Article-at-a-Glance

Background: The importance of sharing a common mental model in communication prompted efforts to spread the use of the SBAR (*S*ituation, *B*ackground, *A*ssessment, and *R*ecommendation) tool at OSF St. Joseph Medical Center, Bloomington, Illinois.

Case Study: An elderly patient was on warfarin sodium (Coumadin) 2.5 mg daily. The nurse received a call from the lab regarding an elevated international normalized ratio (INR) but did not write down the results (she was providing care to another patient). On the basis of the previous lab cumulative summary, the physician increased the warfarin dose for the patient; a dangerously high INR resulted.

Actions Taken: The medical center initiated a collaborative to implement the use of the SBAR communication tool. Education was incorporated into team resource management training and general orientation. Tools included SBAR pocket cards for clinicians and laminated SBAR "cheat sheets" posted at each phone. SBAR became the communication methodology from leadership to the microsystem in all forms of reporting.

Discussion: Staff adapted quickly to the use of SBAR, although hesitancy was noted in providing the "recommendation" to physicians. Medical staff were encouraged to listen for the SBAR components and encourage staff to share their recommendation if not initially provided.

Joint Commission Journal on Quality and Patient Safety

Laminated Poster

SBAR Communication

Use the following SBAR steps to communicate issues, problems or opportunities for improvement to coworkers or supervisors. SBAR can be applied to both written and verbal communications.

SITUATION - State what is happening at the present time that has warranted the SBAR communication. *Example: Patients and visitors are entering the medical center through the wrong doors and getting lost trying to find their destination.*

BACKGROUND – Explain circumstances leading up to this situation. Put the situation into context for the reader/listener. *Example: The campus has many buildings and is accessible from both E. Washington St. and Eastland Dr. Other entrances are more noticeable than the hospital's main entrance. MD offices do not have good maps to mark and hand to patients when sending them to our campus, and they often misdirect patients.*

ASSESSMENT – What do you think the problem is? *Example: People need something that they can carry with them when they are coming to the hospital so they park outside the appropriate entrance.*

RECOMMENDATION – What would you do to correct the problem?
Example: Create a campus visitor guide that includes an "aerial" map of the campus as well as a community map and floor by floor maps. Distribute widely, including to physician offices. Make them available to visitors in admission packets and at all entrances.

Figure 1. *The information on the laminated poster, also reproduced on the pocket cards for clinicians, describes the Situation, Background, Assessment, and Recommendation (SBAR) steps, with an example for each.*

After Action Reviews

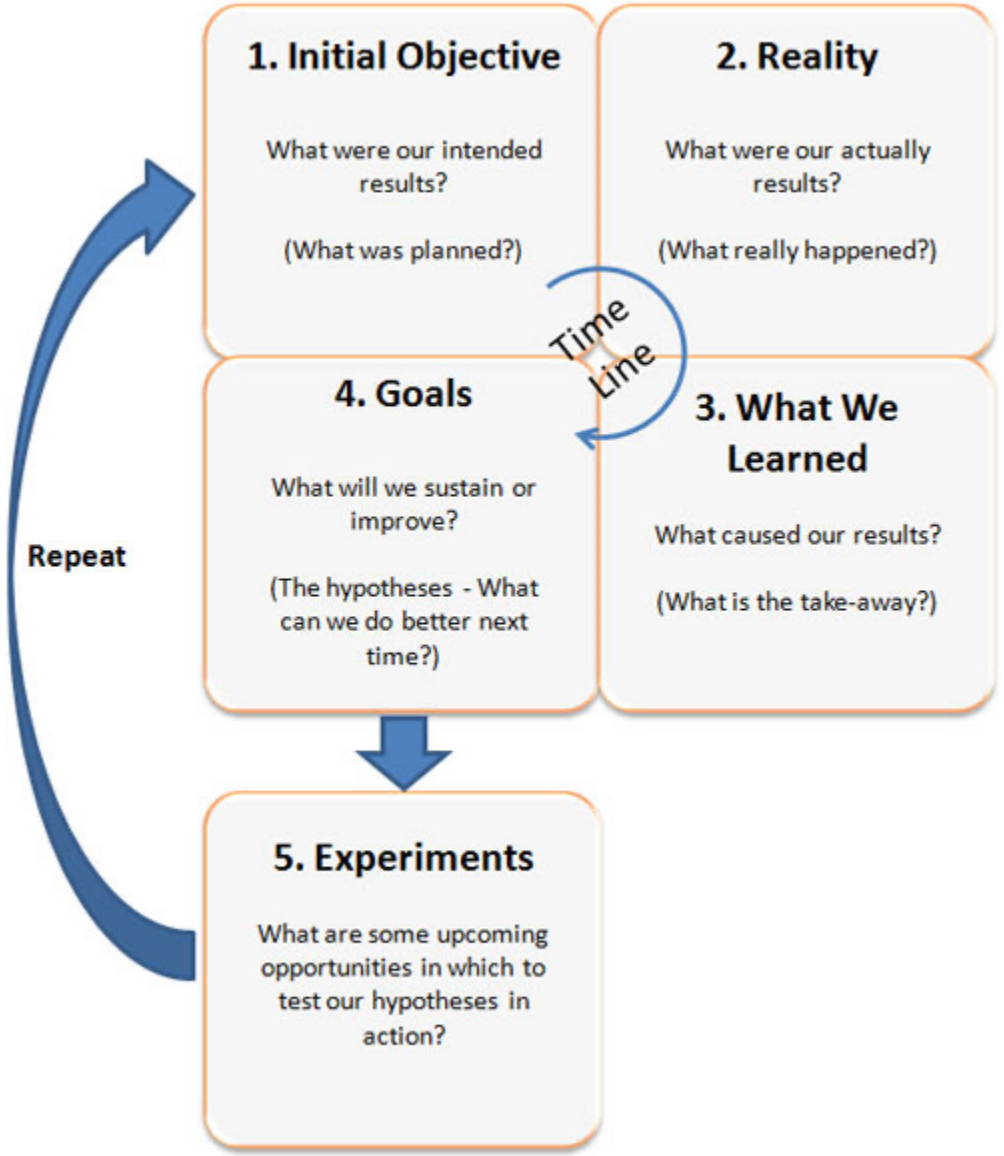

Harvard Business Review
www.hbr.org

After-action reviews identify past mistakes but rarely enhance future performance. Companies wanting to fully exploit this tool should look to its master: the U.S. Army's standing enemy brigade, where soldiers learn and improve even in the midst of battle.

Learning in the Thick of It

by Marilyn Darling, Charles Parry, and Joseph Moore

Steps and Guidelines for Conducting an AAR



Debrief Checklist

The team should address the following questions during a debrief:

- Communication clear?
- Roles and responsibilities understood?
- Situation awareness maintained?
- Workload distribution equitable?
- Task assistance requested or offered?
- Were errors made or avoided? Availability of resources?
- What went well, what should change, what should improve?

Handoffs, Turnovers, and Teamwork…

There are only two ways to improve a process:

- **Reduce the number of steps or**
- **Improve the reliability of each step**

IHI.org Improvement Tip

Handoffs - Multiple Potential Standardized Formats Are Available:

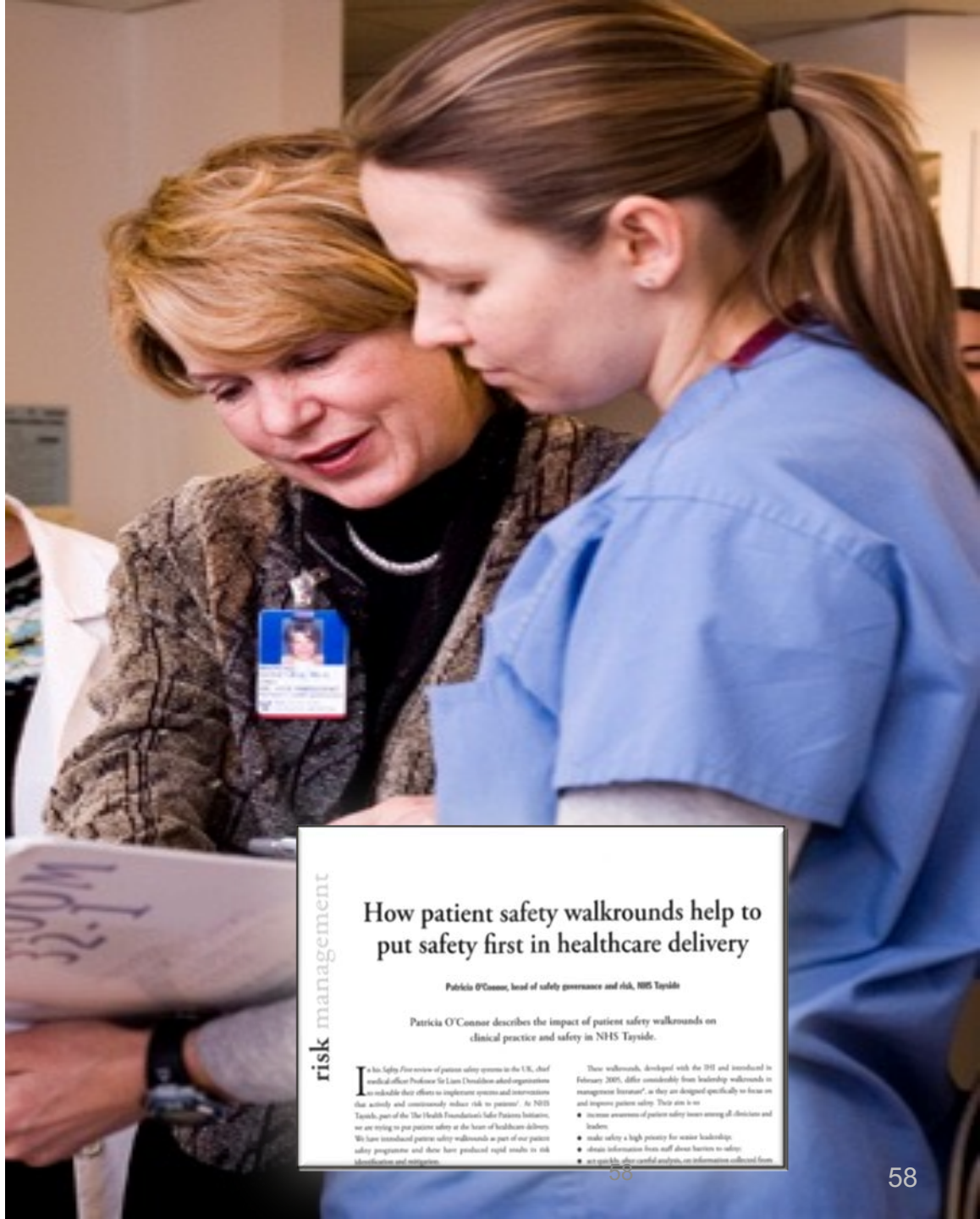
- The Five-P's -- Sentara
- I PASS the BATON - the Department of Defense's Patient Safety Program
- SBAR + 2 - Crew Resource Management
- HANDOFFS - TeamHealth
- Safer Sign Out

