Applying Human Factors to the Design of Safe Systems | Clinical Excellence Commission,
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Event Review 2.0: The Systems Approach

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The rest of Annie's story: The RCA

https://www.youtube.com/watch?v=zeldVu-3DpM

Glucometer Case…

- Patient with hx of poorly-controlled BG levels
  - Admitted to diabetic unit at hospital
  - Pt appears normal or hyperglycemic
- Accucheck indicates critically low BG
  - Misinterpreted by tech and RN as critical high
- Pt given repeated doses of insulin
  - Altered, rapid response called
  - Receives D50, Glucagon, & D10 drip
- Stays in ICU for 3 days: MAJOR EVENT

Nurse SUSPENDED

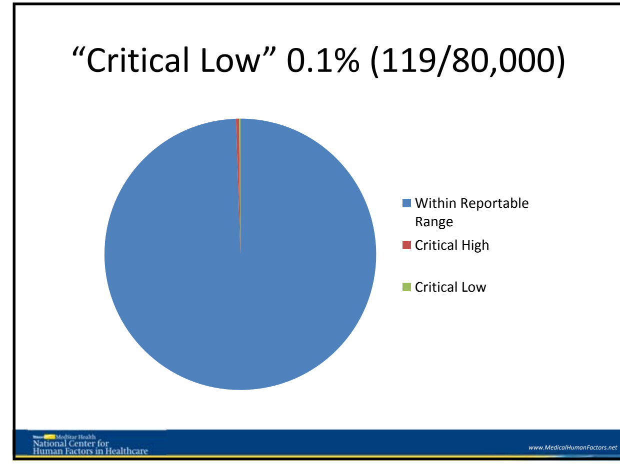
One week later… Repeated Incident

- Same scenario, different unity
- Multiple RNs, NP involved
- All misinterpreted critical LO as critical HI

Did disciplinary response make us safer?

The 'Second Story'

- Patient has multiple signs of normal-high BG
  - Initial ED values = hyperglycemia
  - "I know my sugars, and I'm not low"
  - Ate all meals, snacks
- There was an ongoing failure to revise
  - Due to fixation effect and expectations
  - Glucometer design plays into this failure to revise
  - Actions taken initially have no effect
- 'Fresh' personnel discover true problem


"Critical Low" 0.1% (119/80,000)
Within Reportable Range
Critical High
Critical Low
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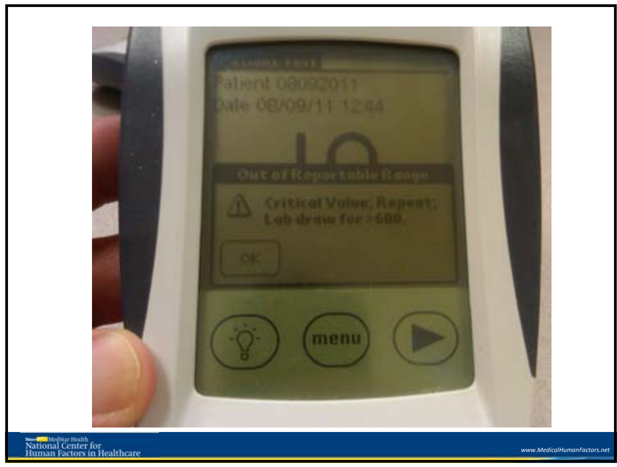
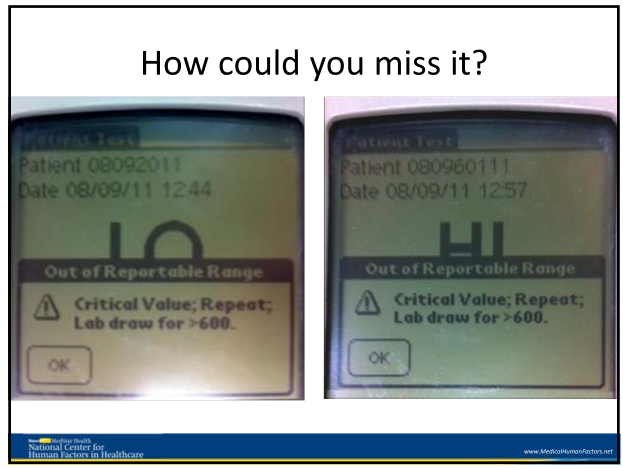
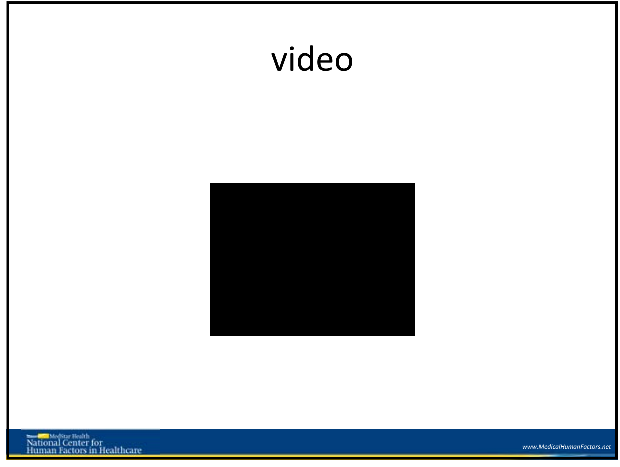

