TRACY SANSON MD

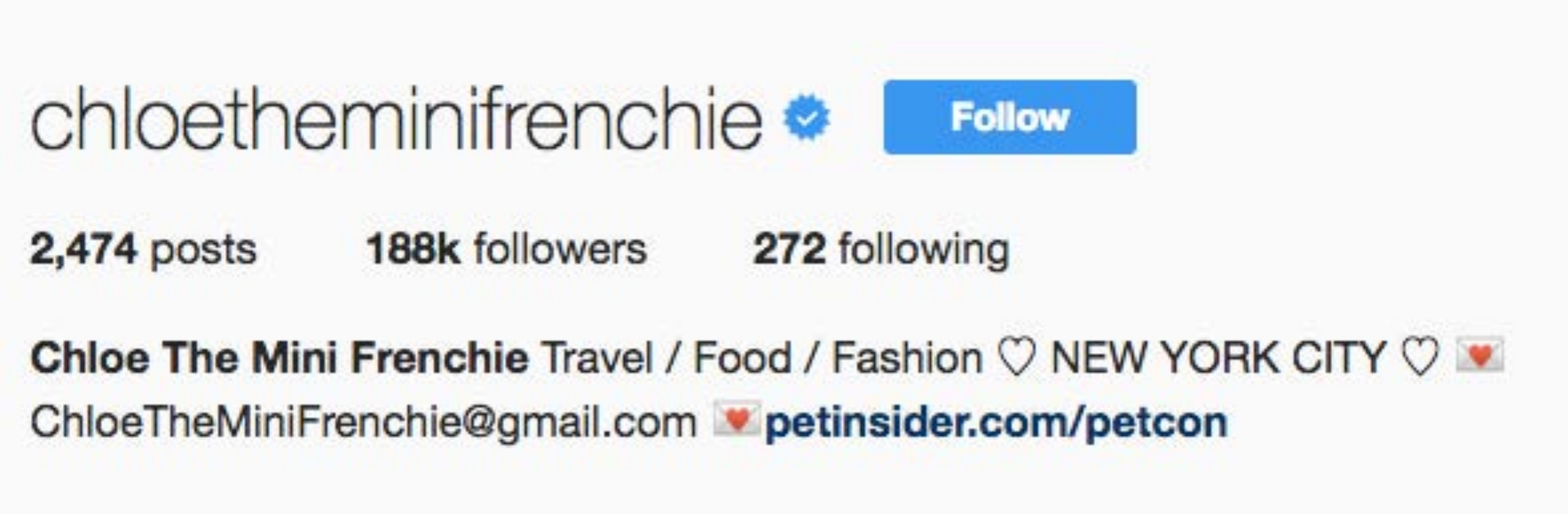
Medical Errors

Tracy Sanson MD, FACEP

Disclosure

No relevant financial relationships with a commercial interest to disclose

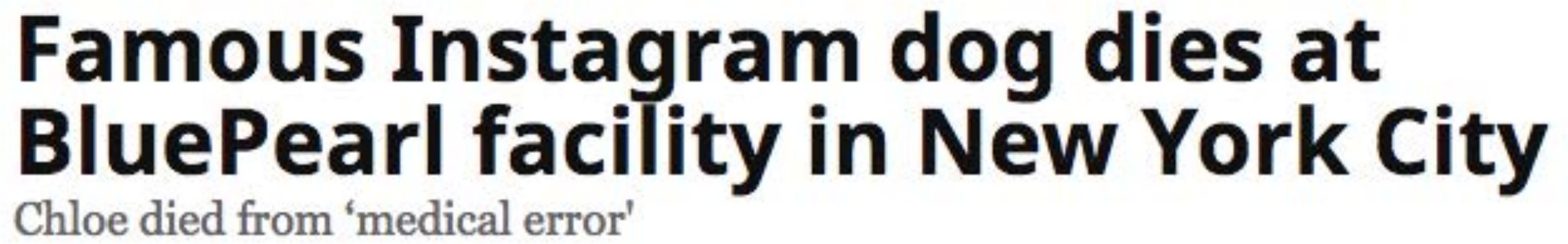
MILK-BONE



chloetheminifrenchie

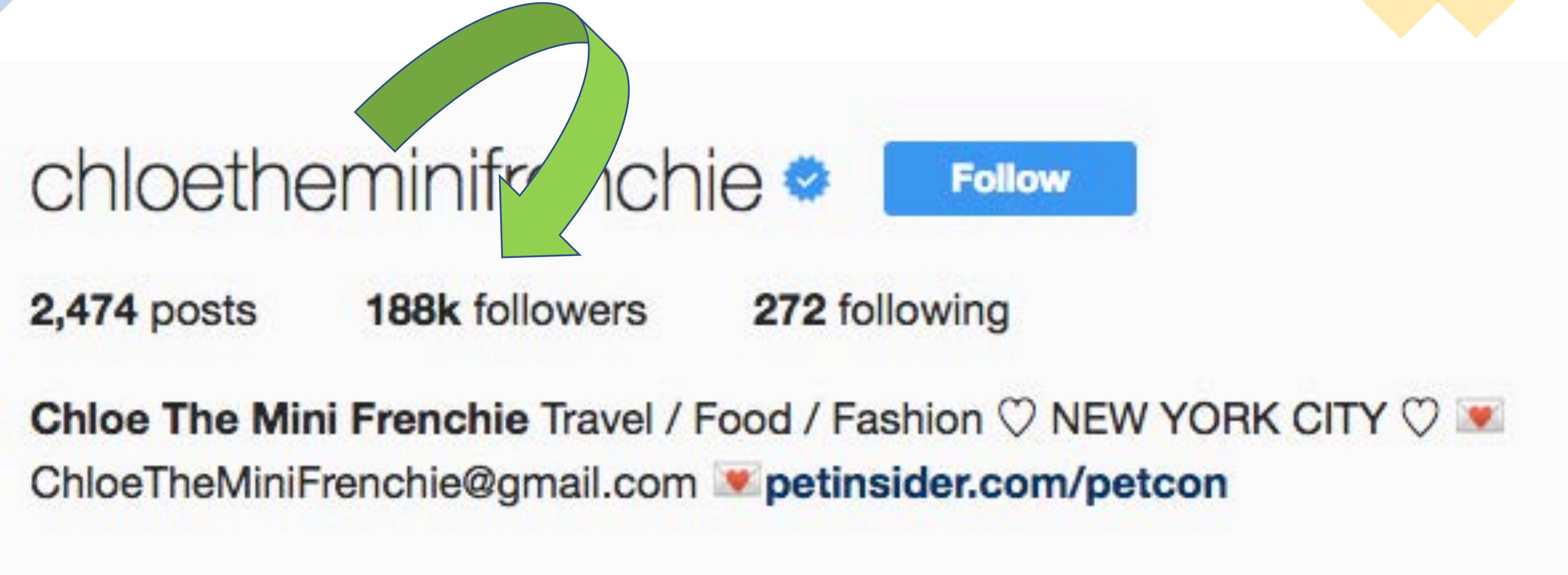
2,474 posts **188k** followers **272** following

Chloe The Mini Frenchie Travel / Food / Fashion ♡ NEW YORK CITY ♡ 💌
ChloeTheMiniFrenchie@gmail.com 💌 **petinsider.com/petcon**



Famous Instagram dog dies at BluePearl facility in New York City

Chloe died from ‘medical error'



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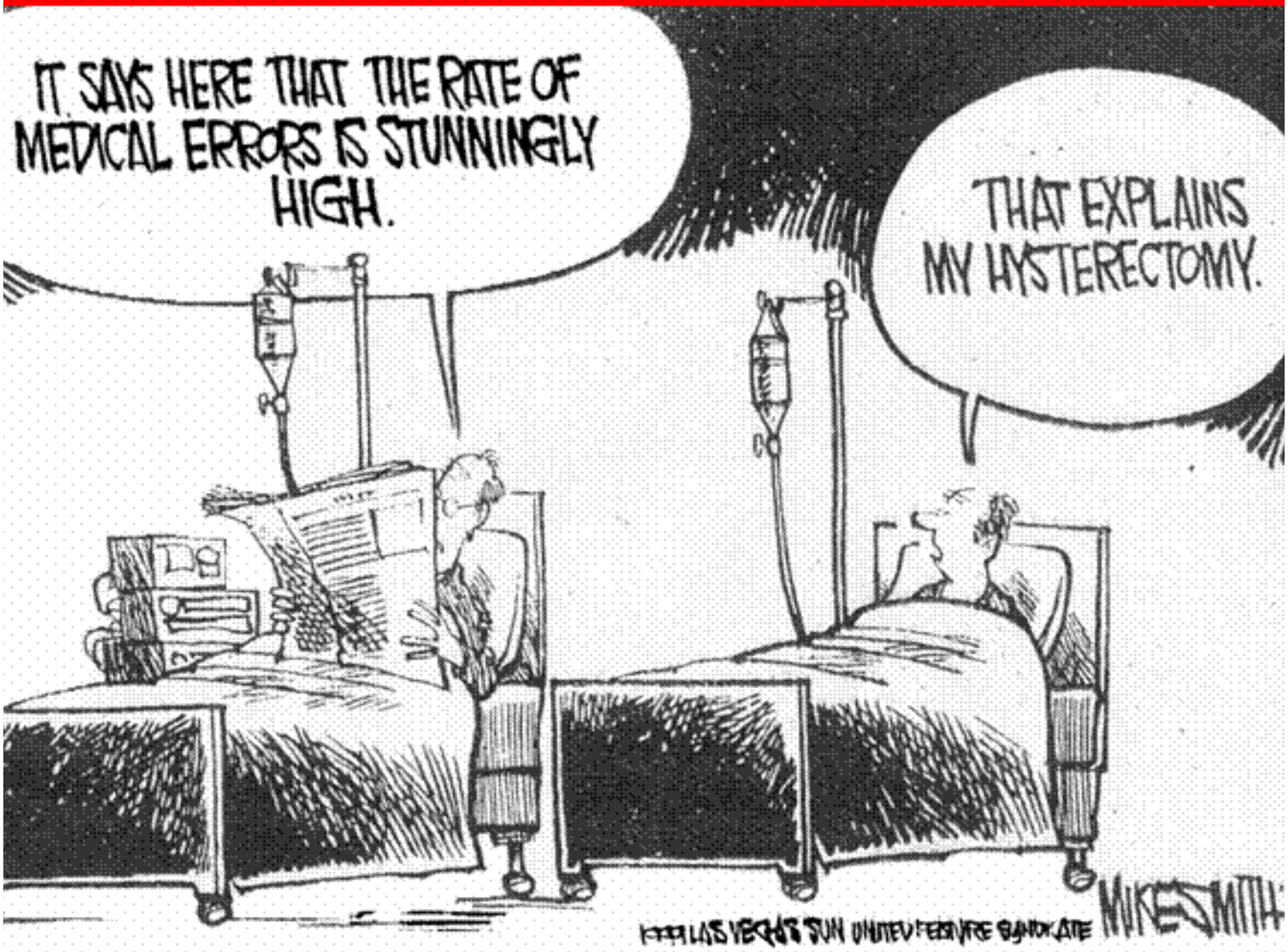
Risk Reduction

