

# Medication Safety: Where Do We Work to Reduce the Risk

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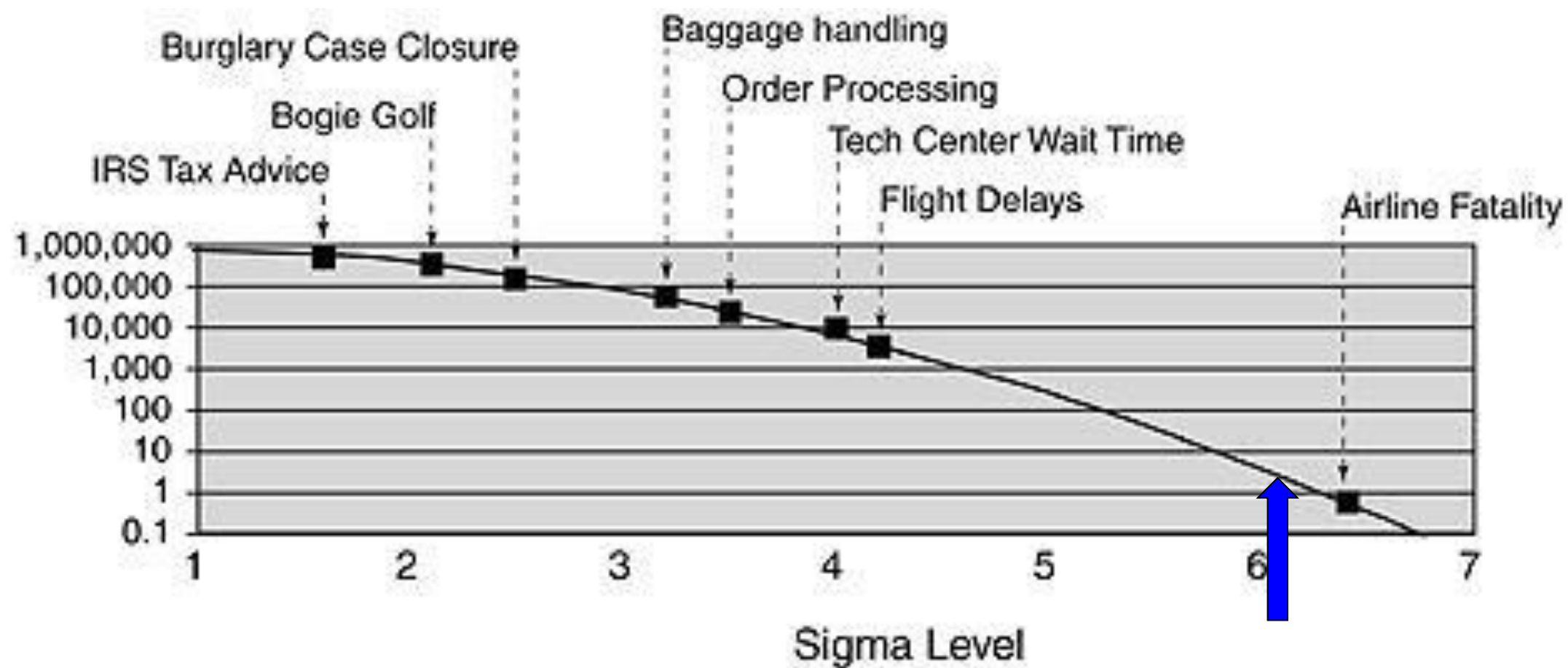
# Objectives for the Session

- Understand Important Vulnerabilities in Medication Safety
- How to mitigate Human Errors in Medication Safety
- What can each of us do to improve medication safety?