Patient 08092011
Date 08/09/11 12:44
LO
Out of Reportable Range
Critical Value; Repeat;
Lab draw for >600.
OK
menu
www.MedicalHumanFactors.net


How could you miss it?
Patient 08092011
Date 08/09/11 12:44
LO
Out of Reportable Range
Critical Value; Repeat;
Lab draw for >600.
OK
Patient Test
Patient 080960111
Date 08/09/11 12:57
HI
Out of Reportable Range
Critical Value; Repeat;
Lab draw for >600.
OK
www.MedicalHumanFactors.net



Procurement: Who determines wording?

Hospital	Text of 'Out of Reportable Range' message popup
A	Critical value; Repeat; Lab Draw for > 600.
B	RR Lo = result <40; RR Hi = result >600
C	Out of range: repeat test to confirm
D	Critical value; repeat within 15 mins; notification required; lab draw for >600
E	Critical value; you must repeat immediately; STAT glucose Lab draw for RR HI
F	Repeat test

We See… What We Expect To See

Aoccdrnig to rscheearch at Cmabrigde Uinervtisy, it deosn't mttaer in waht oredr the ltteers in a wrod are, the olny iprmoetnt tihng is taht the frist and lsat ltteer be at the rghit pclae. The rset can be a toatl mses and you can sitll raed it wouthit a porbelm. Tihs is bcuseae the huamn mnid deos not raed ervey lteter by istlef, but the wrod as a wlohe.

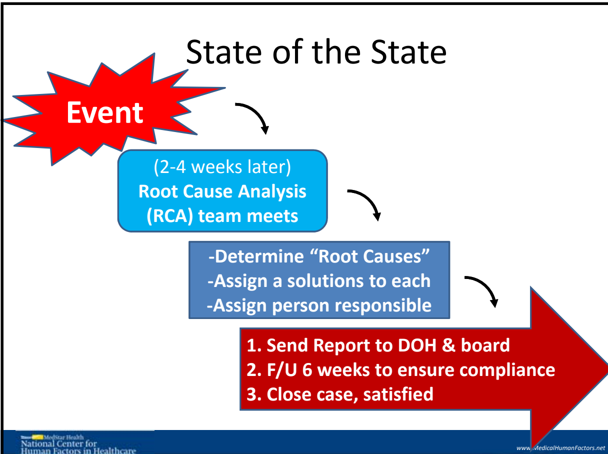
AHRQ Culture Survey: Relevant Questions

"Staff feel like their mistakes are held against them"

"When an event is reported, it feels like the person is being written up, not the problem"

"Staff worry that mistakes they make are kept in their personnel file"

"Our procedures and systems are good at preventing errors from happening"



Limitations of RCA

- Risk of premature conclusion
- Hindsight bias
- Lack of strong leadership and funds
- Failure to follow up
- Name-blame-train-shame
- Wrong contributing factors
- Ineffective solutions
- Non-sustainable solutions
- Failure to care for the caregiver
- Missed opportunities to involve patient & family

Reducing Risk:
Where should we focus?