Risk Surveillance & Reporting

Patient Safety Leadership WalkRounds

"Rounding For Safety"

- **Can you think of any recent events that have resulted in prolonged stays for a patient?**
- **Have there been any near misses that almost caused patient harm but didn't?**
- **Have there been recent incidents you can think of where a patient was harmed?**
- **What aspects of the environment are likely to lead to the next patient harm incident?**
- **Is there anything we can do to prevent the next adverse event?**
- **Can you think of a way in which the system or your environment fails you on a consistent basis?**



A Case Study:

Deploying a Systems Approach to Managing High Risk Clinical Presentations: *Implementing Clinical "Red Rules", Best Practices, and Pathways…*

- Acute Myocardial Infarction
- Stroke
- Appendicitis
- Chest Pain (ACS and Non-ACS)
- Open Wounds
- Abdominal/pelvic pain
- Meningitis
- Spinal Fracture
- Aortic Aneurysm
- Acute Testicular Torsion

Missed and Delayed Diagnoses in the Emergency Department: A Study of Closed Malpractice Claims From 4 Liability Insurers

Allen Kachalia, MD, JD
Tejal K. Gandhi, MD, MPH
Ann Louise Puopolo, BSN, RN
Catherine Yoon, MS
Eric J. Thomas, MD, MPH
Richard Griffey, MD, MPH
Troyen A. Brennan, MD, JD
David M. Studdert, LLB, ScD

From the Division of General Medicine (Kachalia, Gandhi, Puopolo, Brennan) and Department of Emergency Medicine (Griffey), Brigham and Women's Hospital, Boston, MA; Harvard School of Public Health, Boston, MA (Yoon, Brennan, Studdert); and the University of Texas Health Science Center, Houston, TX (Thomas).

Study objectives: Diagnostic errors in the emergency department (ED) are an important patient safety concern, but little is known about their cause. We identify types and causes of missed or delayed diagnoses in the ED.

Methods: This is a review of 122 closed malpractice claims from 4 liability insurers in which patients had alleged a missed or delayed diagnosis in the ED. Trained physician reviewers examined the litigation files and the associated medical records to determine whether an adverse outcome because of a missed diagnosis had occurred, what breakdowns were involved in the missed diagnosis, and what factors contributed to it. Main outcome measures were missed diagnoses, process breakdowns, and contributing factors.

Results: A total of 79 claims (65%) involved missed ED diagnoses that harmed patients. Forty-eight percent of these missed diagnoses were associated with serious harm, and 39% resulted in death. The leading breakdowns in the diagnostic process were failure to order an appropriate diagnostic test (58% of errors), failure to perform an adequate medical history or physical examination (42%), incorrect interpretation of a diagnostic test (37%), and failure to order an appropriate consultation (33%). The leading contributing factors to the missed diagnoses were cognitive factors (96%),

Patient Safety and Error - Prioritizing High-Risk, High-Volume or Problem-Prone Presentations

- ‘Diagnostic errors occur more often when diagnosis is difficult.’
- ‘The AHRQ report provides direction toward targeted solutions, a key insight being that just 15 clinical conditions accounted for 68% of diagnostic errors associated with high-severity harms’
- ‘Most of these conditions belong to 3 disease categories - vascular events, infections, and cancer (the “big three”).’

Opinion

VIEWPOINT

Misdiagnosis in the Emergency Department
Time for a System Solution

Jonathan A. Edlow, MD
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Peter J. Pronovost, MD, PhD
University Hospitals, Shaker Heights, Ohio.

The Agency for Healthcare Research and Quality (AHRQ) commissioned a systematic review of diagnostic errors in the emergency department (ED) that was conducted by the Johns Hopkins University Evidence-Based Practice Center and released on December 15, 2022.[1] Few will read the entire 744-page document. However, most will read the eye-catching finding: "With 130 million U.S. ED visits, estimated rates for diagnostic error (5.7%), misdiagnosis-related harms (2.0%), and serious misdiagnosis-related harms (0.3%) could translate to more than 7 million errors, 2.5 million harms, and 350 000 patients suffering potentially preventable permanent disability or death."

Studies that report large numbers of medical harms often produce reactions of alarm from some and outrage from others. The major US emergency medicine societies wrote a joint response to the AHRQ report that, based on serious methodological concerns, challenges the AHRQ report's conclusions.[2] Diagnostic errors are especially prone to raise concern among clinicians because they are associated with physicians' self-identity and are often viewed as personal failings resulting in feelings of shame rather than as a signal to investigate the systems issues behind the problem. Because the underlying data are often imperfect, physicians often challenge their accuracy rather than interpret them as a call for improvement. To help with the transition from data to improvements, we offer 3 insights.

> The health care profession needs to accept that physicians, being human, are fallible—systems of care to reduce diagnostic errors to a minimum must be designed.

First, diagnostic errors are universal and implicate all specialties and areas of health care. The AHRQ report notes that diagnostic error rates estimated in the ED are remarkably similar to those in other areas of medicine. The report estimates a total ED diagnostic error rate of 5.7%[1] and notes that other studies have found a 6.3% rate among primary care patients[3] and roughly 8% in hospital autopsies.[4] The AHRQ report estimates that serious harms occur in 0.3% of ED visits and notes other studies indicate a 0.1% rate in primary care and 0.4% in hospitalized patients.[1] Even if the data from a heterogeneous group of studies analyzed in the report do not allow such precise point estimates of error, all agree that there is room for improvement in diagnostic accuracy in the ED.[1,2] The error and harm rates cited for ED visits, primary care patients, and hospitalized patients are very similar, even though emergency clinicians see any and all patients, unscheduled, under great time pressure, often in an overcrowded, chaotic environment with frequent distractions. As the AHRQ report acknowledges, "The ED is one of the most challenging clinical settings to practice medicine." That diagnostic errors are not higher in emergency medicine is, in the words of the report, "a testament to the skill and capability of practicing emergency physicians."

Diagnosis is not always simple. Some diagnoses can be made accurately at a glance; others are difficult during the first hours, and some clinical problems are even undiagnosable early in their course. These diagnoses may be obvious days later, after more testing, more clinicians' input, or simply more time, which can be the diagnostician's friend. Studies that use a reference standard of the diagnosis at 30 days after an ED visit or at hospital discharge may classify a patient whose diagnosis changes with more data as a diagnostic error. They are diagnostic errors, but they are not necessarily preventable and may not cause the harm to the patient.

The factor of time is intrinsic to emergency medicine, where the goal is not necessarily to make a specific diagnosis every time, but rather, to make a safe disposition (treat time-dependent conditions, hospitalize some patients for further evaluation, or discharge others for further outpatient care). A safe disposition with an incomplete diagnosis is an acceptable outcome of ED care. Nevertheless, an incorrect diagnosis due to incomplete data resulting in harm should still be a target for system-based diagnostic quality improvement.

Diagnostic errors occur more often when diagnosis is difficult. We rarely misdiagnose strokes presenting with unilateral weakness, but diagnosing stroke in patients presenting with dizziness and vomiting is intrinsically trickier and misdiagnosis is frequent.[5] The AHRQ report provides direction toward targeted solutions, a key insight being that just 15 clinical conditions accounted for 68% of diagnostic errors associated with high-severity harms, which makes the problem far more tractable. Most of these conditions belong to 3 disease categories—vascular events, infections, and cancer (the "big three").[6] These are top causes of disease and death across clinical settings, so they should be prime targets for interventions.