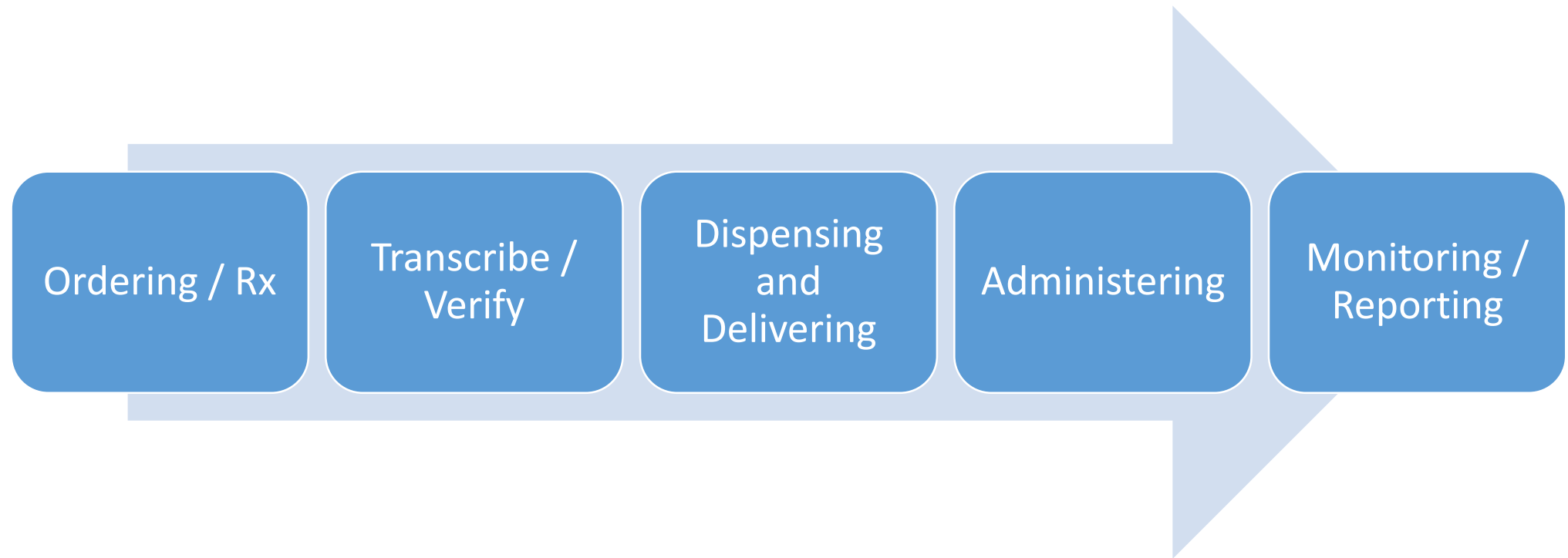


# Some Data for Context

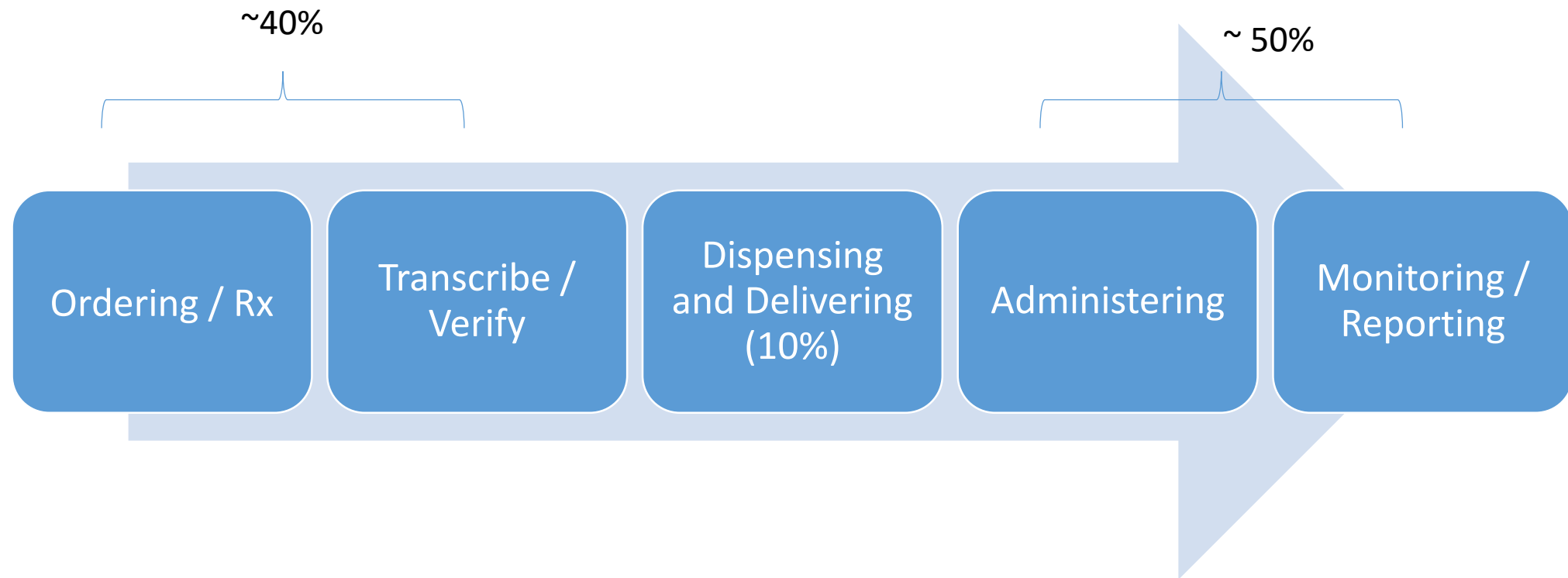
- **Across PHC , about 700K medications are processed each MONTH**
- **We have an average of 5743 medication “variances” per YEAR (.068%)**
- **The number of serious safety events (SSE) was 6 over 6 months (<1 per 1,000,000)- so called “6 Sigma” performance**
- **The only other process in healthcare that SAFE is general anesthesia**