- Focus on hazards and unsafe conditions
- Focus on near misses
- Address contributing factors that can be changed
- Use a TRUE non-punitive safety system
- Employ *EFFECTIVE* and *SUSTAINABLE* solutions

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Develop Sustainable Solutions

Develop Effective Solutions

Consider Solutions in Context
(work as performed)

Focus on HAZARDS, proactive safety

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Complex Adaptive Systems

WORK AS IMAGINED
How managers believe work is being done (rules)

GAP

WORK AS PERFORMED
Every-day work: How work IS being done

Adapted from: Ivan Pupulidy

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"the conference organizer wants to explore why certain kinds of adverse events recur, despite developing policies implemented to quell them"

Why folks "don't meet expectations"

- Not aware of expectation
- Aware but don't agree
- Aware and agree, but ambiguity in expectation
- Aware and agree and unambiguous, but they *don't have the ability* to do it

Ref: Goeschel, Gurses, Lubonski

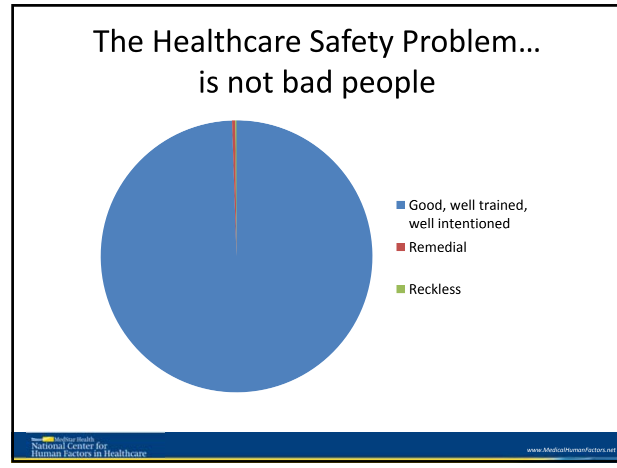
Associates need avenues for feedback when they don't understand or if expectations aren't feasible in their context

Why folks "don't meet expectations"

The design of the…

System
Device
IT system
Process
Etc…

Facilitates normal error


The Healthcare Safety Problem…
is not bad people
Good, well trained, well intentioned
Remedial
Reckless
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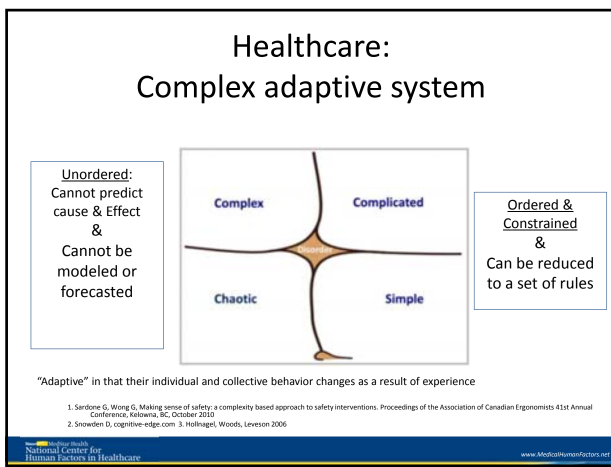
Healthcare:
Complex adaptive system
Unordered: Cannot predict cause & Effect & Cannot be modeled or forecasted
Complex
Complicated
Chaotic
Simple
Ordered & Constrained & Can be reduced to a set of rules
"Adaptive" in that their individual and collective behavior changes as a result of experience
1. Sardone G, Wong G, Making sense of safety: a complexity based approach to safety interventions. Proceedings of the Association of Canadian Ergonomists 41st Annual Conference, Kelowna, BC, October 2010
2. Snowden D, cognitive-edge.com 3. Hollnagel, Woods, Leveson 2006
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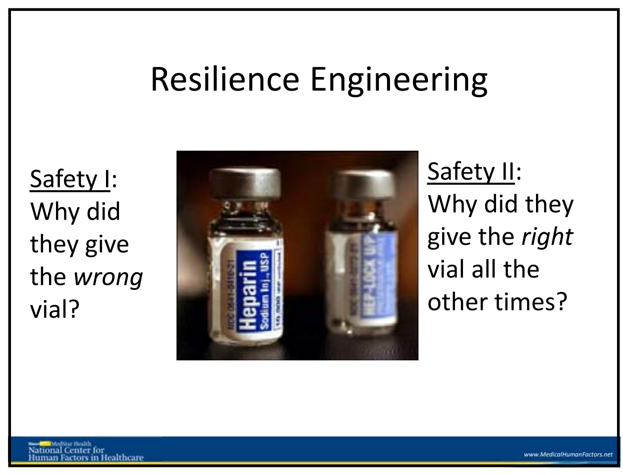
Resilience Engineering
Safety I: Why did they give the wrong vial?
Heparin
Safety II: Why did they give the right vial all the other times?
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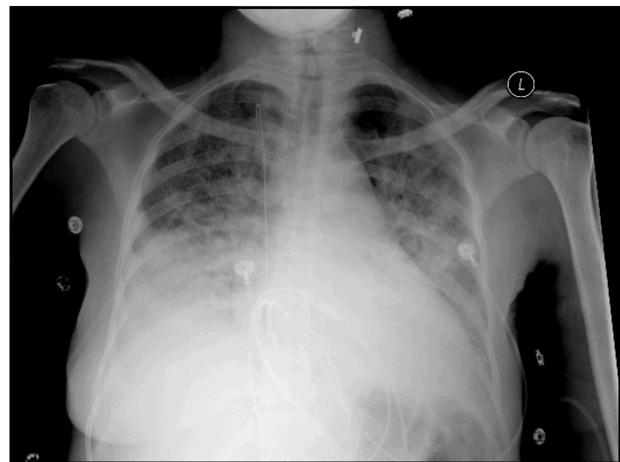
Hindsight Bias: “Wire Case”