FEDERAL
EXPRESS


IT SAYS HERE THAT THE RATE OF MEDICAL ERRORS IS STUNNINGLY HIGH.
THAT EXPLAINS MY HYSTERECTOMY.
LAS VEGAS SUN UNITED FEATURE SYNDICATE
MIKE SMITH

We cope with complexity

Health-care workers are quite good at compensating for some of the complex and unclear design of some aspects of the workplace

- ○ Equipment
- ○ Physical layouts

Complex even Chaotic environments

COVID-19
Arts + Culture
Economy + Business
Education
Environment + Energy
Ethics + Religion
Health
Politics + Society
Scie

THE CONVERSATION

Academic rigor, journalistic flair

How situation awareness could save your life

May 22, 2018 11.34am EDT

How to enhance situation awareness

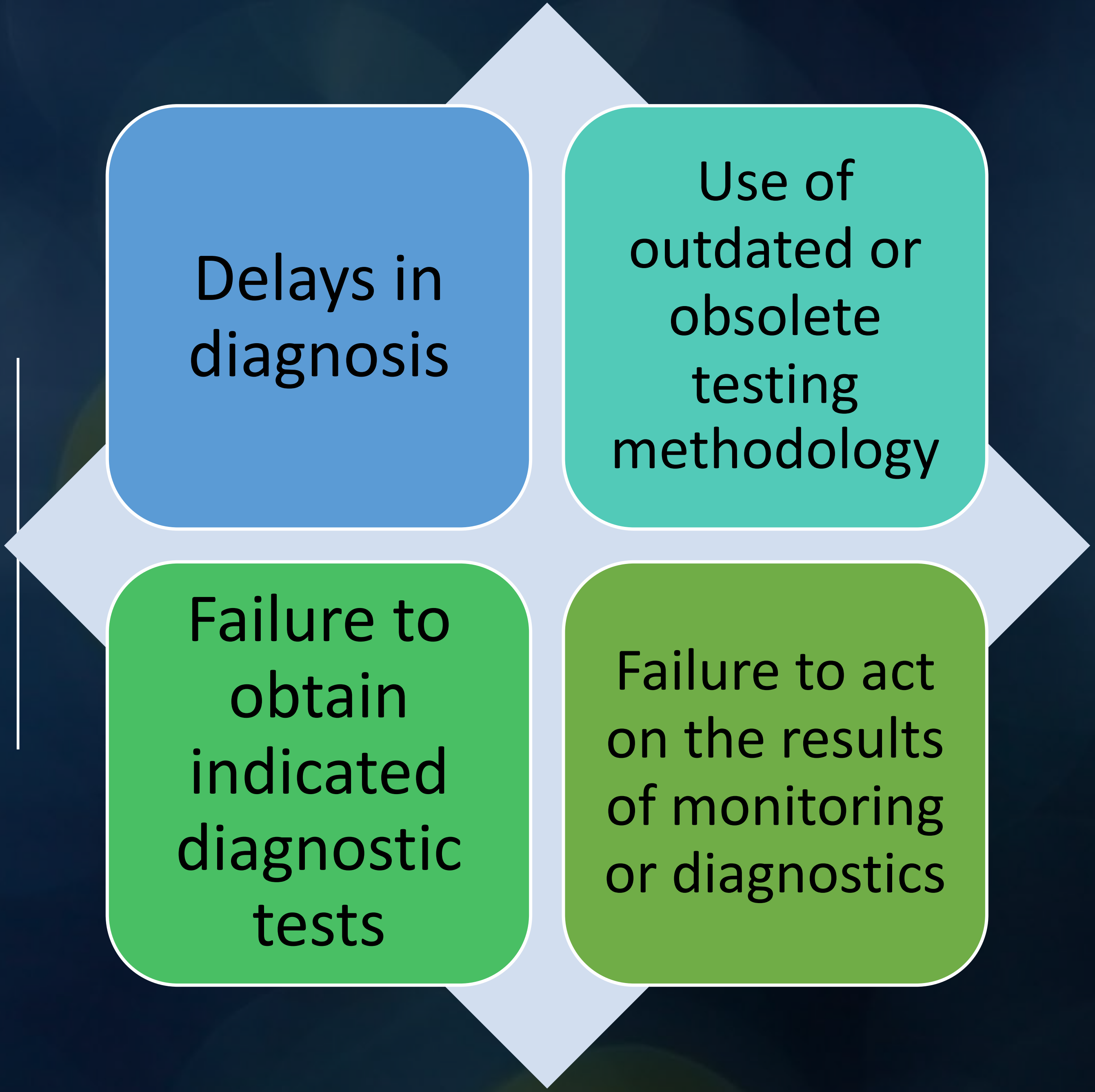
- Practice: training can improve routine performance and help you maintain awareness in an emergency
- Minimize distractions: think “sterile cockpit” – nothing must divert your attention
- Watch out for fatigue: know the symptoms of tiredness and take a break when you need one
- Be active: look for new information, monitor your environment so you can spot problems and react

Rate your ‘environmental’ risk factors?

- Noise
- Distractions
- Interruptions
- Workflow
- System and process designs

Rate your ‘human’ risk factors?

Diagnostic Errors



Delays in diagnosis

Use of outdated or obsolete testing methodology

Failure to obtain indicated diagnostic tests

Failure to act on the results of monitoring or diagnostics

Treatment Errors

- ✓Errors in the performance of a procedure/operation
- ✓Errors in administering treatment or therapy
- ✓Delay in providing treatment
- ✓Inappropriate or contraindicated care or treatment

Performance Errors

Surgical errors, such as the performance of a wrong-site surgery

Communication Errors

- Failure to educate and inform patients
- Miscommunication
- Ineffective or lack of communication

Systems Errors

- Incidents involving inadequate or nonexistent processes or procedures
- Equipment malfunctions
- Facility-based incidents

Medication Errors

Errors that arise out of prescribing, dispensing, administering, or monitoring of patient medications

Wrong site/wrong procedure surgery continues to be the most common basis for quality of care violations

Failure to consider a diagnosis is the biggest problem

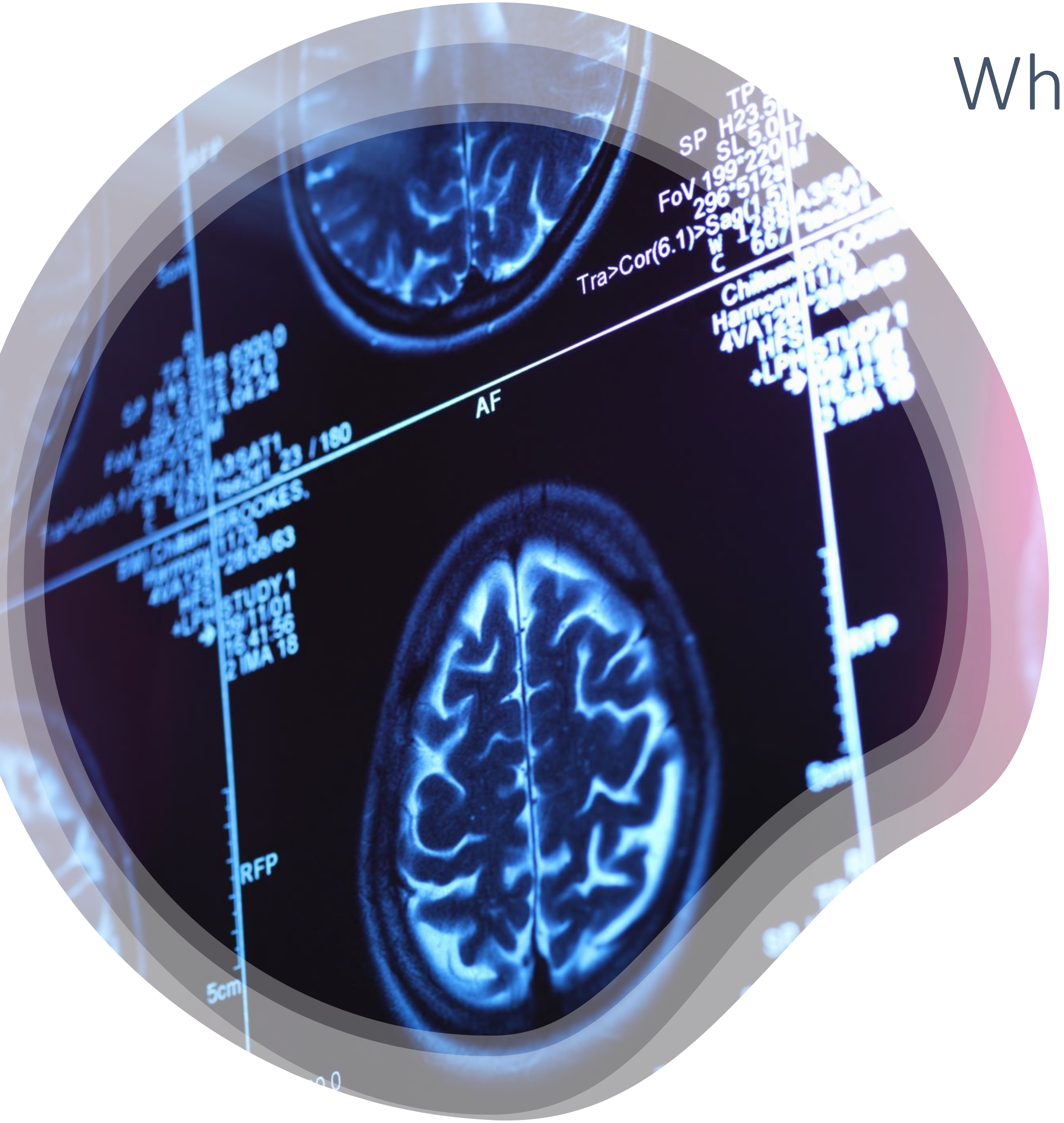
Where do diagnostic errors occur?