# The Five Stages of the Medication Process

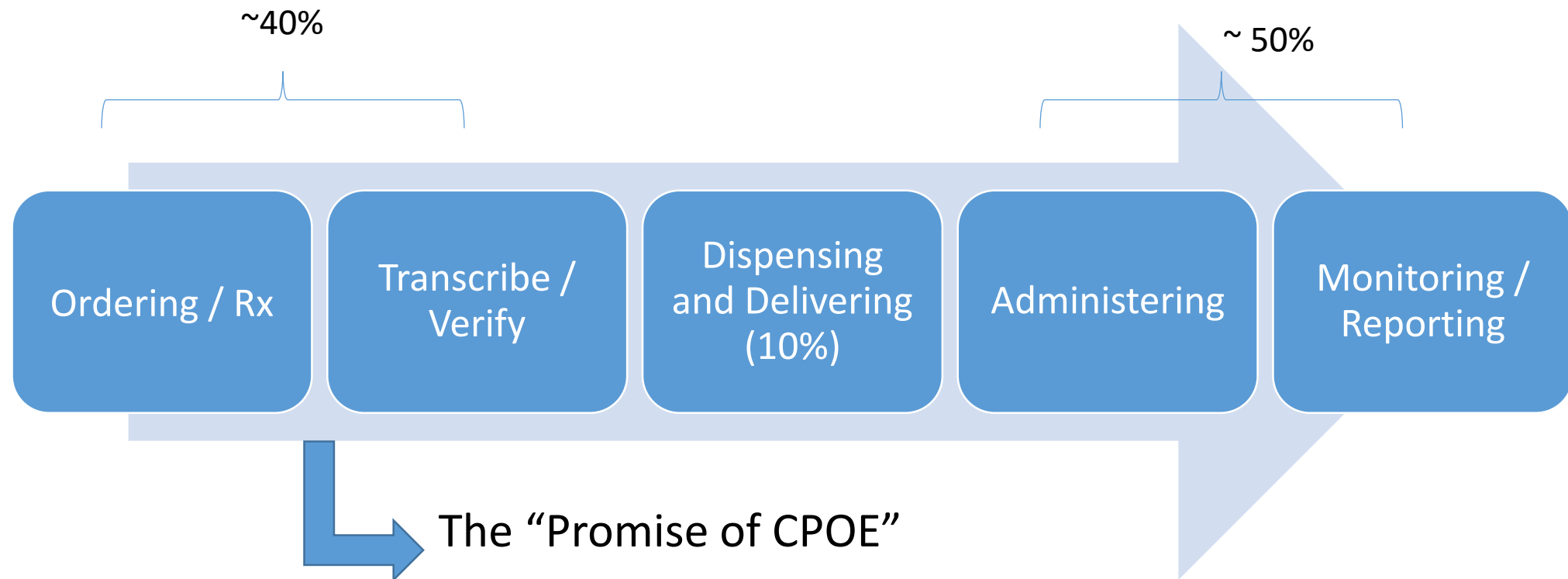


# Human Error can occur at ANY step...



\*Data from analysis of PHC variances related to medications / fluids

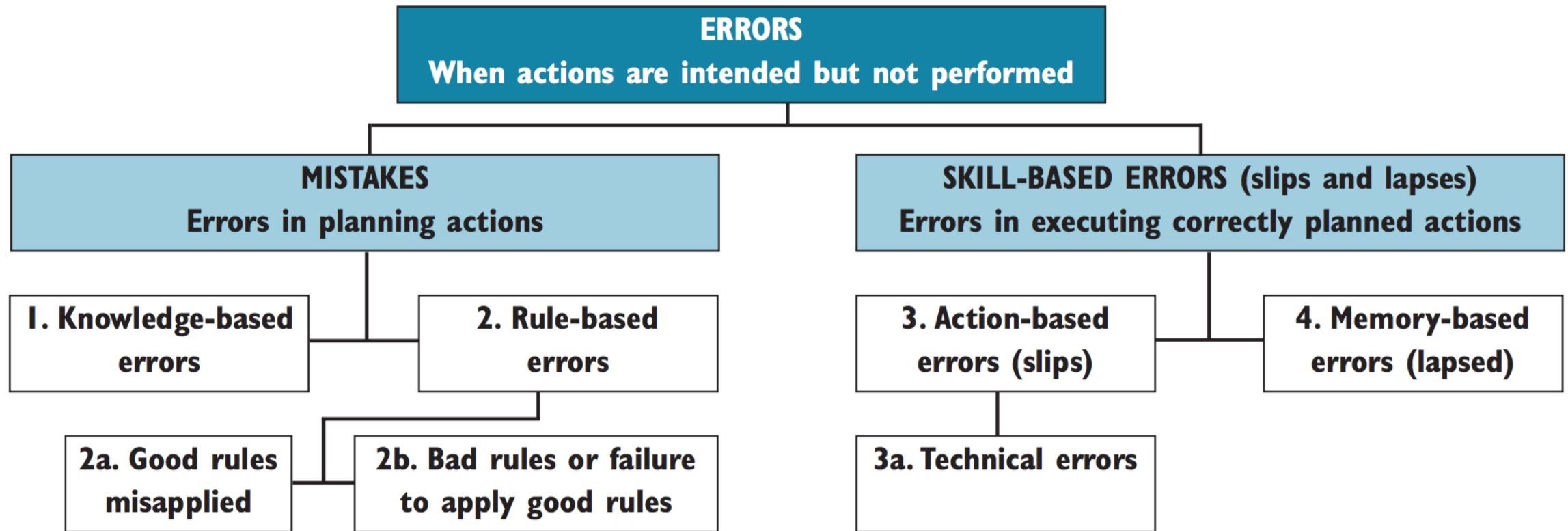
# Human Error can occur at ANY step...