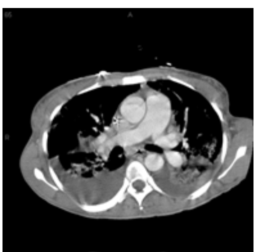
Cognitive Tasks

Basketball Video Instructions:

- Follow white shirts carefully
- Count passes
  - (excluding bounces)

Cognitive Tasks

- Inattentional Blindness
- Task Fixation
- Satisfaction of Search
- Our Current Solution:
  “don’t let go of the wire…”
  “Always check the whole XR”
- Will we achieve high reliability?
- System Solutions?
  - Computer aided diagnosis?
  - Seldinger design?
  - Shared cognition



Lum, Fairbanks, et al. Misplaced Femoral Line Guidewire and Multiple Failures to Detect Foreign Body on Chest X-ray. Acad Emerg Med, 2005; 12(7): 658-662.

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Our Current Solution: “don’t let go of the wire…”

- Email from former medical student, regarding intern orientation:

  “We had a central line session today and I was thinking about how you said it's really impossible to never let go of the wire even though that's what they teach. ***In the teaching video she let go of the wire 4 times.****”*

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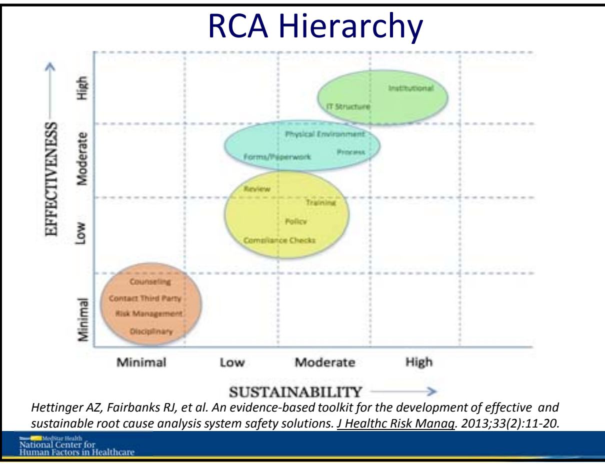
RCA Hierarchy



Hettinger AZ, Fairbanks RJ, et al. An evidence-based toolkit for the development of effective and sustainable root cause analysis system safety solutions. J Healthc Risk Manag. 2013;33(2):11-20.

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Hierarchy of Solutions

IFF changes feasible in context of work

1. Environmental & Design Changes
2. Forcing functions and constraints
3. Automation and computerization
4. Protocols, standards, information, alarm
5. Independent verification/redundancy
6. Rules and policies
7. Education, training, instruction

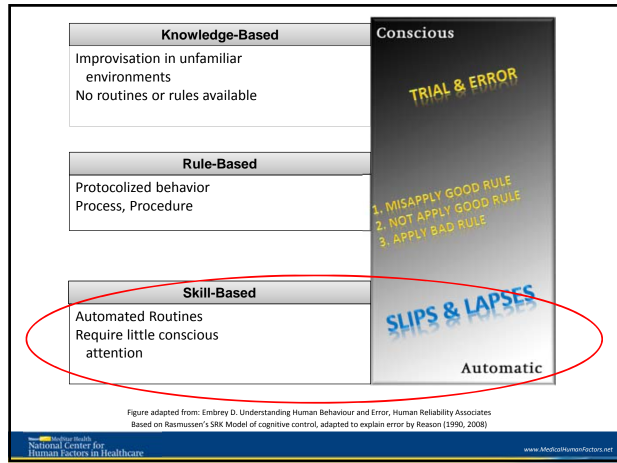
Thomadsen, Lin. Advances in Patient Safety: Vol. 2, AHRQ 2008