Reduction of diagnostic errors should be viewed as a system issue across all health care settings and specialties. Policy makers, the private sector, and physicians

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DE GRUYTER

Diagnosis 2019; 6(3): 227–240

David E. Newman-Toker*, Adam C. Schaffer, C. Winnie Yu-Moe, Najilla Nassery, Ali S. Saber Tehrani, Gwendolyn D. Clemens, Zheyu Wang, Yuxin Zhu, Mehdi Fanai and Dana Siegal*

Serious misdiagnosis-related harms in malpractice claims: The “Big Three” – vascular events, infections, and cancers

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Received March 6, 2019; accepted April 28, 2019; previously published online July 11, 2019

Abstract

Background: Diagnostic errors cause substantial preventable harm, but national estimates vary widely from 40,000 to 4 million annually. This cross-sectional analysis of a large medical malpractice claims database was the first phase of a three-phase project to estimate the US burden of serious misdiagnosis-related harms.

Methods: We sought to identify diseases accounting for the majority of serious misdiagnosis-related harms (morbidity/mortality). Diagnostic error cases were identified from Controlled Risk Insurance Company (CRICO)'s Comparative Benchmarking System (CBS) database (2006–2015), representing 28.7% of all US malpractice claims. Diseases were grouped according to the Agency for Healthcare Research and Quality (AHRQ) Clinical Classifications Software (CCS) that aggregates the International Classification of Diseases diagnostic codes into clinically sensible groupings. We analyzed vascular events, infections, and cancers (the “Big Three”), including frequency, severity, and settings. High-severity (serious) harms were defined by scores of 6–9 (serious, permanent disability, or death) on the National Association of Insurance Commissioners (NAIC) Severity of Injury Scale.

Results: From 55,377 closed claims, we analyzed 11,592 diagnostic error cases [median age 49, interquartile range (IQR) 36–60; 51.7% female]. These included 7379 with high-severity harms (53.0% death). The Big Three diseases accounted for 74.1% of high-severity cases (vascular events 22.8%, infections 13.5%, and cancers 37.8%). In aggregate, the top five from each category (n = 15 diseases) accounted for 47.1% of high-severity cases. The most frequent disease in each category, respectively, was stroke, sepsis, and lung cancer. Causes were disproportionately clinical judgment factors (85.7%) across categories (range 82.0–88.8%).

Conclusions: The Big Three diseases account for about three-fourths of serious misdiagnosis-related harms. Initial efforts to improve diagnosis should focus on vascular events, infections, and cancers.

Keywords: diagnosis; diagnostic errors; health services research; malpractice; medical errors.

Introduction

Diagnostic error is recognized as a major source of preventable harms in US healthcare, but current estimates of

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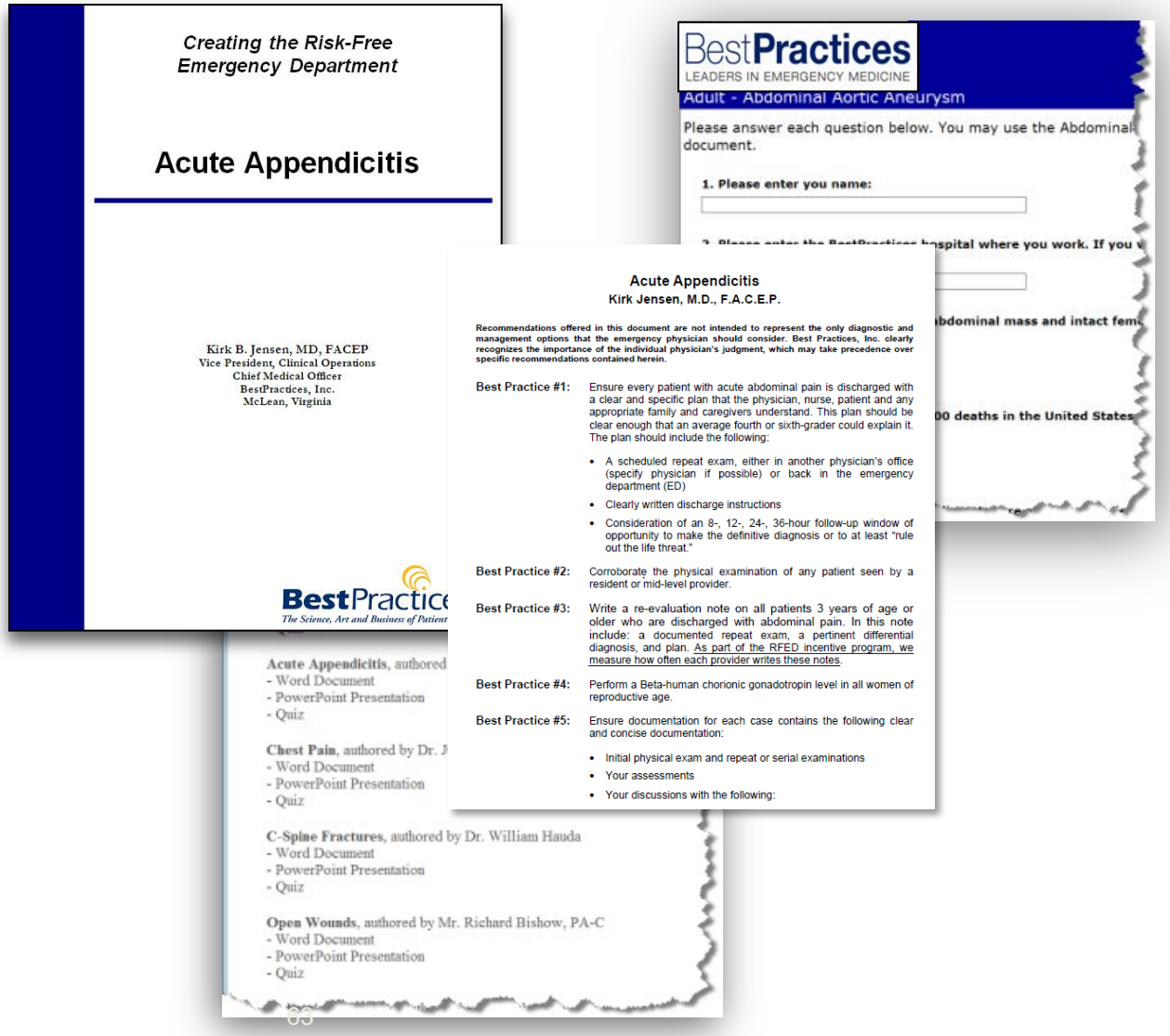
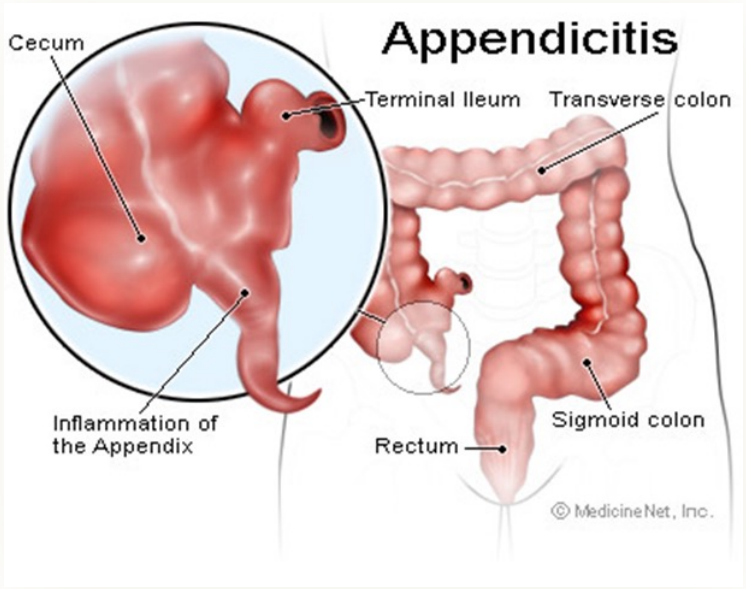
Creating the 'Risk-Free' Emergency Department (RFED)- Acute Appendicitis



Acute Appendicitis

- **Best Practice #1**: Ensure every patient with acute abdominal pain is discharged with a clear and specific plan that includes a scheduled repeat exam in the next 12-24 hours and clearly written discharge instructions.
- **Best Practice #2:** Corroborate the physical examination of any patient seen by a resident or APP.
- **Best Practice #3:** Ensure there are at least two documented exams in the patient's chart.
- **Best Practice #4:** Perform a Beta-human chorionic gonadotropin level in all women of reproductive age.
- **Best Practice #5:** Ensure documentation for each case contains the following clear and concise documentation:
  - Initial physical exam and repeat or serial examinations
  - Your assessments including differential diagnosis.
- **Best Practice #6:** In patients with typical presentations of appendicitis, contact a surgeon as quickly as is reasonable to ascertain whether or not the patient can receive surgery without diagnostic studies. Long stays in the ED may increase the chance of perforation, and so malpractice risk.
- **Best Practice #7:** In adults with possible appendicitis who receive an abdominal/pelvic CT:
  - A CT with no contrast (IV, oral or rectal) may be performed in patients where appendicitis is the primary concern and other diagnoses (e.g. diverticulitis, cancer, obstruction) are less likely.
- **Best Practice #8:** In children, using ultrasound before CT as a staged approach to minimize ionizing radiation exposure.
  - In patients with a high level of suspicion for appendicitis and a negative non-contrast CT, perform a CT with IV and oral contrast.
- **Best Practice #9:** When a patient with possible appendicitis is discharged from the ED, write a note in the chart that synthesizes your thoughts as to why the patient does not have appendicitis (e.g., results of laboratory tests, imaging studies, and serial examinations) and the differential diagnosis you considered in the patient.