\*39% of EHRs testing failed to detect harmful drug orders, 13% could be fatal



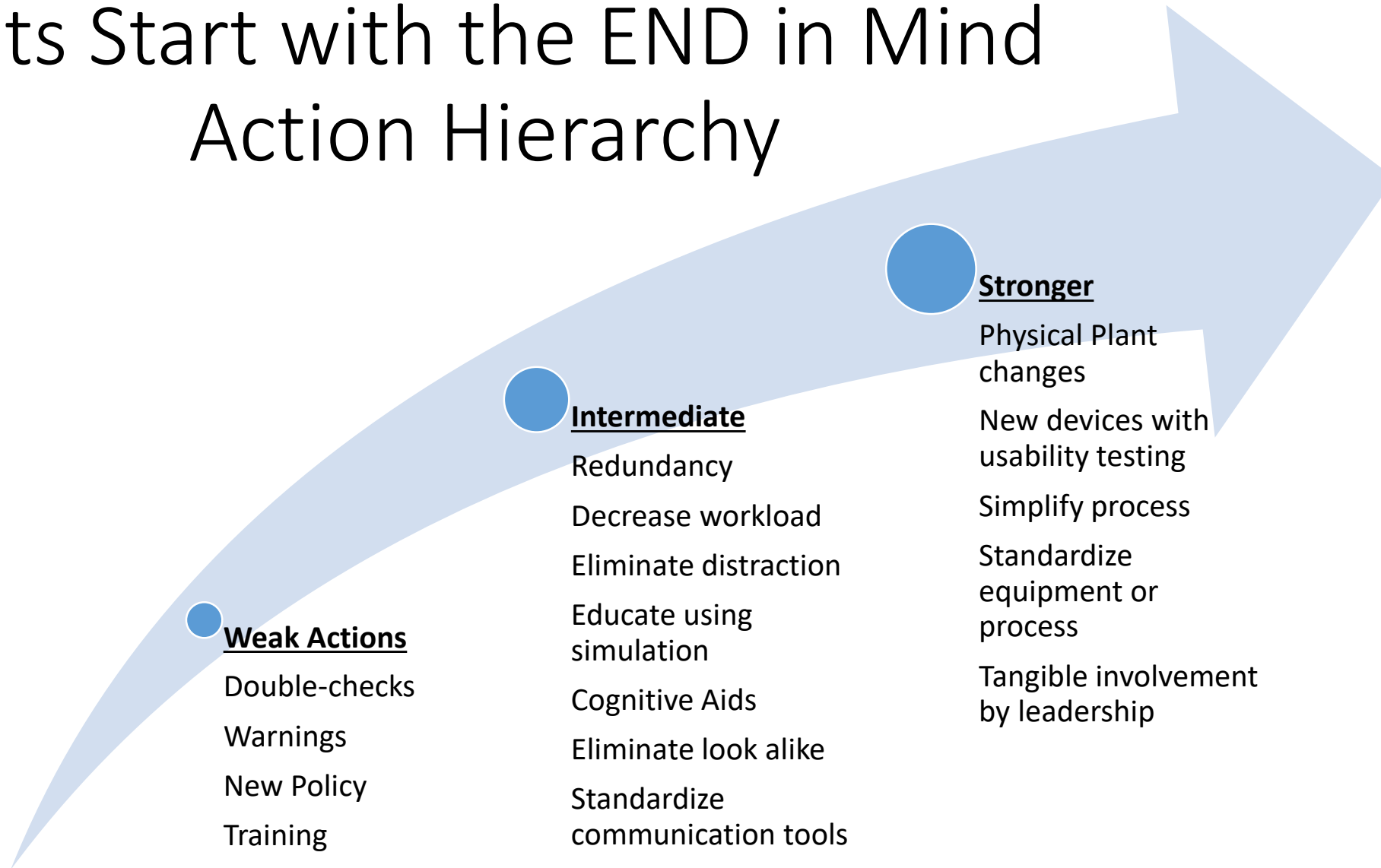
# To Understand SAFETY, We Must Talk about Errors



**FIGURE 2** The classification of medication errors based on a psychological approach. (Reproduced with permission from Ferner RE, Aronson J. Clarification of terminology in medication errors. Definitions and classification. *Drug Saf* 2006; **29**:1011–22.)