- 44% The testing phase

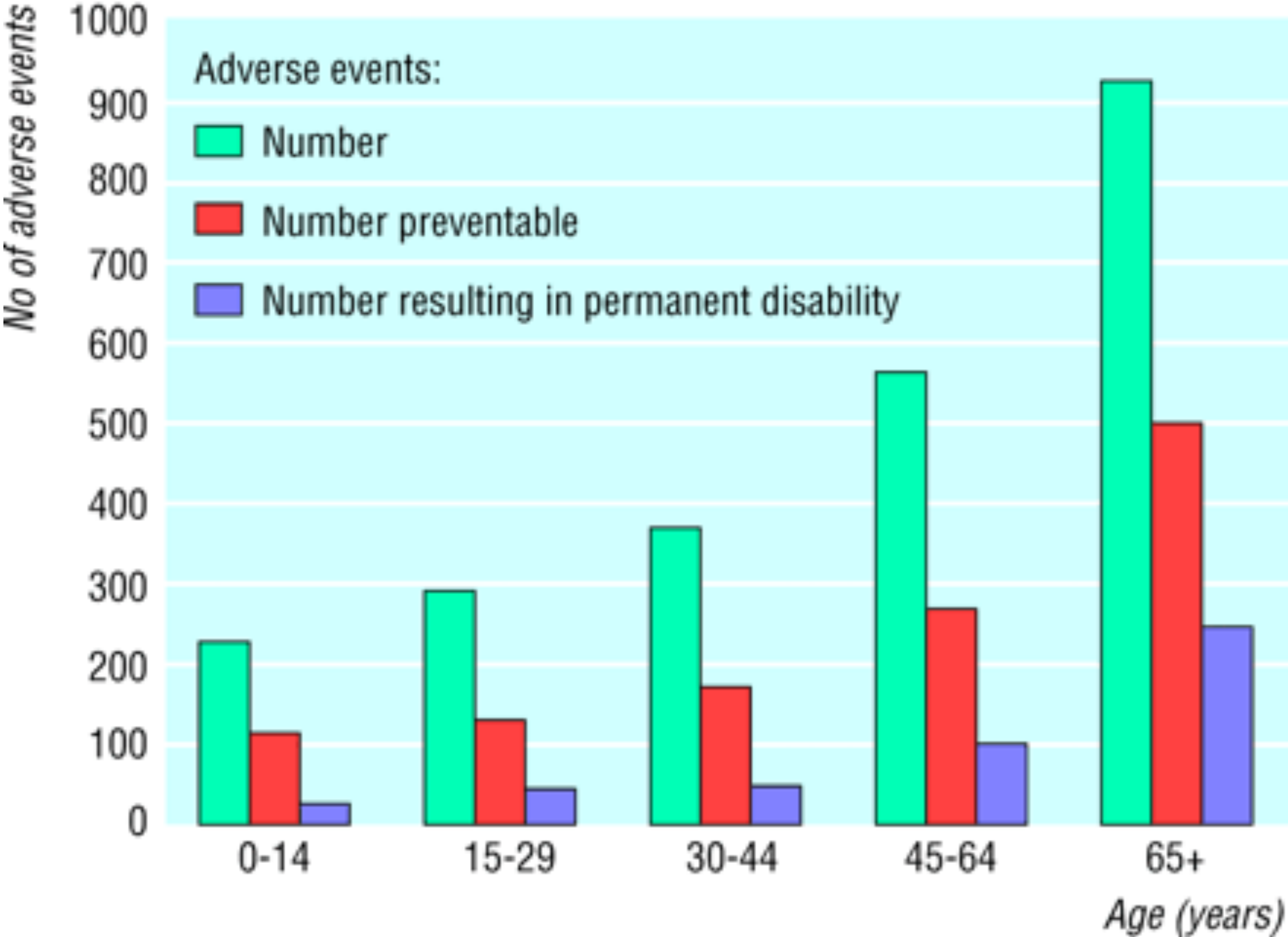
  failure to order, report, and f/u laboratory results
- 32% Clinician assessment errors

  failure to consider and overweighing competing dx
- 10% History taking
- 10% Physical examination
- 3% Referral or consultation errors, delays

Which patients are most at risk?



- Cardiothoracic surgery, vascular surgery, or neurosurgery
- With complex conditions
- In the emergency department
- Care by inexperienced clinicians
- Older patients


No of adverse events
1000
900
800
700
600
500
400
300
200
100
0
Adverse events:
Number
Number preventable
Number resulting in permanent disability
0-14
15-29
30-44
45-64
65+
Age (years)

TJC: Universal Protocol

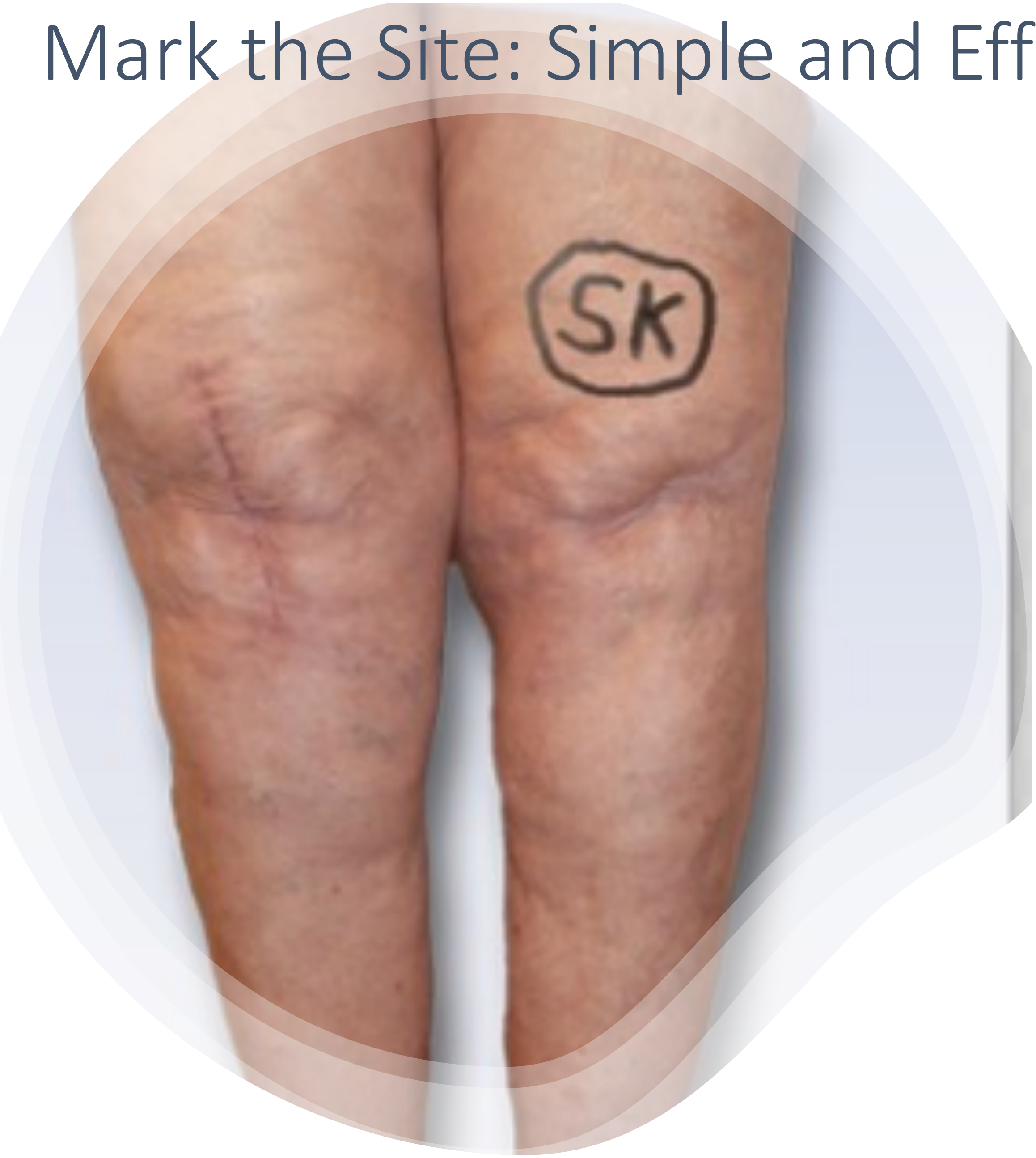
Applies to all operative and other invasive procedures and includes:

Marking the operative site

Taking a time-out immediately before starting

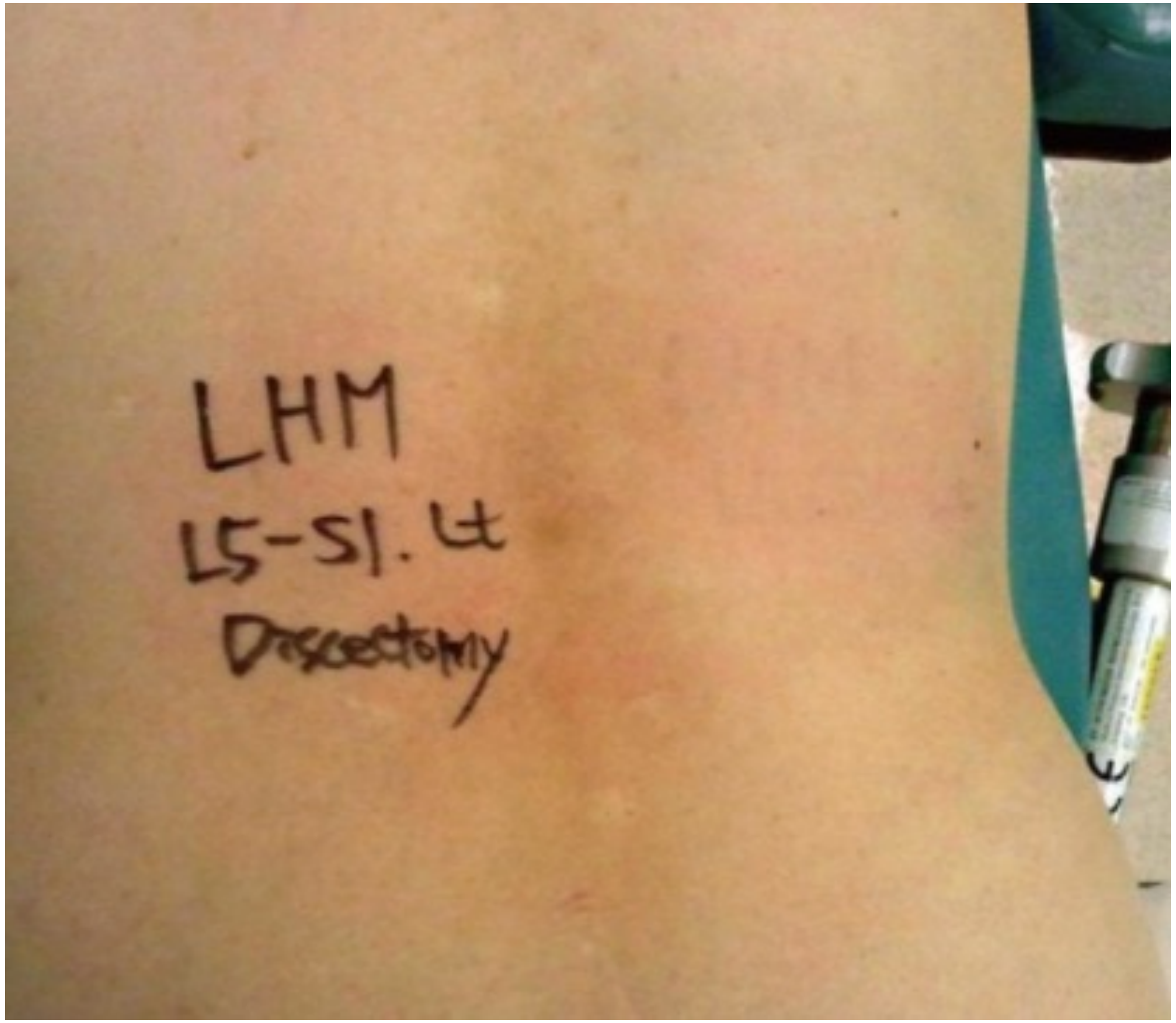
Adapting requirements for non-operating room settings, including bedside procedures

Mark the Site: Simple and Effective



- Made with sufficiently permanent marker to remain visible after skin preparation
- Visible after patient prepped and draped
- Made at or near the surgical site
- Nonoperative sites should not be marked
- Unambiguous, consistent method and type of marking

Pause


LHM
L5-S1. Lt
Discectomy

Document verification of:

- Patient identity
- Correct side and site
- Procedure to be performed
- Correct patient positioning
- Availability of any special equipment or requirements

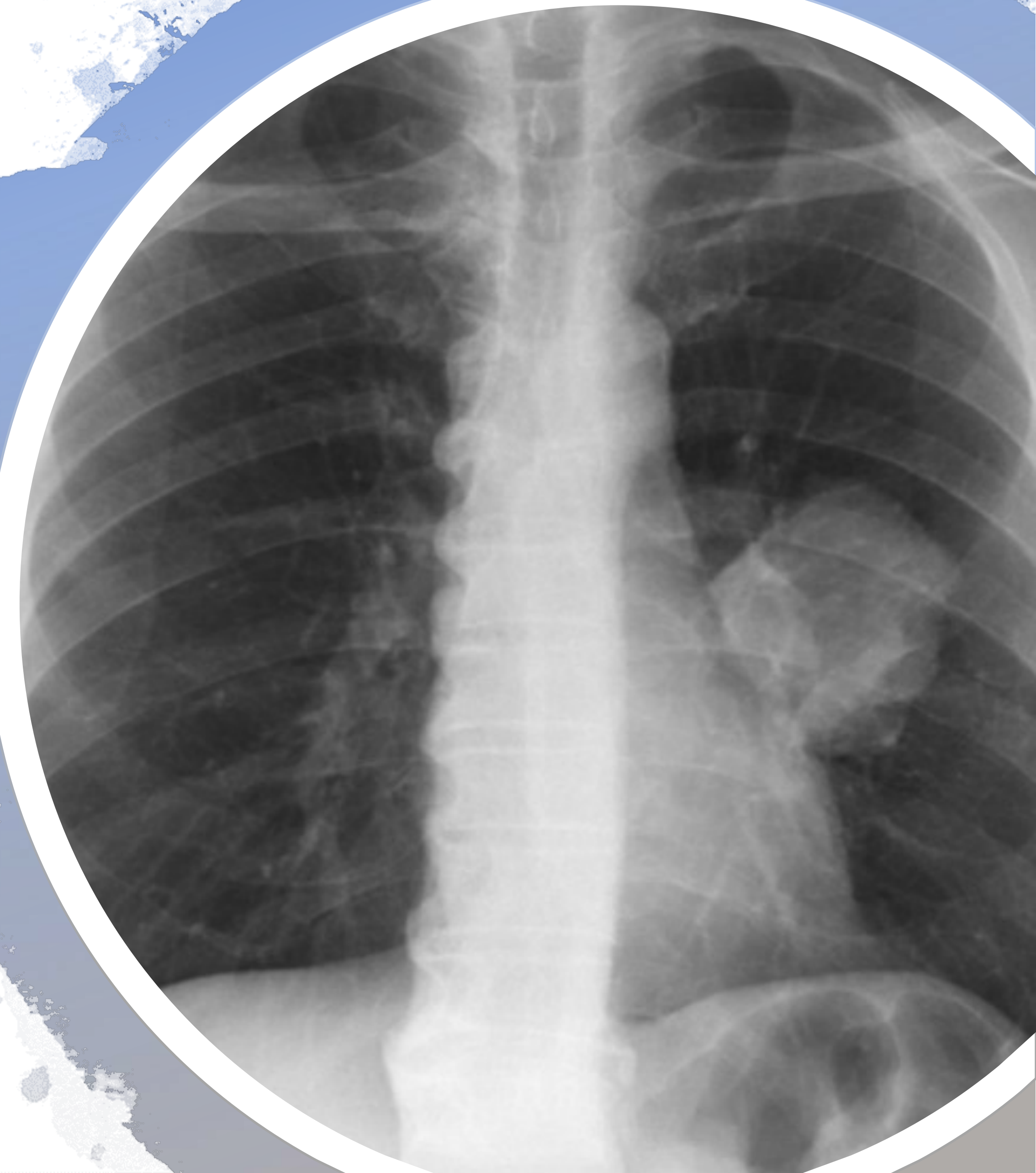
Cancer

Misdiagnosed cancer most prevalent types of medical errors

American Cancer Society (ACS)

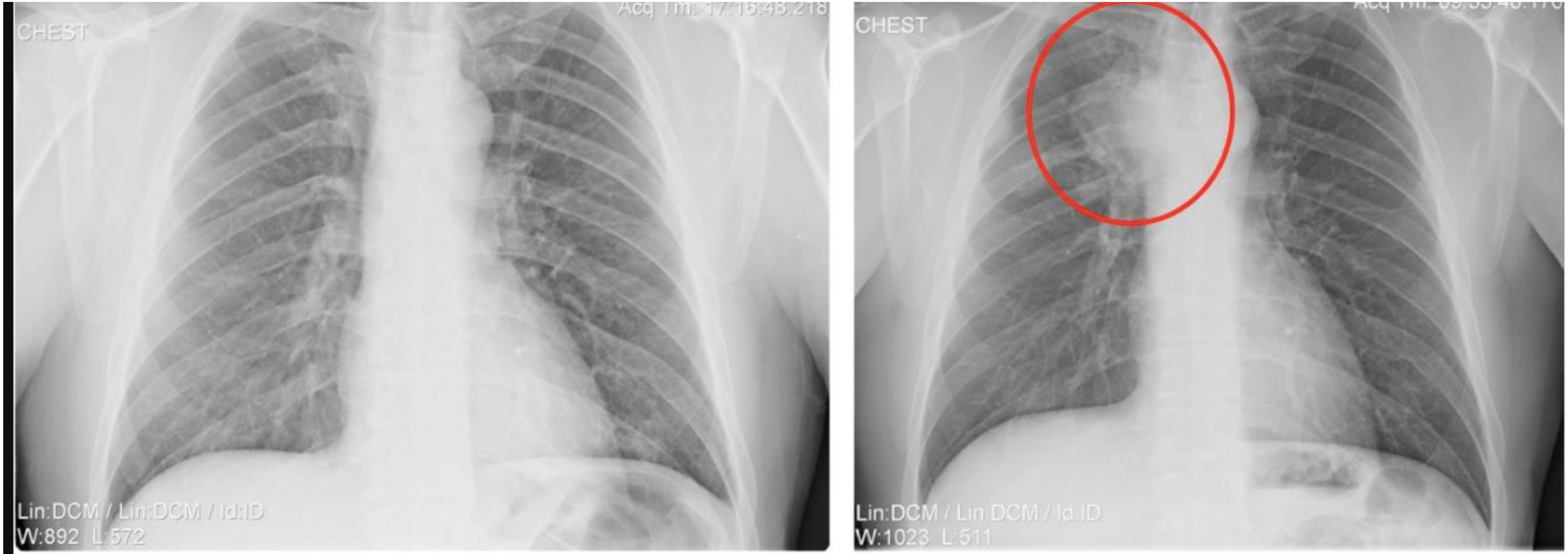
Cancer is 2nd leading cause of death in US