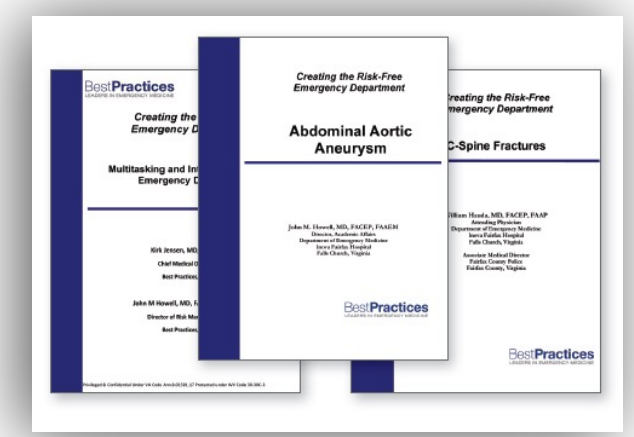


Building Out a High Reliability Organization (HRO) ED

Our Approaches and Tools-RFED

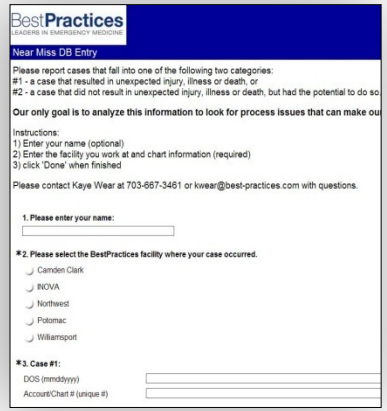
25 Modules

Available online and eligible for CME credit



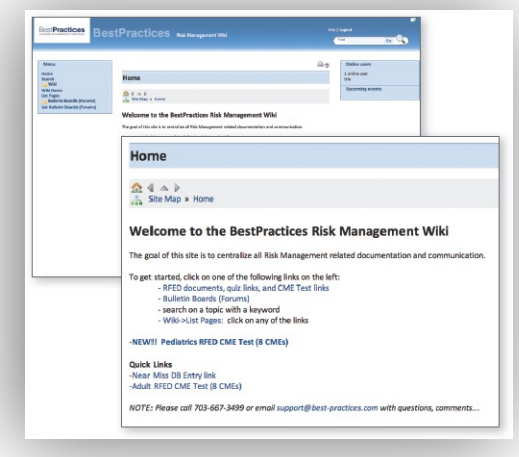
Near Miss Database

Tracking events and identifying trends



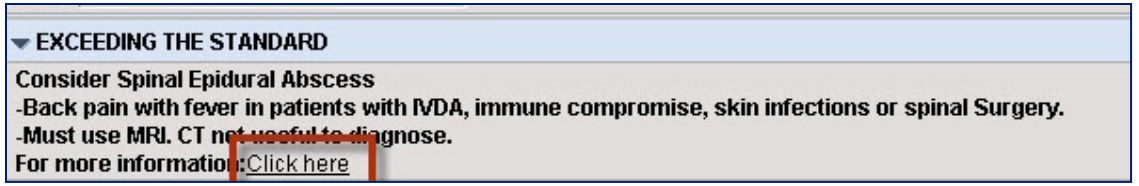
Risk Wiki

An online community of BP clinicians



EMR Integration

Decision support based on evidence-based protocols



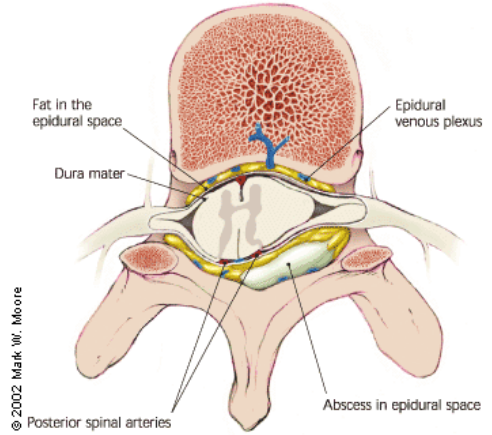
Enhancing Reliability - Scribes

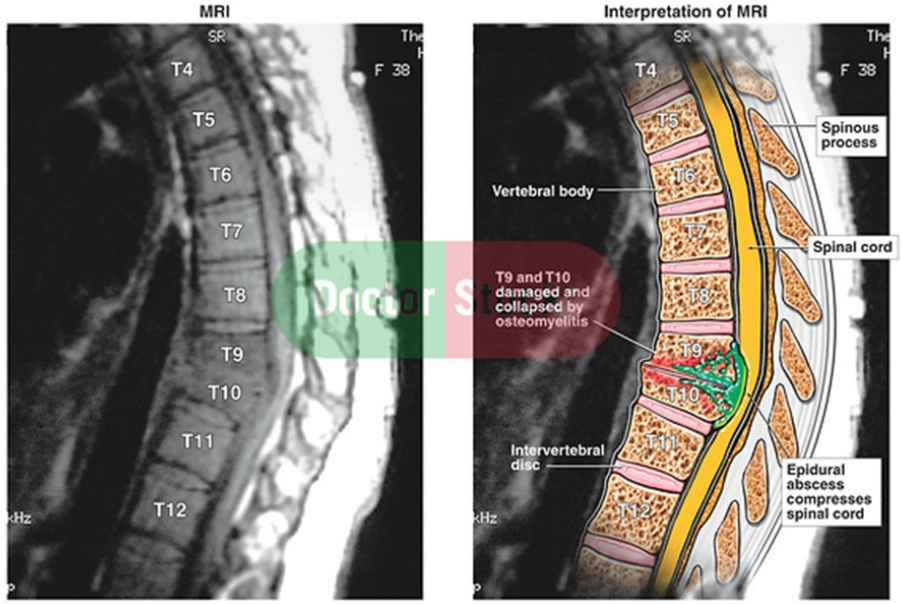
Scribes prompted the Clinician real-time to document

	Percent of Records In Compliance	
	Pre-Intervention	Post-Intervention
ABDOMINAL PAIN		
Radiology Results Documented	24%	92%
2nd Physical Exam Documented	20%	98%
D/C Note Documented	28%	98%
CHEST PAIN		
Radiology Results Documented	16%	98%
EKG Results Documented	26%	100%
D/C Note Documented	36%	98%

Spinal Epidural Abscess

- Identified by the database, confirmed by surveillance of open malpractice cases
- Evidence based education
- Increased frequency may be due to MRSA
- We have had a few great saves as a result
- Continue to monitor database for spikes in frequency
- Within 6 months, 8 “victories” on SEA patients…





The Risk-Free ED and EBM Results

- A **70% reduction in one year** in incidents
- **Decreased** loss runs
- **Decreased** loss reserves
- **Decreased** malpractice premiums
- **Increased** physician satisfaction

High Leverage Patient Safety Strategies:

- Human Resource Strategies
- Operations Management and Patient Flow
- Teamwork and Communication
- Emphasizing a Culture of Reliability
- Risk Surveillance and Outcomes Measurement
- Managing High Risk Presentations

With an Emphasis on Approaches That We Can Actually Implement…

High Leverage Patient Safety Strategies

- ❑ Define your Why…
- ❑ Pick one or two approaches to emphasize
- ❑ Track your progress and results
- ❑ Hardwire the process
- ❑ Start over with another one…

The #1 Reason To Commit To This Is …

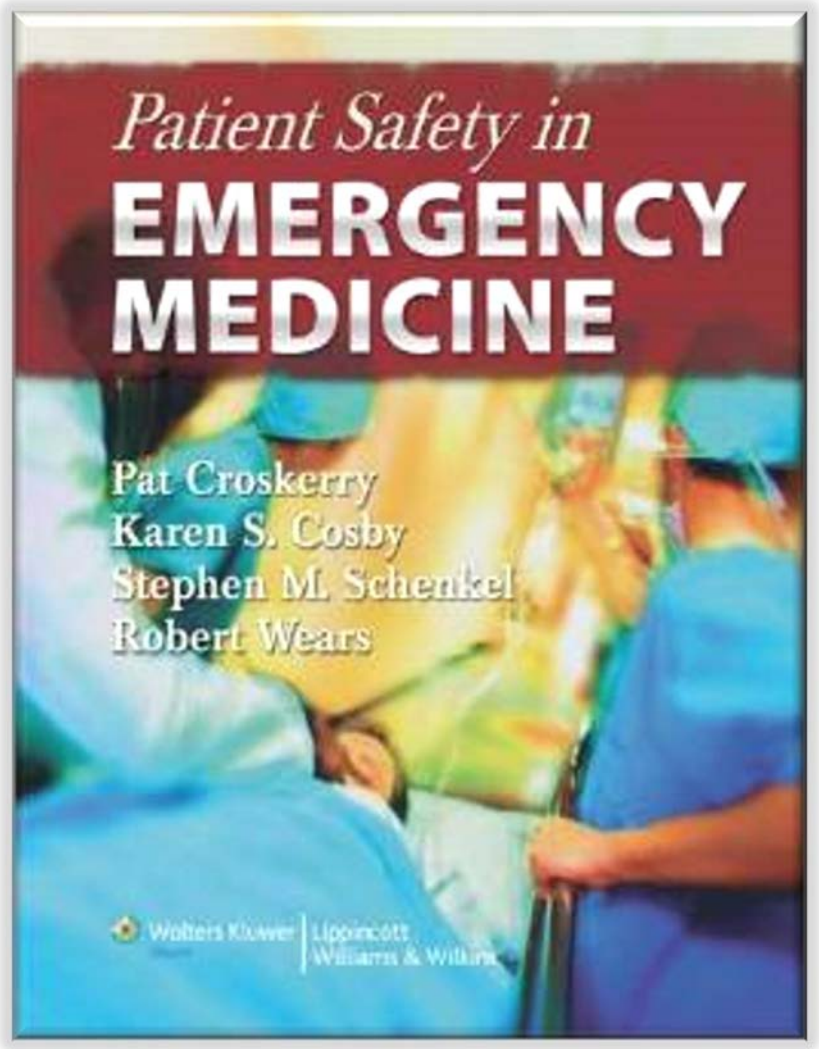
"It's good for our patients …
and it's good for
our people who take care of our
patients…"