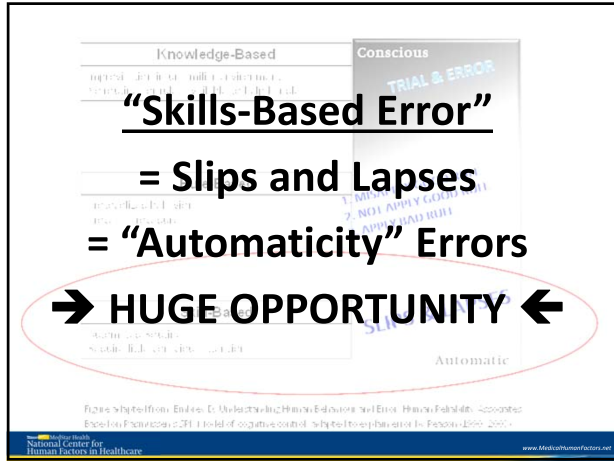
Key Points

- Normal work, not adverse events, should be our focus of learning
  - "I could have told you that would happen"

What DOES NOT reduce risk

- Concluding after an adverse event/RCA:
  - "Failure to follow policy" (or procedure) as primary root cause
  - "Develop policy" or "train staff" or "counsel" as primary action
  - "Human Error" as a cause without contributing factors
  - Any flavor of the "name, blame, and train" approach





3 things leaders can do tomorrow

1. Shift resources to 1° and 2° prevention
2. Implement Just Culture and start the change
   – Senior Leaders to frontline workers
3. Formally implement an event review process based on safety science

It will change the culture!

– NPSF's new "RCA squared" (npsf.org)
– AHRQ's new "CANDOR" (Fall 2015 release)

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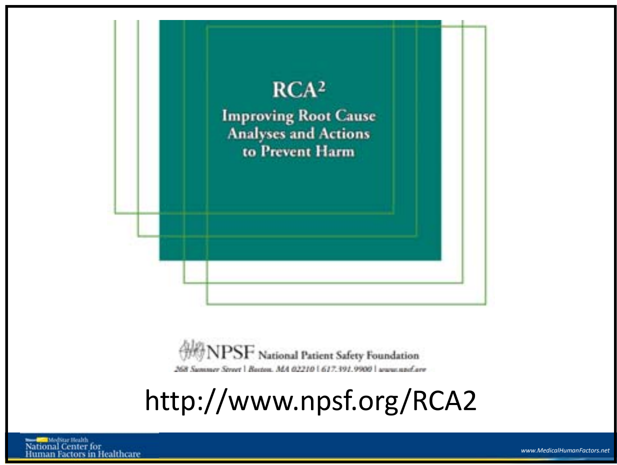


http://www.npsf.org/RCA2

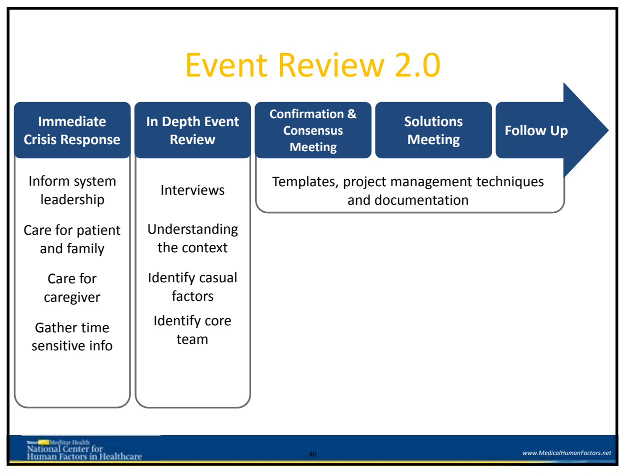
AHRQ's CANDOR Tools: 2016

- Transparency and disclosure
- Care for the caregiver
- Improved hazard reporting
- Event review 2.0

Desired Outcomes of the Review Process

Event Review

Support of Caregiver	Frontline safety champions
Support of Patient	Improves trust and reduces long term liability costs
Identification and Learning	ID contributing factors and hazards, Mitigate future events
Solutions	ID contributing factors and hazards, Mitigate future events
Impact on Safety Culture	Go team has a profound impact on the perception of frontline employees



Thinking differently…

- "Go Team"
- Protected Peer Review
- 2 Meeting Structure
- Majority of work done before first meeting
- Expedited timeline for major events
- Updated Language

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Insanity

"Continuing to do the same thing and expecting different results."

--Einstein

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