Lung Cancer



Leading cause of cancer death for both men and women

- ~ 29 % of the total US cancer deaths
- Communication issues most prevalent root cause
  - Failure to respond to abnormal x-ray
  - Inadequate follow-up


CHEST
Acq Tm: 17:16:48.218
Lin:DCM / Lin:DCM / Id:ID
W:892 L:572
CHEST
Lin:DCM / Lin:DCM / Id:ID
W:1023 L:511

July 2011 → February 2013

Compare

Previous studies/films

Document

- Patient history, both personal and family
- Physical examination with specificity
- Discussions—pt’s understanding of info
- Recommendations—consultations, additional tests or procedures
- Patient refusals—consider use of informed refusal documentation
- Review, date, & initial diagnostic reports before they are filed

Refer

Additional testing

Consultations

F/U

Have procedures in place that provide for follow-up and recall for patient referrals, consultations, and testing

Neurological Conditions

- Complex
- Frequently misdiagnosed
- Complaint of headache most frequently misdiagnosed

Complaints requiring further evaluation

Weakness or numbness of the face, arm, confusion or difficulty speaking or understanding

Problems with vision such as dimness or loss of vision in one or both eyes

Dizziness or problems with balance or coordination

Problems with movement or walking

Further evaluation

01

Severe headaches with no other known cause

02

Sudden nausea, vomiting, or fever not caused by viral illness

03

Brief loss or change of consciousness such as fainting, confusion, seizures, or coma

65-year-old man with atrial fibrillation, lung cancer, and chronic renal insufficiency presented to ED with shortness of breath

RR 32, 102.4° F

O2 sat 87% on 100% non-rebreather

Chest X-ray showed a right middle lobe infiltrate.

Due to respiratory distress, patient intubated

Became hypotensive with BP of 65 mm Hg. While continuing fluid resuscitation

BP supported with phenylephrine and vasopressin. Phenylephrine was changed to norepinephrine

After 8 hours, ABG:

pH	*7.23*
PCO_2	*23 mm Hg*
PO_2	*161 mm Hg*
BE	*–16*
lactate	*6.2 mmol/L*

Pulmonary artery catheter placed

initial numbers consistent with cardiogenic shock rather than septic shock

CVP 13-17 mm Hg

Pulmonary capillary wedge pressure 19 mm Hg

Cardiac index 1.8 L/min/m^2

Systemic vascular resistance 1500 dynes/sec x cm^{-5}

Norepinephrine rapidly weaned

Remained on vasopressin

Echo: global decrease in contractility

Ejection fraction of 45%

Mild right ventricular dilatation

*Patient had been receiving **0.4** units/min of vasopressin rather than intended dose of **0.04** units/min*

Vasopressin discontinued

People Are Set-Up to Make Mistakes

Incompetent people are, at most,

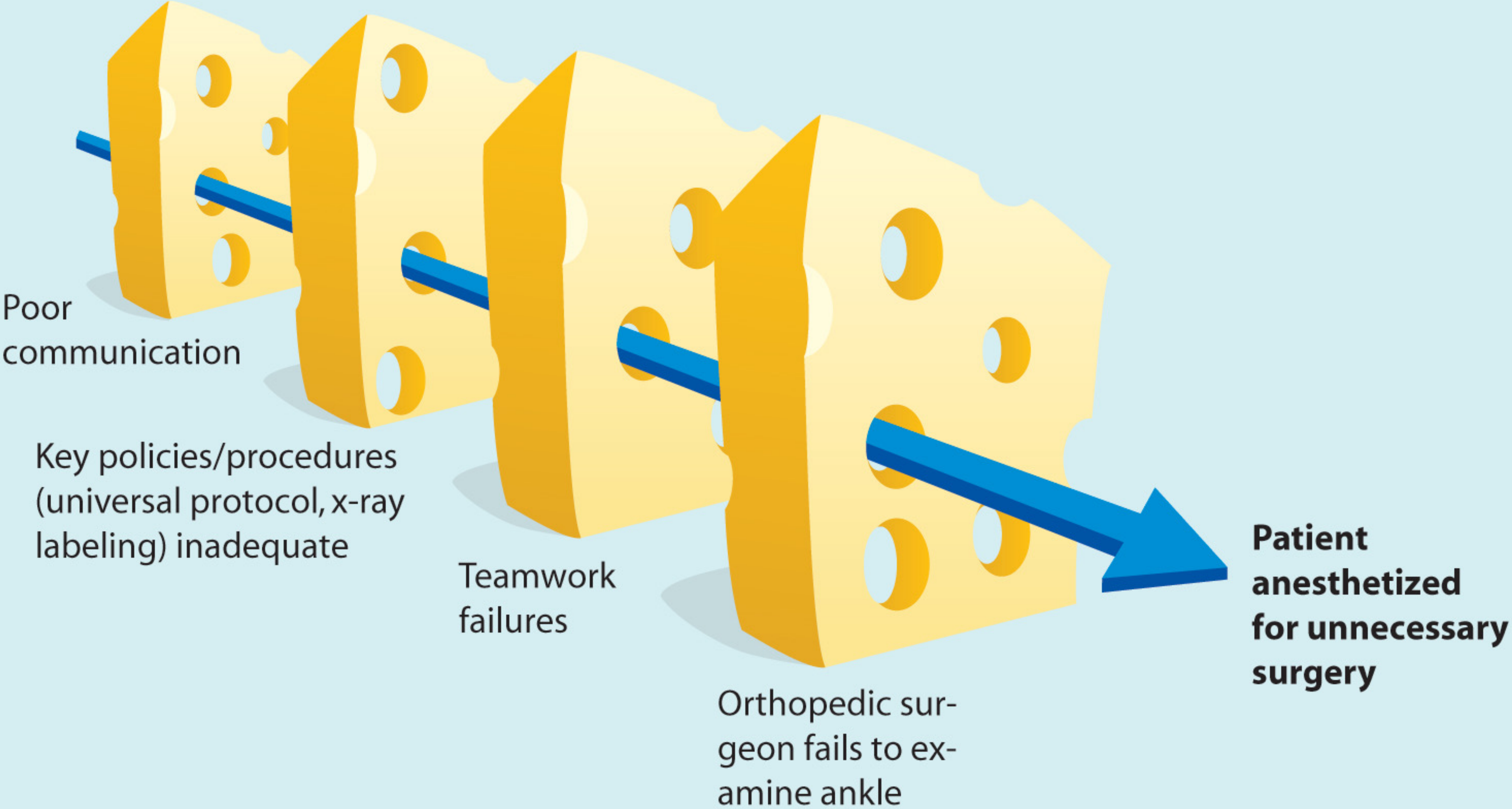
1% of the problem

The other 99% are good people trying to do a good job who make very simple mistakes and it's the processes that set them up to make these mistakes.

Dr. Lucian Leape, Harvard School of Public Health

“The real mistake is the one from which we learn nothing”

John Powell


Poor communication
Key policies/procedures (universal protocol, x-ray labeling) inadequate
Teamwork failures
Orthopedic surgeon fails to examine ankle
Patient anesthetized for unnecessary surgery

Root Cause Analysis

Root Cause Analysis

- Investigation of a serious adverse event or close call
- Performed by a team with expertise in the area whose members were not directly involved with the error
- Team typically organized by patient safety or quality improvement program

Goals of Root Cause Analysis

What happened

Why did it happen

What can be done to prevent it from happening again

Root Cause Analysis Actions

- Address root causes and contributing factors
- Are specific and concrete
- A cold reader should be able to understand and implement
- Will be tested or simulated prior to full implementation
- Process owners are consulted regarding ideas

Root Cause Analysis

Assess environment of the error and identify system vulnerabilities rather than individual culpability

- ✓ Observe work environment
- ✓ Interview staff involved
- ✓ Review incident reports of similar errors
- ✓ Propose realistic suggestions for change

Five Step Process: RCA

- Charter the team
- Document and research
- Identify root causes
- Develop actions
- Establish outcome measures

Performing Root Cause Analysis

Step # 1—Develop timeline of events

- ✓Everyone in contact with the patient (from physician to transporter)
- ✓All orders
- ✓All tests, test results

Step #2—Generate a differential diagnosis for systems factors that may have contributed to the error

RCA—Timeline

- Fellow tells resident to start patient on vasopressin
- Resident uses computerized order entry system.

  Multiple doses of vasopressin are available.
- Orders vasopressin 0.4 units/min instead of 0.04 units/min
- Nurses deliver medication for 16 hours

RCA—Timeline

- Team rounds on patient next morning

  including attending, pharmacist, nurses, and trainees
- During orientation tour, nurse informs nursing students that patient is receiving vasopressin at a dose of 0.4 units/minute
- ICU fellow overhears this and realizes the dose is incorrect

Poor staff / trainee teamwork skills

- ✓Order incorrectly written by resident after a verbal order from fellow
- ✓Unlikely fellow asked resident whether he understood the order or had used vasopressin previously
- ✓Unlikely that verbal order was followed by a “read back” by trainee

RCA

No systematic process in the ICU for reviewing key aspects of patient care during daily rounds

- ✓ICU physician rounding process rarely includes a regular assessment of medication doses, drug interactions, or key error prevention and patient safety steps
- ✓Pharmacists not always included

No nursing guidelines or protocols for use of vasopressor medications

- ✓Nursing didn’t follow set protocols related to the use of vasopressors
- ✓No systematic review of medication doses during nursing sign-out
- ✓No regular process of “double-checking” whether right drug is being given to right patient at the right dose

RCA

No pharmacy process to highlight medications used in differing doses for different indications

- ✓CPOE or a barcoding system alone will not eliminate medication errors
- ✓CPOE system did not ask for the indication, nor flag the order for pharmacist to review

- Most institutions respond to errors by patching “small leaks” in systems that have created the error
- Most long-lasting changes result from complete system redesign
- Most institutions are reluctant to commit the resources and effort required for such changes