~ THOM MAYER, MD

Patient Safety in Emergency Medicine

August 18, 2008

by Pat Croskerry MD (Editor), Karen S. Cosby MD FACEP (Editor), Stephen M. Schenkel MD MPP (Editor), Robert L. Wears MD MS (Editor)



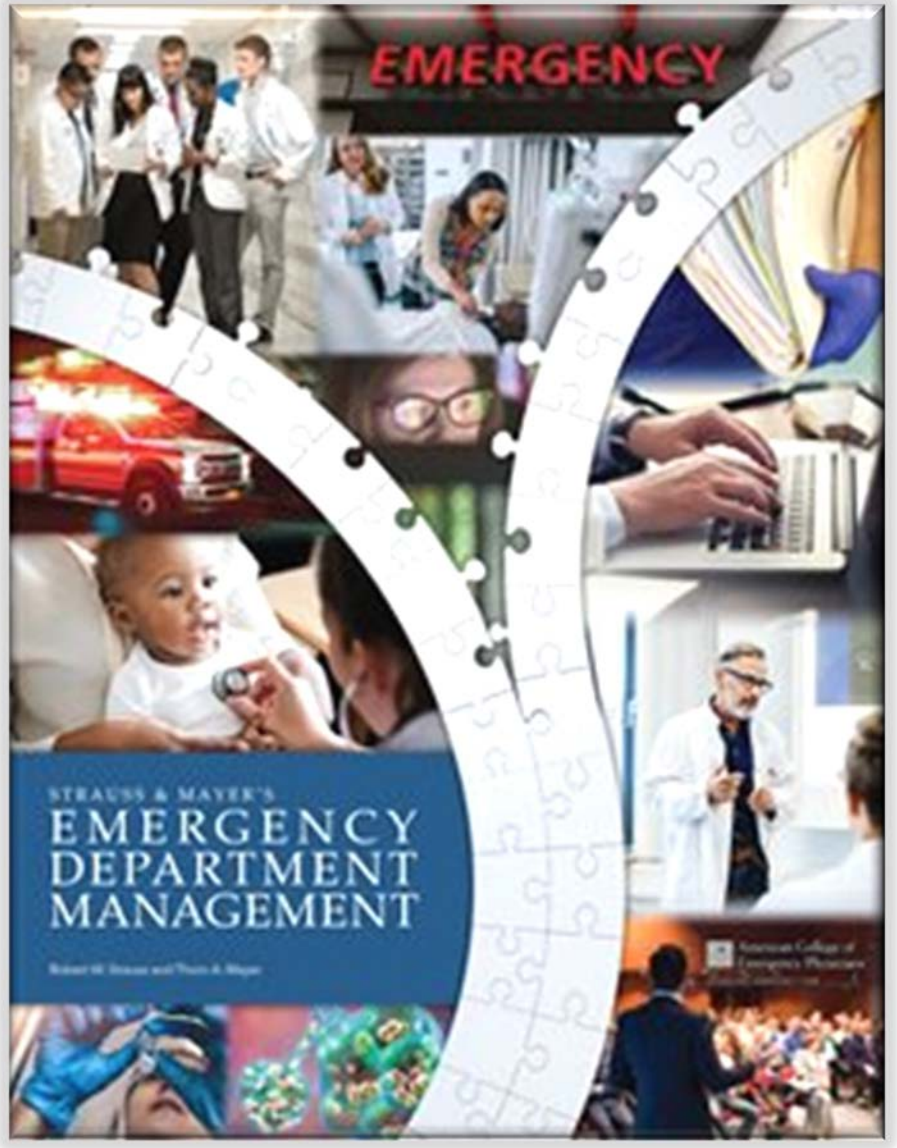
Strauss and Mayer's Emergency Department Management

Second Edition – October 2021

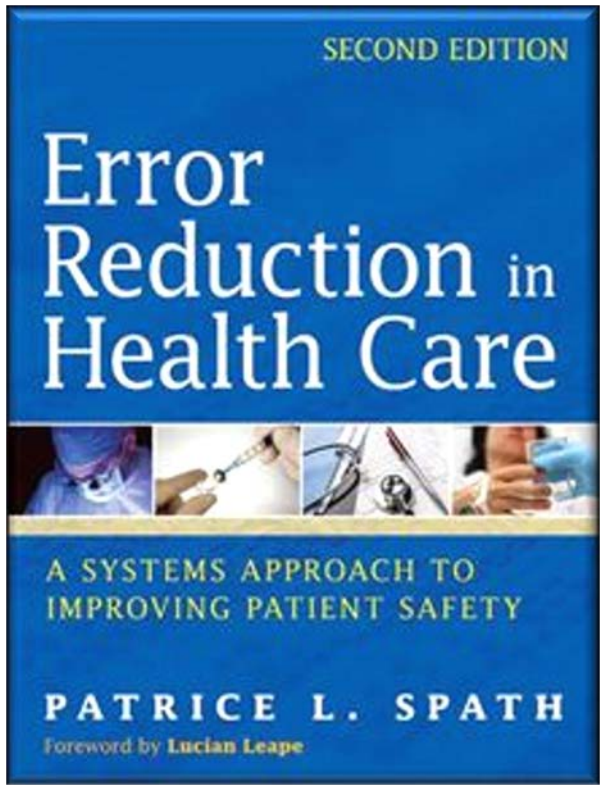
- Robert W. Strauss MD, Thom A. Mayer, MD, Chief editors
- Kirk B Jensen, MD, MBA, FACEP, Senior Associate Editor (as well as Section Editor – S-1-Leadership Principles, S-3 - Operations: Flow S-6 – Quality and Service, S-11 - Malpractice)

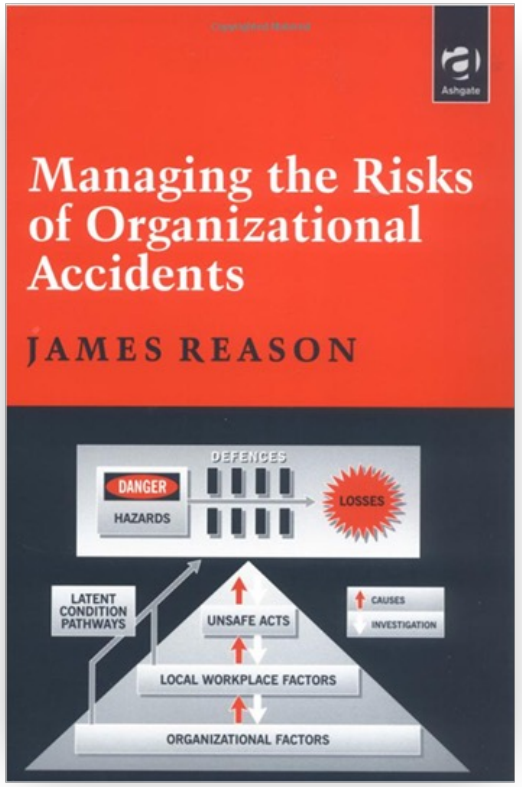
Publisher: ACEP

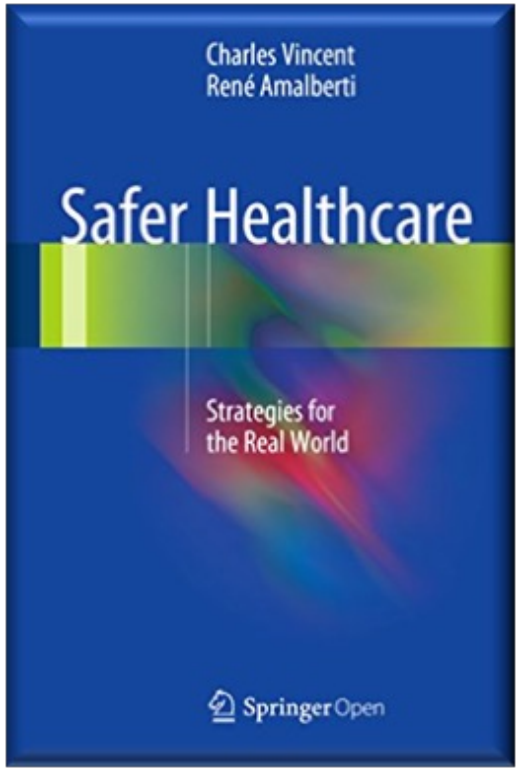
Relevant chapters on patient flow, patient safety, human cognition, risk management, teamwork, culture change, and leadership development…



Patient Safety References…



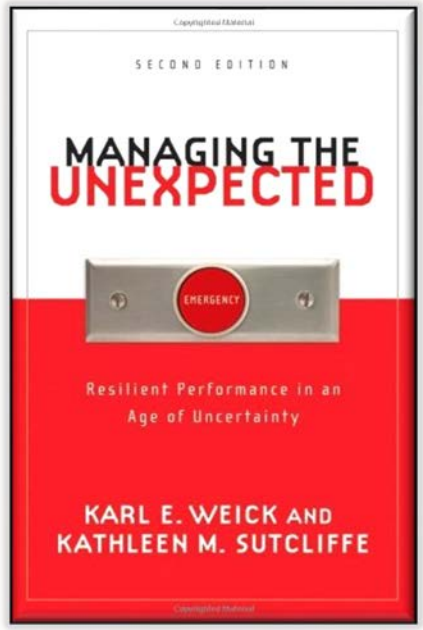




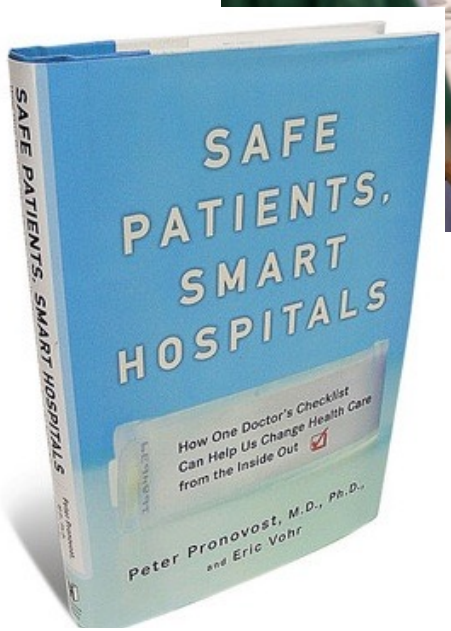
Taking a Systems Approach to Patient Safety:
High Reliability Organizations (HROs)

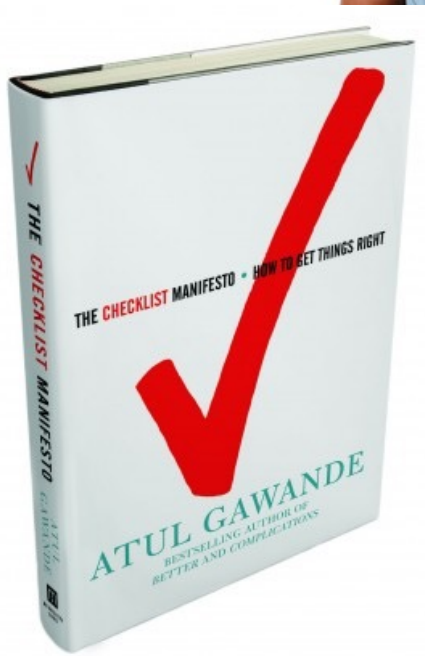
There are five characteristics of **High Reliability Organizations** that have been identified as responsible for the "**mindfulness**" that keeps them working well when facing unexpected situations:

- **Preoccupation with failure**
- **Reluctance to simplify interpretations**
- **Sensitivity to operations**
- **Commitment to resilience**
- **Deference to expertise**

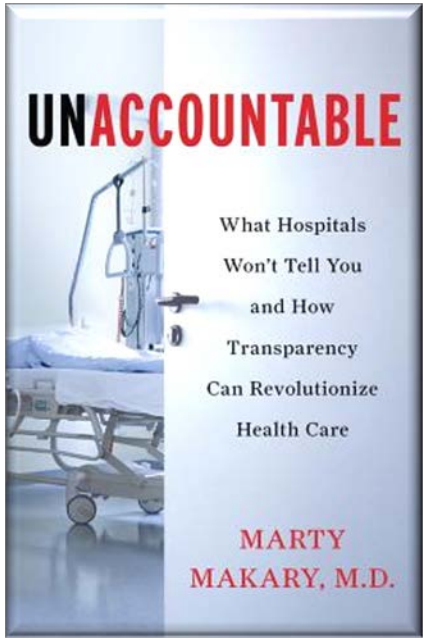


An Intensivist and a Surgeon on the Benefits of Checklists





Taking a Systems Approach to Patient Safety- Recommendations from a Practicing Surgeon:



5 Recommendations

- Online Dashboards
- Safety Culture Scores
- Cameras
- Open Notes
- No More Gagging

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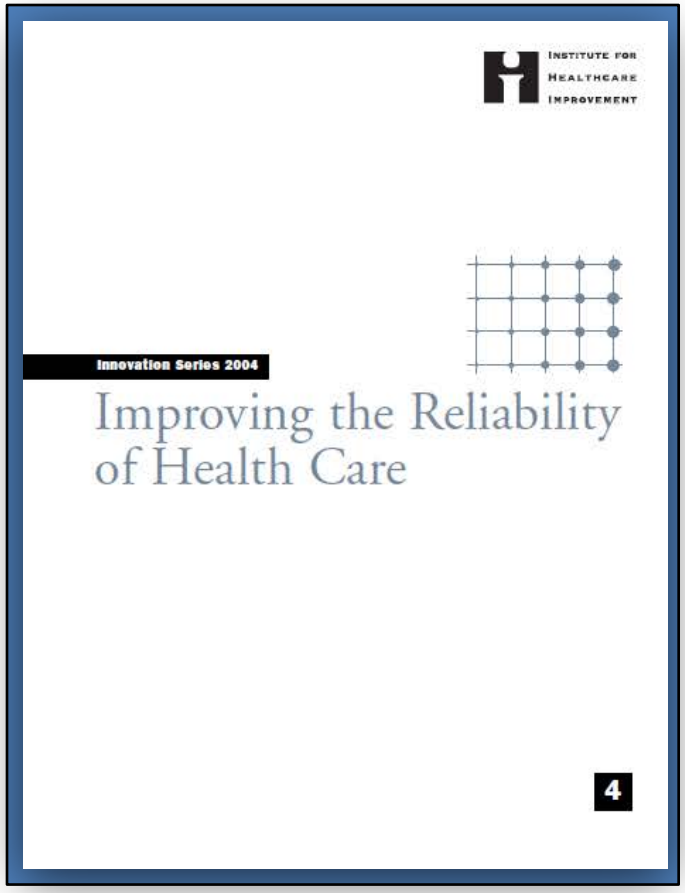


The Concept of Reliability in Emergency Medicine

Shari Welch, MD, FACEP
Kirk Jensen, MD, FACEP, MBA

Despite the fact that the United States boasts one of the most advanced health care systems in the world, this system is highly "unreliable" and fraught with error. This article is an introduction to the concept of "reliability" in emergency medicine. It suggests ways in which the health care system could promote increased reliability of operations and processes in the emergency department by using reliability principles and tools that have proven successful in other high-risk settings. Through comparisons to aviation and nuclear power, this article illustrates the differences in culture between emergency medicine and other high-risk organizations and points to the qualities that promote reliability. Finally, a specific model for reliability in the emergency department, operations, and clinical processes is proposed. (Am J Med Qual 2007;22:50-58)

Keywords: medical error; reliability; variation; high-reliability organizations; patient safety; performance improvement; emergency medicine

Although we take comfort in the knowledge that we practice in one of the most advanced health care systems in the world, the fact is that this system is highly "unreliable" and fraught with error. In his landmark article "Error in Medicine," Lucian Leape recounted a number of disturbing statistics.[1] Autopsy studies have shown that 35% to 40% of deaths are caused by missed diagnoses. One study showed that the average intensive care unit (ICU) had 1.7 errors in treatment per patient per day. When looking at operational errors, the data are even worse; for instance, positive urine cultures were either untreated or not followed up 52% of the time. More sobering still, according to a 2002 report from the Joint Commission on Accreditation of Healthcare Organizations, more than half of sentinel events involving death or permanent injury over a 7-year period occurred in the emergency department (ED).[2] Furthermore, there are data to suggest that 70% of people who leave the ED have an abnormal heart rate that would require a rapid response team.[3] How can such a high-tech medical environment prove so operationally unreliable? What can we do to change this?

RELIABILITY AND CHAOS DEFINED

When people involved in health care process improvement talk about "reliable" processes, they are referring to something specific and quantitative. According to Thomas Nolan—statistician, leading authority in health care performance improvement, and senior fellow at the Institute for Healthcare Improvement (IHI)—*reliability* is defined as "failure free operation over time, from the point of view of the patient."[4] It is the capability of a process, procedure, or health service to perform its intended function in the required time under existing conditions. Reliability is measured this way:

$$\text{Reliability} = \frac{\text{Number of actions that achieve the intended result}}{\text{Total number of actions taken}}.$$

Unreliability is often measured this way.

$$\text{Unreliability} = 1 - \text{Reliability}.$$

AUTHORS' NOTE: Dr Welch is with the Department of Emergency Medicine at LDS Hospital, Salt Lake City, UT. Dr Jansen is a faculty member of the Institute for Healthcare Improvement, Rocky Mount, NC. The authors have no affiliation with or financial interest in any product mentioned in this article. The authors' research was not supported by any commercial or corporate entity. *Corresponding author:* Shari Welch, MD, FACEP, Department of Emergency Medicine, LDS Hospital, 8th Avenue and C Street, Salt Lake City, UT 84143 (e-mail: swelch@netsworld.com).