RCA—System Solutions

Multidisciplinary approach to medication delivery process

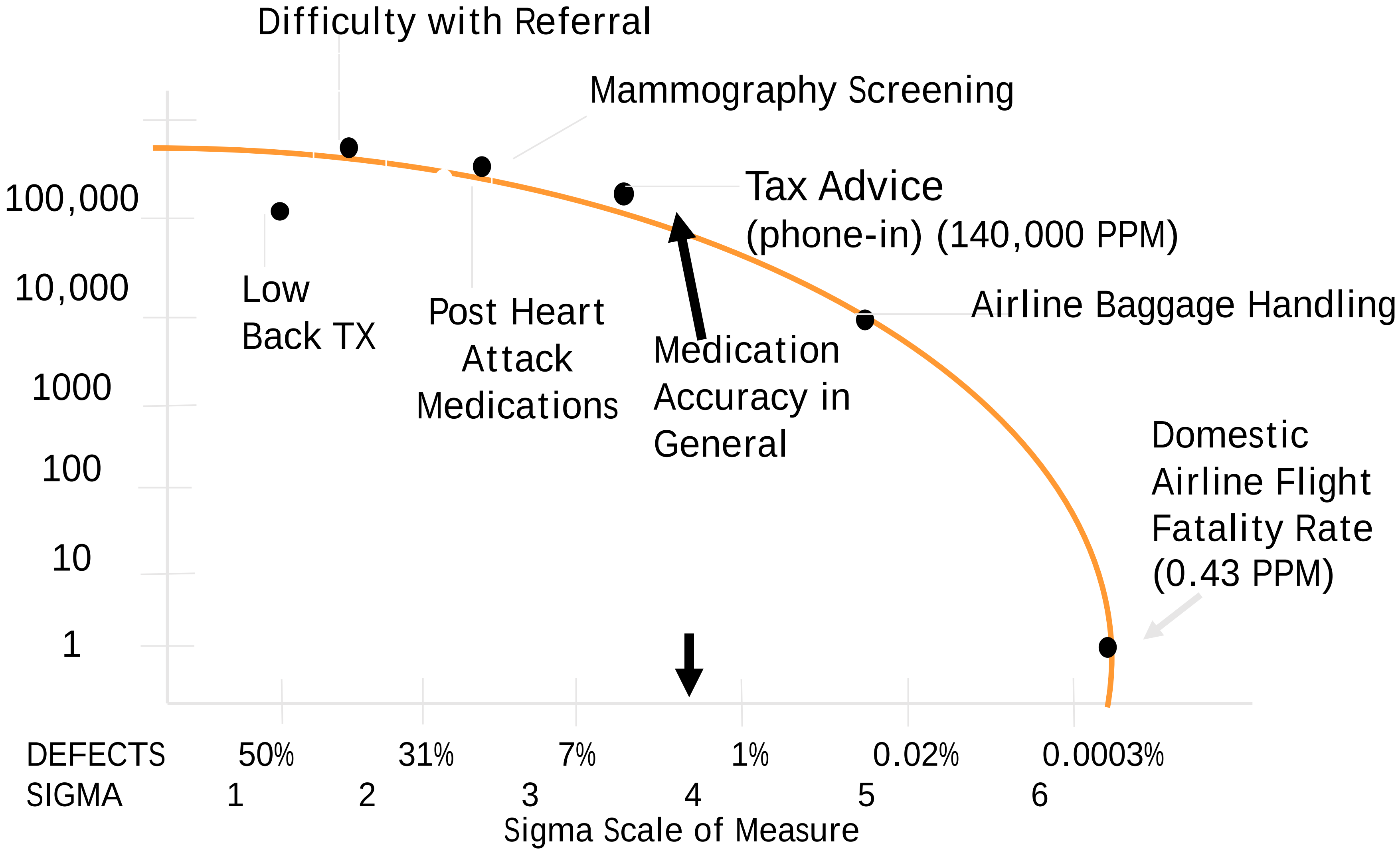
- ✓Reconcile all medications on admission and discharge from ICU
- ✓ICU safety officer rounds with team reviewing all medication
- ✓At minimum: team, including pharmacist, reviews all medications on rounds

RCA—System Solutions

- High-risk medications similar to high-risk procedures
  - ✓ "Time outs" before admin
  - ✓ Program standard dosing scales into pumps

- Implement teamwork training for all ICU staff, physicians, nurses, and trainees
  - Include role-playing and simulations to improve team dynamics and communication

Comparative Reliability Between Industries



Source: Institute for Healthcare Improvement

The 5 R’s

- ✓Right Patient
- ✓Right Drug
- ✓Right Route
- ✓Right Time
- ✓Right Dose

4 out of 5 is not enough

A *Systems* Approach

“The systems approach is not about changing the human condition but rather the conditions under which humans work.”

J.T. Reason, 2001

HRO

NY WATERWAY

Factors impacting medical errors
(Human, Event, and Environment)

- Organizational factor (workflow design, staffing levels, resources)
- Ergonomic factors (lighting, noise, legibility and confusing design of labels)
- Situational factors (fatigue, stress, sensory overload)
- Cognitive lapses (overgeneralization, bias, reversion to familiar under stress)
- Human vulnerabilities (poor planning ability, short-term memory, problem-solving and communication ability, and limited attention span)

Factors impacting medical errors

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Root Cause Airline and Medical Errors: Communication

- 70-80% of airline accidents related to interpersonal communication

  Sexton & Helmreich, 99

- 70-80% of medical errors related to interpersonal communication

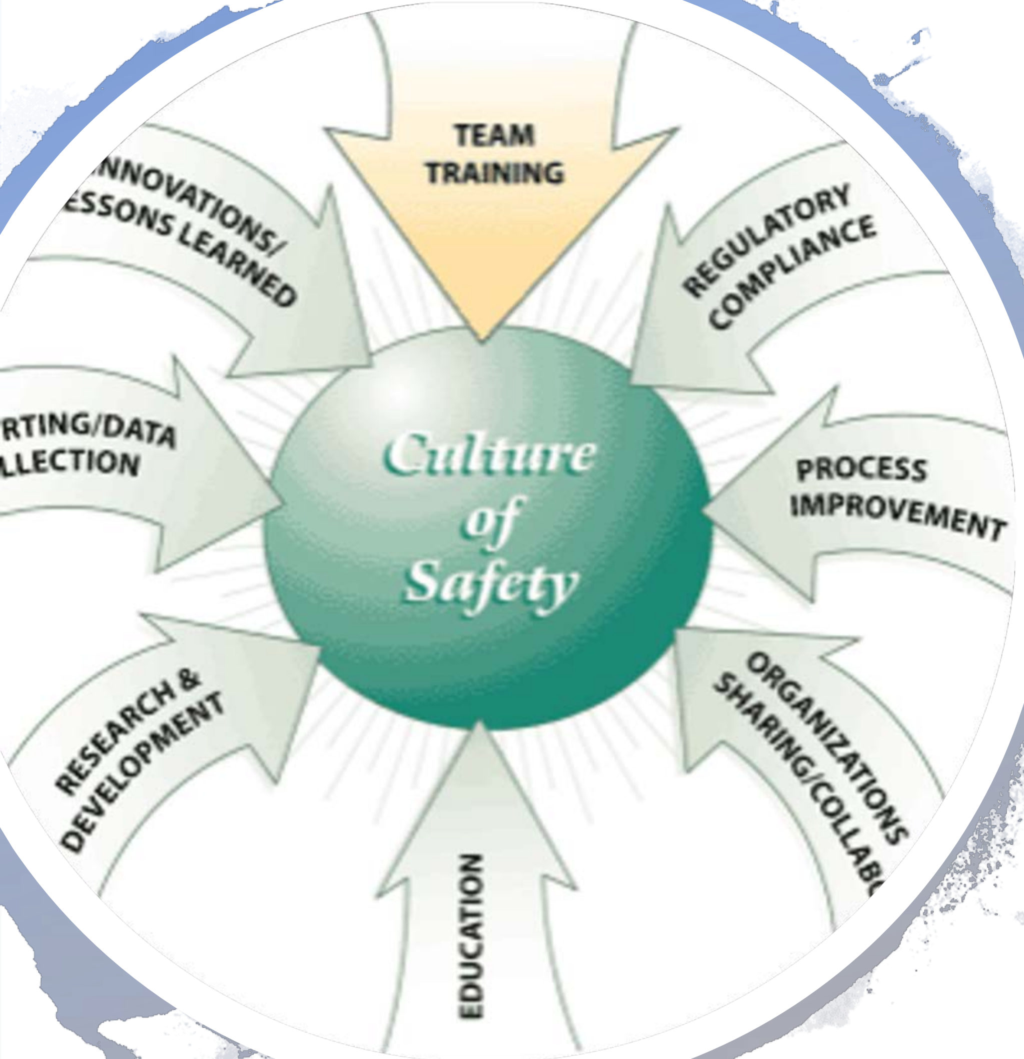
  Williamson et. Al, 93

- 66% of sentinel events have incomplete communication as a root cause JCAHO Alert Issue 12

Crew Resource Management

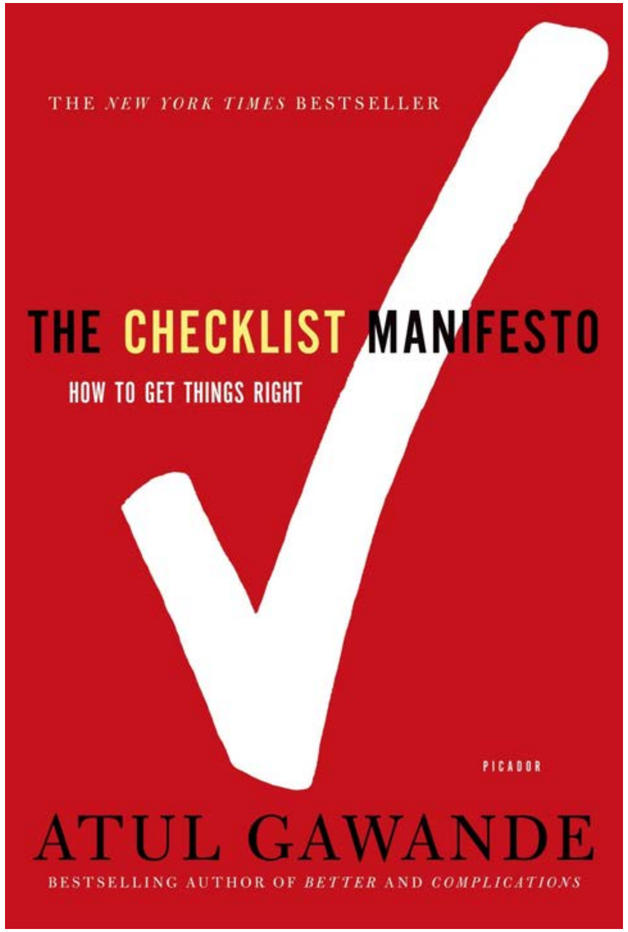
Crew (team) communication and coordination behaviors are **identifiable, teachable**, and applicable to high-stakes environment

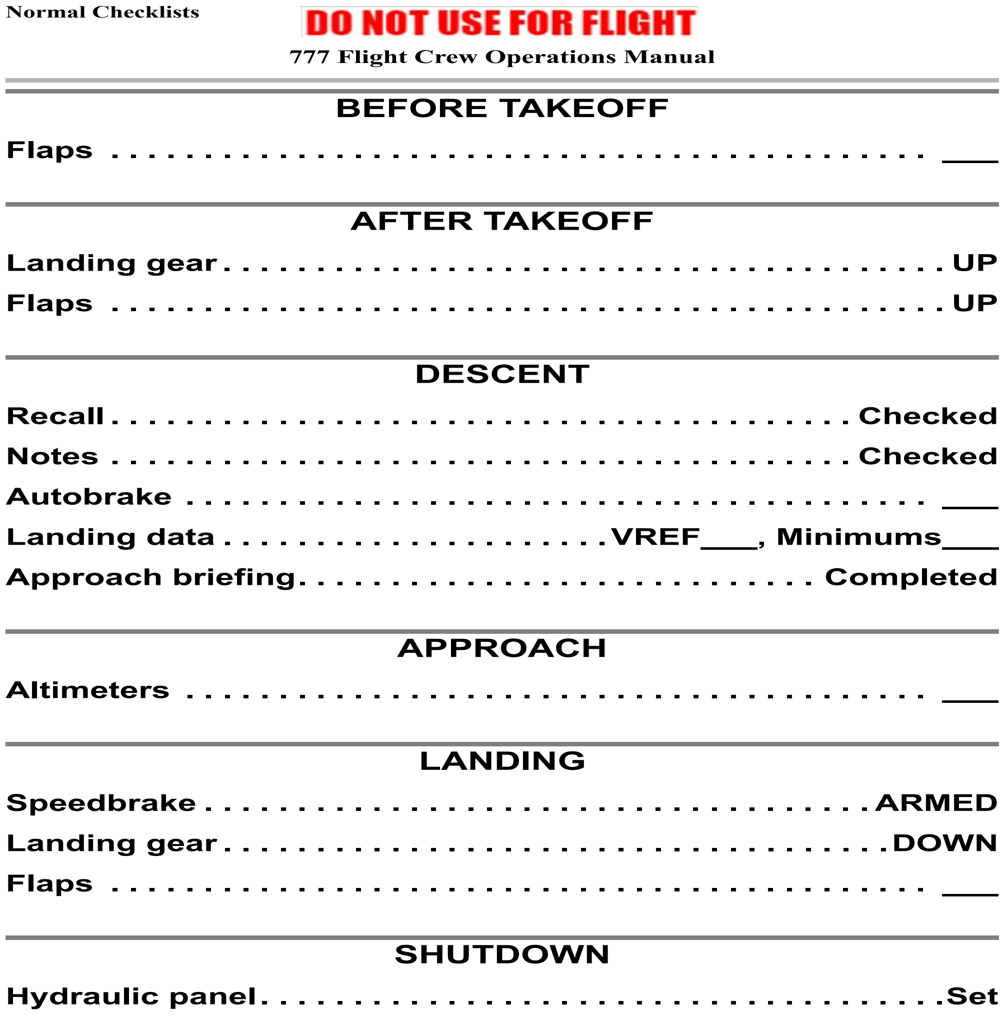
Those behaviors, although seen spontaneously, **needs to be practiced** regularly and reinforced to be reliable


TEAM TRAINING
REGULATORY COMPLIANCE
PROCESS IMPROVEMENT
ORGANIZATIONS SHARING/COLLAB
EDUCATION
RESEARCH & DEVELOPMENT
RTING/DATA LLECTION
NNOVATIONS/ ESSONS LEARNED
Culture of Safety

- Teamwork training
- Briefings, debriefings and timeouts
- Incident reporting
- Simulator training In medicine
- Standardization

Atul Gawande’s Checklist Manifesto


THE *NEW YORK TIMES* BESTSELLER
THE CHECKLIST MANIFESTO
HOW TO GET THINGS RIGHT
PICADOR
ATUL GAWANDE
BESTSELLING AUTHOR OF *BETTER* AND *COMPLICATIONS*


Normal Checklists **DO NOT USE FOR FLIGHT**

777 Flight Crew Operations Manual

BEFORE TAKEOFF

Flaps	___

AFTER TAKEOFF

Landing gear	UP
Flaps	UP

DESCENT

Recall	Checked
Notes	Checked
Autobrake	___
Landing data	VREF___, Minimums___
Approach briefing	Completed

APPROACH

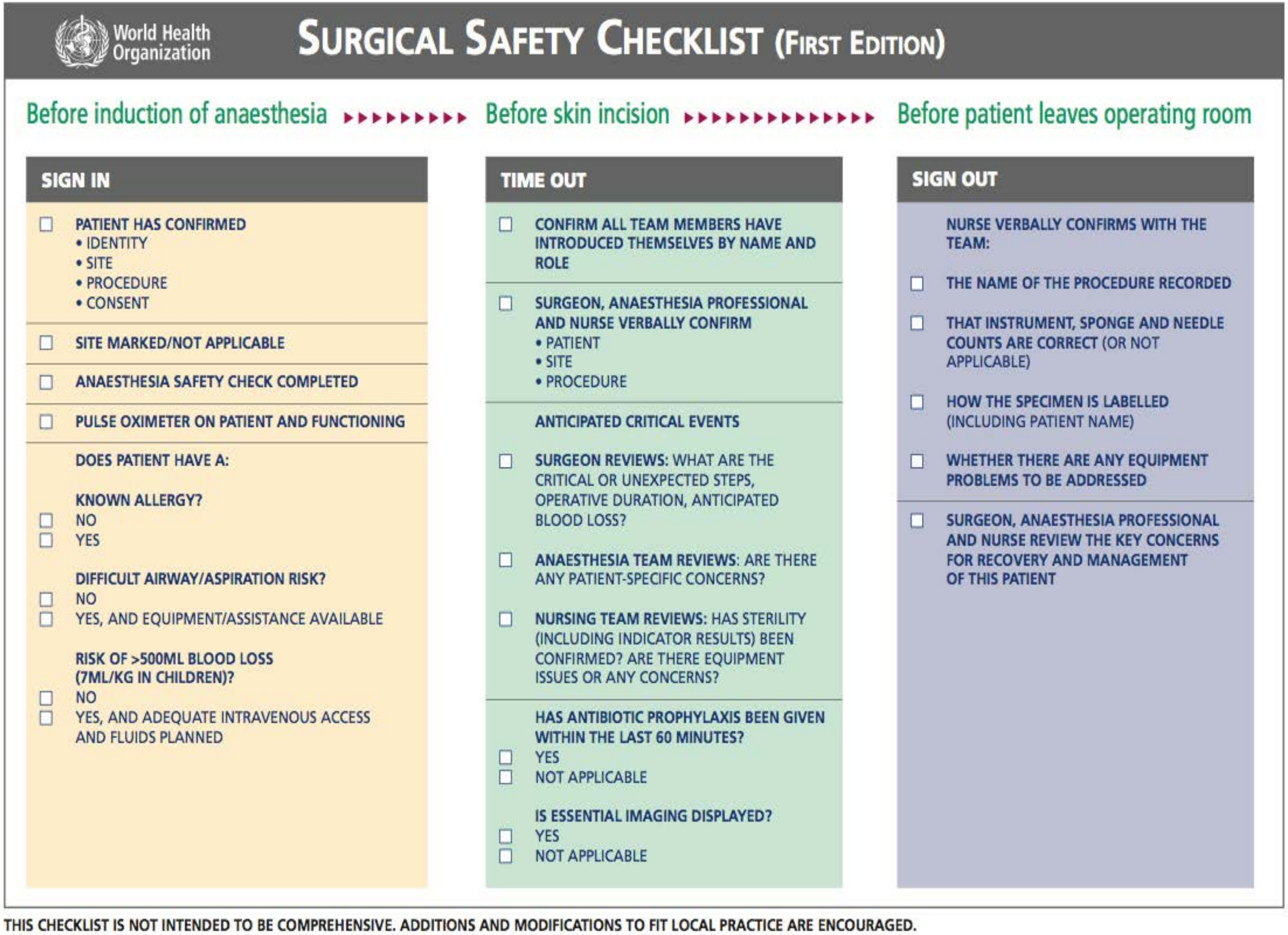
Altimeters	___

LANDING

Speedbrake	ARMED
Landing gear	DOWN
Flaps	___

SHUTDOWN

Hydraulic panel	Set



World Health Organization

SURGICAL SAFETY CHECKLIST (FIRST EDITION)

Before induction of anaesthesia ▸▸▸▸▸▸▸▸▸ Before skin incision ▸▸▸▸▸▸▸▸▸▸▸▸▸▸ Before patient leaves operating room

SIGN IN

☐ **PATIENT HAS CONFIRMED**
- IDENTITY
- SITE
- PROCEDURE
- CONSENT

☐ **SITE MARKED/NOT APPLICABLE**

☐ **ANAESTHESIA SAFETY CHECK COMPLETED**

☐ **PULSE OXIMETER ON PATIENT AND FUNCTIONING**

DOES PATIENT HAVE A:

KNOWN ALLERGY?
☐ NO
☐ YES

DIFFICULT AIRWAY/ASPIRATION RISK?
☐ NO
☐ YES, AND EQUIPMENT/ASSISTANCE AVAILABLE

RISK OF >500ML BLOOD LOSS (7ML/KG IN CHILDREN)?
☐ NO
☐ YES, AND ADEQUATE INTRAVENOUS ACCESS AND FLUIDS PLANNED

TIME OUT

☐ **CONFIRM ALL TEAM MEMBERS HAVE INTRODUCED THEMSELVES BY NAME AND ROLE**

☐ **SURGEON, ANAESTHESIA PROFESSIONAL AND NURSE VERBALLY CONFIRM**
- PATIENT
- SITE
- PROCEDURE

ANTICIPATED CRITICAL EVENTS

☐ **SURGEON REVIEWS:** WHAT ARE THE CRITICAL OR UNEXPECTED STEPS, OPERATIVE DURATION, ANTICIPATED BLOOD LOSS?