American Journal of Medical Quality, Vol. 22, No. 1, Jan/Feb 2007
DOI:10.1177/1062860606296385

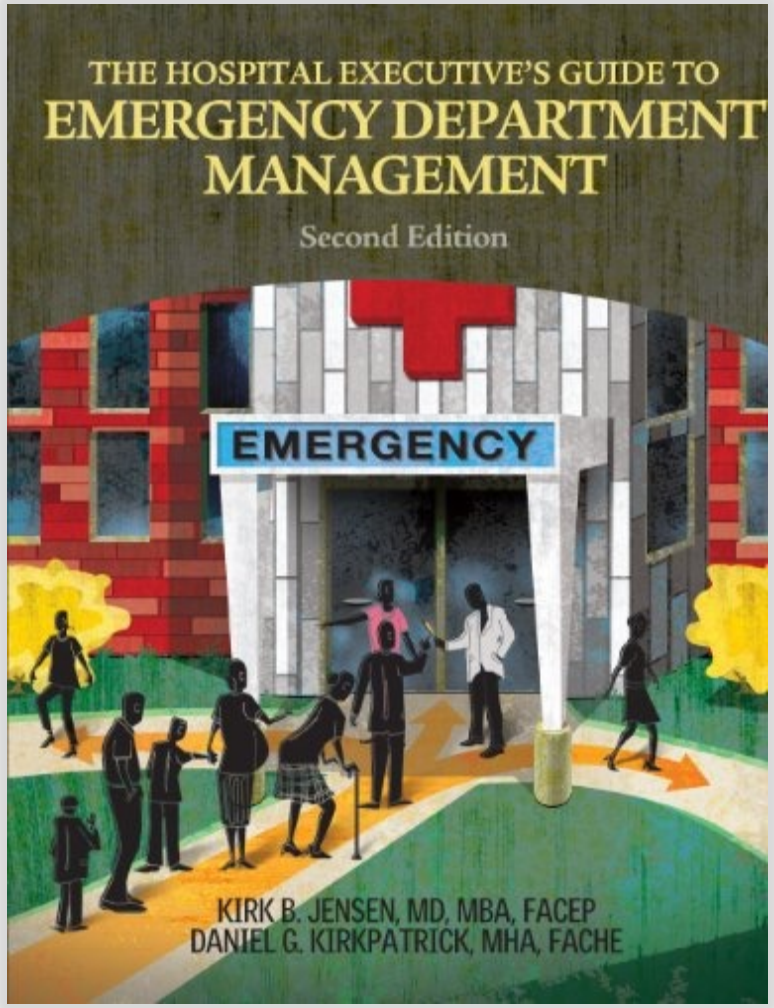
Drs. Welch and Jensen
The American Journal of Medical Quality
January 2007

The Hospital Executive's Guide to Emergency Department Management

Kirk B. Jensen, MD, FACEP
Daniel G. Kirkpatrick, MHA, FACHE

Table of Contents:

HcPro April 2014

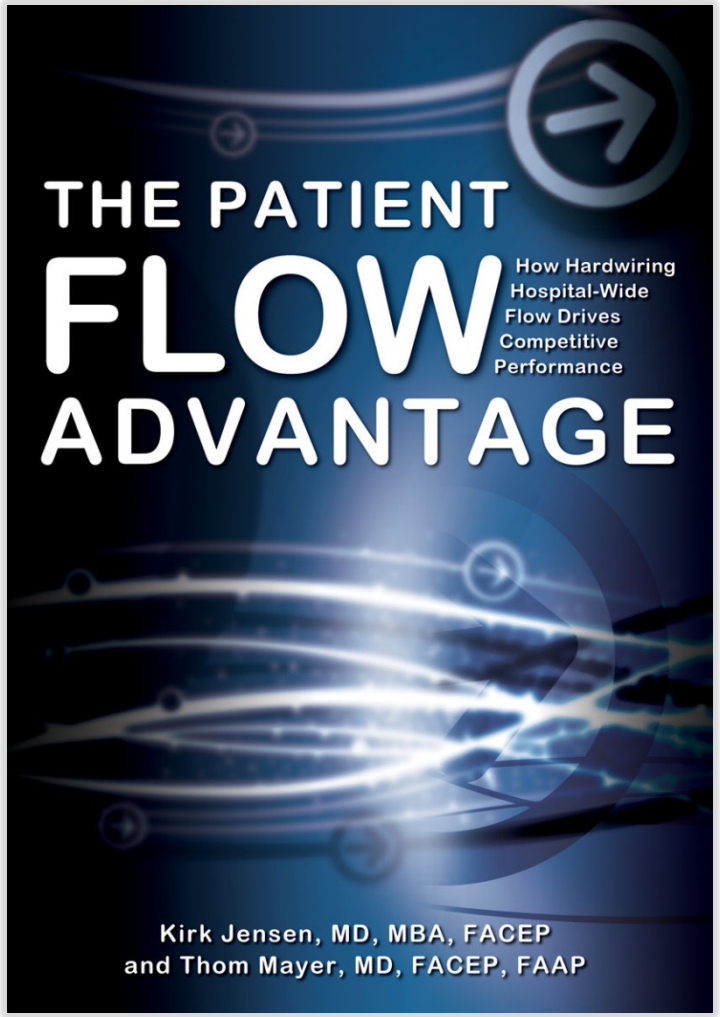


The Patient Flow Advantage:

How Hardwiring Hospital-Wide Flow Drives Competitive Performance

Kirk Jensen/Thom Mayer FireStarter Publishing, 2014

The Patient Flow Advantage: How Hardwiring Hospital-Wide Flow Drives Competitive Performance



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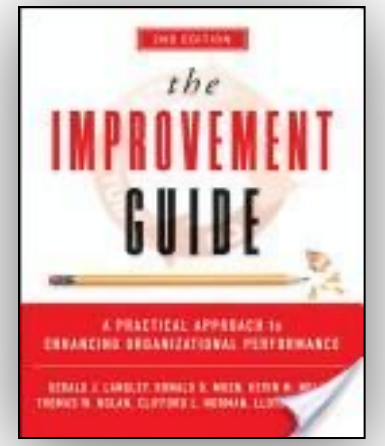
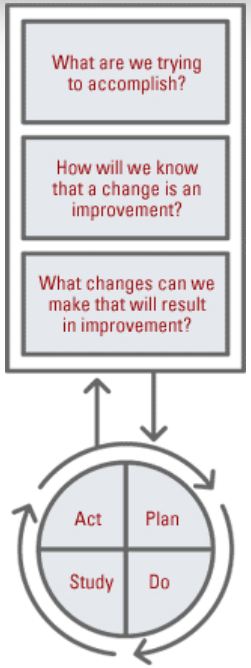
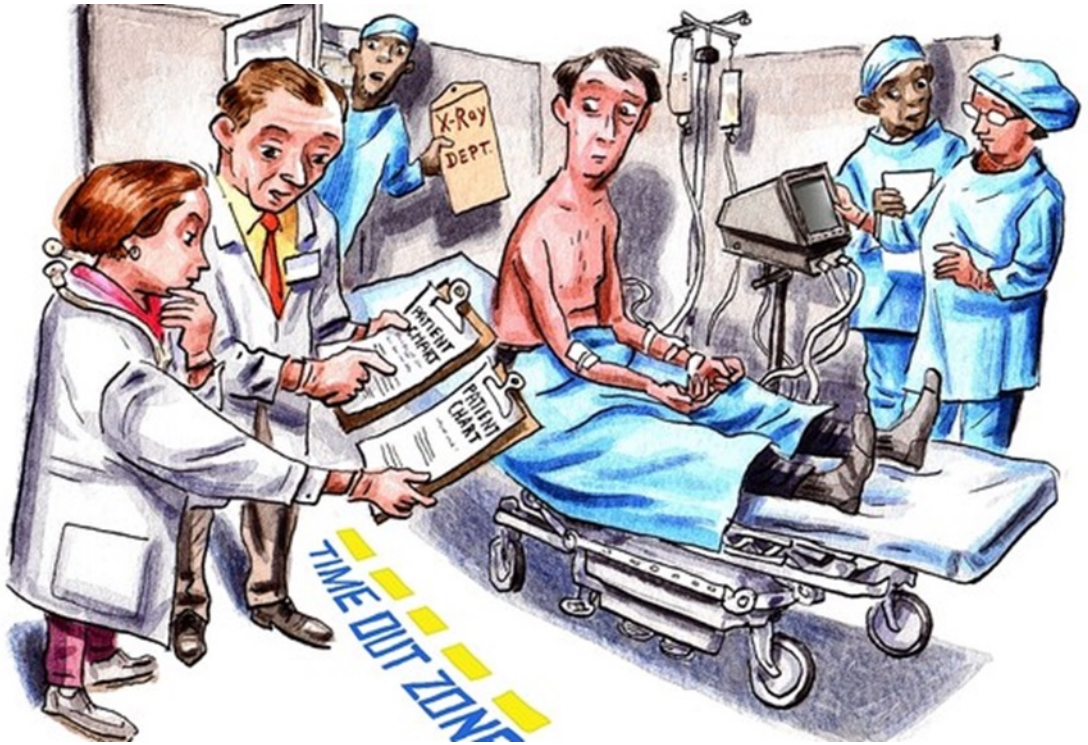




Addendum:
Select Patient Safety Issues by Specialty…



Top 10 ER Ailments in the U.S.