☐ **ANAESTHESIA TEAM REVIEWS:** ARE THERE ANY PATIENT-SPECIFIC CONCERNS?

☐ **NURSING TEAM REVIEWS:** HAS STERILITY (INCLUDING INDICATOR RESULTS) BEEN CONFIRMED? ARE THERE EQUIPMENT ISSUES OR ANY CONCERNS?

HAS ANTIBIOTIC PROPHYLAXIS BEEN GIVEN WITHIN THE LAST 60 MINUTES?
☐ YES
☐ NOT APPLICABLE

IS ESSENTIAL IMAGING DISPLAYED?
☐ YES
☐ NOT APPLICABLE

SIGN OUT

NURSE VERBALLY CONFIRMS WITH THE TEAM:

☐ **THE NAME OF THE PROCEDURE RECORDED**

☐ **THAT INSTRUMENT, SPONGE AND NEEDLE COUNTS ARE CORRECT** (OR NOT APPLICABLE)

☐ **HOW THE SPECIMEN IS LABELLED** (INCLUDING PATIENT NAME)

☐ **WHETHER THERE ARE ANY EQUIPMENT PROBLEMS TO BE ADDRESSED**

☐ **SURGEON, ANAESTHESIA PROFESSIONAL AND NURSE REVIEW THE KEY CONCERNS FOR RECOVERY AND MANAGEMENT OF THIS PATIENT**

THIS CHECKLIST IS NOT INTENDED TO BE COMPREHENSIVE. ADDITIONS AND MODIFICATIONS TO FIT LOCAL PRACTICE ARE ENCOURAGED.

Atul Gawande’s Checklist Manifesto

Surgical outcome	Before	After checklist
Death	1.5%	0.8%
Any complication	11.0%	7.0%
Surgical-site infection	6.2%	3.4%
Unplanned return to OR	2.4%	1.8%

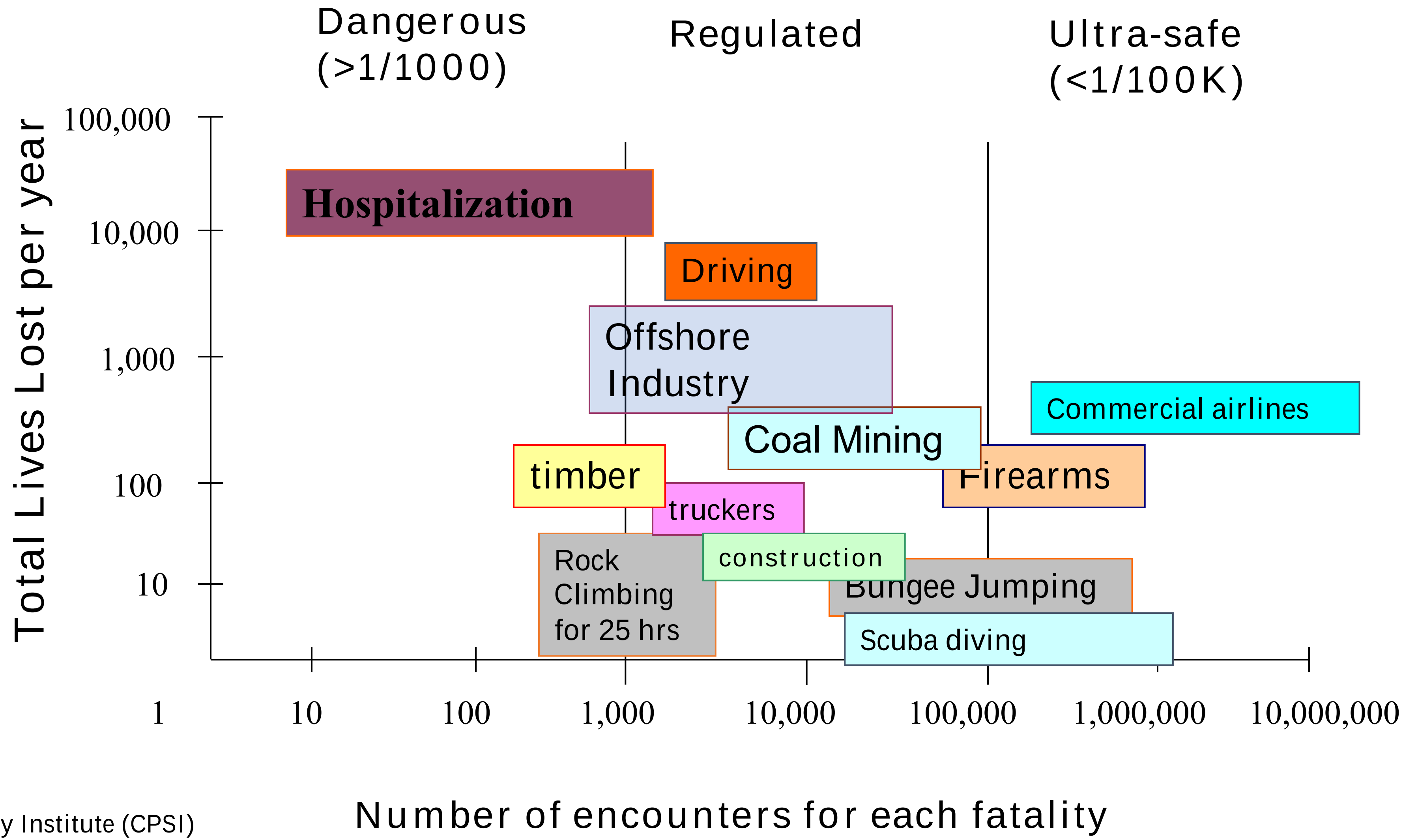
A Culture of Safety

*Sexton JB, Thomas EJ, Helmreich RL, Error, stress and teamwork in medicine and aviation: cross sectional surveys. BrMedJour, 3-18-2000.

% Positive Responses from:	Pilots	Medical
Is there a negative impact of fatigue on your performance?	74%	30%
Do you reject advice from juniors?	3%	45%
Is error analysis system-wide?	100%	30%
Do you think you make mistakes?	100%	30%
Easy to discuss/report mistakes?	100%	56%

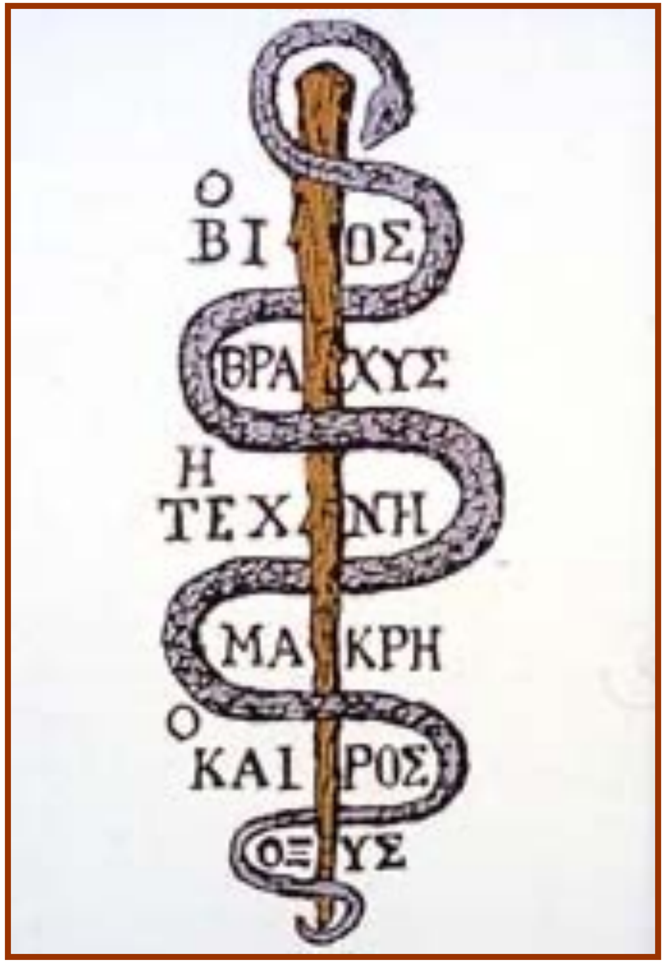
Canadian Patient Safety Institute (CPSI)

Risky Activities



Canadian Patient Safety Institute (CPSI)

HUMANS


Ο
ΒΙΟΣ
ΒΡΑΧΥΣ
Η
ΤΕΧΝΗ
ΜΑΚΡΗ
Ο
ΚΑΙΡΟΣ
ΟΞΥΣ

"…there are some patients we cannot help, there are none we cannot harm…"

Arthur Bloomfield, M.D.

Quality of Healthcare in America Project 2003

-----Dr. Ken Stahl

Canadian Patient Safety Institute (CPSI)

Some material from:

- Prevention of Medical Errors CME Risk Management Course for Florida Practices   The Doctors Company Patient Safety Department
- Richard Smith Editor, BMJ
- American College of Emergency Physicians: A Primer for Emergency Medicine Residents and Practicing Emergency Physicians