- Abdominal pain **4.9%**
- Chest pain **4.1%**
- Contusion with intact skin surface **3.7%**
- Acute upper respiratory infections, excluding pharyngitis **3.2%**
- Spinal disorders **3%**
- Open wound, excluding head **2.7%**
- Cellulitis and abscess **2.6%**
- Fractures, excluding lower limb **2.1%**
- Urinary tract infection, site not specified **1.9%**
- Sprains and strains, excluding ankle and back **1.8%**

DATA: CENTERS FOR DISEASE CONTROL, 2010

Making Sense of a Sickness — **WSJ Reporting**

A serious ailment can look a lot like something else in the hubbub of the emergency room, where nearly 123 million people a year are treated.

REAL CONDITION	MISTAKEN DIAGNOSIS	WHAT CAN GO WRONG
Heart attack	Indigestion, muscle strain, gallstones, bronchitis, anxiety	Failure to take medical history, perform electrocardiogram, consider heart attack risk for person under 55 years old
Stroke	Vertigo, migraine, alcohol intoxication, head trauma	Failure to order timely brain imaging tests or start intravenous stroke medication
Appendicitis	Viral gastroenteritis	Failure to perform thorough physical exam, blood tests, CT scan
Meningitis	Influenza, tension headache, migraine, muscle strain in neck	Failure to administer spinal-tap test or to administer timely antibiotics
Pulmonary embolism	Heart attack, seizure, high blood pressure	Failure to provide lung scan, ultrasounds, MRI, blood tests, or failure to administer blood-thinning drugs

There Are Patient Safety Challenges in All of Our Practices

Sources of Error In Emergency Medicine Include:

- High levels of diagnostic uncertainty;
- "Decision density," or the volume of decisions that are made in a given amount of time;
- A high amount of cognitive load needed to process the large volume of data;
- Narrow time windows for patient assessment;
- Multiple care transitions for any given patient; and
- A multitude of interruptions and distractions throughout the thought process.

Patrick Croskerry, MD, PhD, Professor of Emergency Medicine, Dalhousie University, Halifax, Nova Scotia, Canada **Medscape Emergency Medicine. 2008; ©2008 Medscape**
Posted 07/17/2008

Crowding as a Factor in Patient Mortality…

Increase in patient mortality at 10 days associated with emergency department overcrowding

Drew B Richardson

MJA 2006; 184(5):213-216

Abstract Objective:
To quantify any relationship between emergency department (ED) overcrowding and 10-day patient mortality
Design and setting:
Retrospective stratified cohort analysis of three 48-week periods in a tertiary mixed ED in 2002-2004. Mean "occupancy" (a measure of overcrowding based on number of patients receiving treatment (was calculated for 8-hour shifts and for 12-week periods. The shifts of each type in the highest

There Are Patient Safety Challenges in All of Our Practices

Sources of Error In Surgery include:

- ***Wrong-site or wrong-patient surgery***
  - Accounts for 50% of all surgeon disciplinary actions by Florida Board of Medicine
- ***Cancer***
  - Surgeon often sued for missing questionable lesions, even if very faint or subtle on imaging study
- ***Cardiac problems in patient presenting for non-cardiac surgery***
- ***Retained foreign objects***
- ***Follow-up for surgical complications– "poor or lazy follow-up"***
- ***Missed acute abdomen***
- ***Poor patient selection***

A study of 15,000 medical records in hospitals in Colorado and Utah revealed that about 54% of surgical errors are preventable.

Surgical Patient Safety Suggestions

Pre-operative

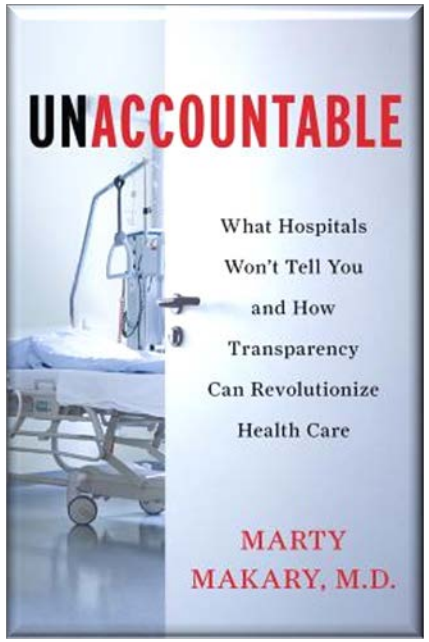
1. **If the surgery involves an amputation or removal, make sure that the area is physically marked.** Put a red "X" on the side of the body where the surgery is to be performed.
2. **Confirm the surgery site with the patient before he is anesthetized**. Ask the patient why he is in the operating room and if applicable, on which side of the body the operation is to be performed.
3. **Ask the patient if he has any allergies**-even if the question has already been asked and charted-before beginning anesthesia.
4. **Perform a verbal run-through** with the operating team of all medications to be administered during the surgical procedure.
5. **Have two members of the surgical team read** all labels aloud during the run-through.
6. **Double check to make sure** that any X-rays or other diagnostic images are positioned properly and not turned backward.

Post-operative

1. **Make sure an accurate sponge and instrument count is given. If for reasons of patient safety closure happens without a count, take the following steps:**
   - *Make sure that it is specifically mentioned in the post-operative report*
   - *As soon as it can be done safely order x-rays to be taken-or other protective measures-to make certain that no foreign objects were left in the incision*
2. **In certain emergency situations where an accurate account of sponges and instruments is not possible, make a specific note of that fact in the post-operative report.**
3. **Make note of anything unusual in the post-operative report so that the patient can be carefully monitored.**

Preventing Medical Errors: A CME Update. St. Louis University. St. Louis: TIV. 2010.

Taking a Systems Approach to Patient Safety- Recommendations from a Practicing Surgeon:



5 Recommendations

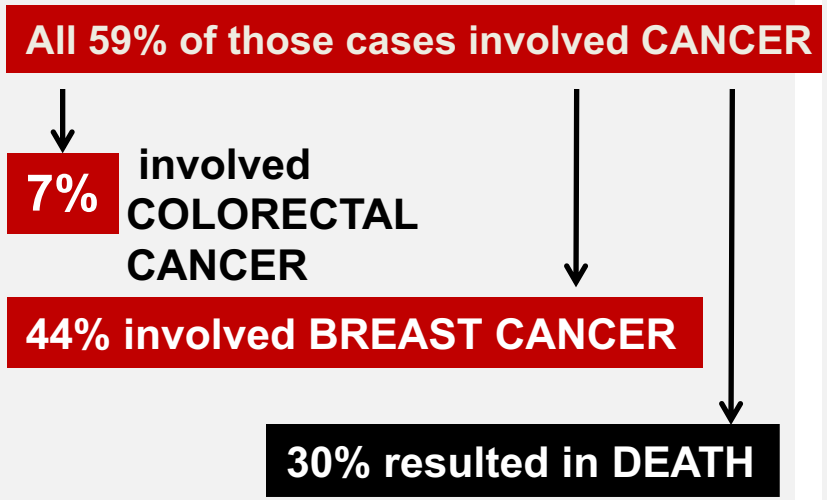
- Online Dashboards
- Safety Culture Scores
- Cameras
- Open Notes
- No More Gagging

Sources of Diagnostic Error in Internal Medicine Include:

When Mistakes Happen

Researchers reviewed malpractice awards to study the causes and effects of medical mistakes.
59% of the cases involved diagnostic errors that harmed patients.

Among claims involving **diagnostic** errors…



Note: Based on a review of 181 closed claims involving diagnostic errors by four malpractice companies

Leading Factors Contributing to Error*

Failure of Judgment	79%
Failure of vigilance or memory	59%
Knowledge	48%
Patient's behavior	46%
Handoffs to other staff	20%

***Errors can have multiple causes**

Most Common Health-Care Breakdowns*

Failure to order the right test	55%
Failure to create a follow-up plan	45%
Failure to obtain adequate history or conduct a physical	42%
Incorrectly interpret diagnostic tests	37%

Sources: Crico/RMF, Annals of Internal Medicine

Patient Safety Challenges in Our Practices

Sources of Error In Anesthesia Include:

(Closed Claims Analysis from 1975-2000)

- **Respiratory** events accounted for 36% of claims
- **Cardiovascular** events accounted for 31%

- **Medication-related** events accounted for 9%
- **Equipment-related** events accounted for 6%
- **Block-related** events accounted for 6%

Anesthesia Patient Safety Suggestions

A patient under general anesthesia is totally dependent upon the surgical team for her welfare, even her survival. Again, it is impossible to completely eliminate the possibility of mishap, but there are certain procedures that can be incorporated to help minimize it. These include:

1. **Whenever possible, the anesthesiologist should do the pre-op work up.**
2. **The most efficient monitoring devices available should be employed during the procedure.**
3. **Both the surgeon and the anesthesiologist should be accessible to the nursing staff during recovery.**
4. **Any unusual patient response to the anesthesia should be clearly noted in the post-operative report.**

Preventing Medical Errors: A CME Update. St. Louis University. St. Louis: TIV. 2010.