# Lets Start with the END in Mind

## Action Hierarchy



# Skill Based Human Failures

## (Slip & Lapse)

***Errors Rare (3/1000) Made by experienced and highly trained, well motivated staff: Additional training NOT valid***

Characteristics	Error Prevention Interventions
<p><b><u>Slip</u></b> - A frequently performed physical action goes wrong</p> <ul style="list-style-type: none"><li>• Familiar tasks that require little conscious attention</li><li>• Error could happen when attention is momentarily diverted</li><li>• Repetition</li></ul>	<ul style="list-style-type: none"><li>• Automation</li><li>• Checklists and reminders</li><li>• Verification check points</li><li>• Visual cues and reminders</li></ul>
<p><b><u>Lapse</u></b> – Short-term memory lapse</p> <ul style="list-style-type: none"><li>• Not doing what you meant to do</li><li>• Omissions following interruptions</li><li>• Perceptual Confusion</li></ul>	<ul style="list-style-type: none"><li>• Self checks and 2<sup>nd</sup> person checks</li><li>• Removal of distractions and interruptions</li><li>• Sufficient time available to complete task</li><li>• Warnings and alarms to help detect errors</li></ul>

# Skill Based Activity

## PHARMACY TECH REVIEW

pharmacytechreview.com

### Calculate Dose Based on Weight

Todd, the cat, has been prescribed a drug that should be given 2mg per kg of his weight. Todd is a solid 24 lb cat. Calculate Todd's dosage.

$$2.2 \text{ lb} = 1 \text{ kg}$$

$$\frac{2 \text{ mg}}{1 \text{ kg}} \Rightarrow \frac{2 \text{ mg}}{2.2 \text{ lb}} = \underline{\hspace{2cm}}$$

# Example of Skill Based Slip

- Omission associated with interruption
  - “I picked up my coat to go out when the phone rang. I answered it and then went out the door without my coat.”
- Reduced Intentionality
  - “I went into the bedroom to fetch a book. Took off my rings, looked into the mirror and came out again--without book.”



geetrish.com

## General

### ▼ Diet/Nutrition

- ☒ Diet NPO  
Diet effective now starting Today at 0915 Until Specified  
Pre-op, Sign & Hold

### ▼ ## VTE Risk Assessment

- [LINK TO CAPRINI SCALE](#)

- ☐ VTE: Low Risk
- ☐ VTE: Moderate Risk
- ☒ VTE: High Risk  
VTE Risk Score High? Yes  
Sign & Hold

### ▼ ## Mechanical VTE Prophylaxis for All Patients- IPC preselected

- ☒ Intermittent pneumatic compression (IPC)  
Routine, Until discontinued starting Today at 0915 Until Specified  
Pre-op, Sign & Hold
- ☐ Mechanical Contraindications

### ▼ ## Chemo VTE Prophylaxis- select proper medication or a contraindication for this patient

- ☒ hepaRIN, porcine (PF) injection 5,000 Units  
5,000 Units, Subcutaneous, 30 min pre-op, Starting Today at 0914, Pre-op, Sign & Hold
- ☐ Enoxaparin (LOVENOX) 40 mg injection  
40 mg, Subcutaneous, 30 min pre-op, Starting 3/28/19, Pre-op
- ☐ Enoxaparin (LOVENOX) 30 mg injection  
30 mg, Subcutaneous, 30 min pre-op, Starting 3/28/19, Pre-op
- ☐ Orthopedic Patients Only: aspirin tablet  
325 mg, Oral, 30 min pre-op, Starting 3/28/19, Pre-op
- ☐ Pharmacological Contraindications

## Medications

### ► Antibiotics

[click for more](#)

### Additional SmartSet Orders

# **Did I Order Antibiotics?**



## General

### ▼ Diet/Nutrition

- ☒ Diet NPO  
Diet effective now starting Today at 0915 Until Specified  
Pre-op, Sign & Hold

### ▼ ## VTE Risk Assessment

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## Medications

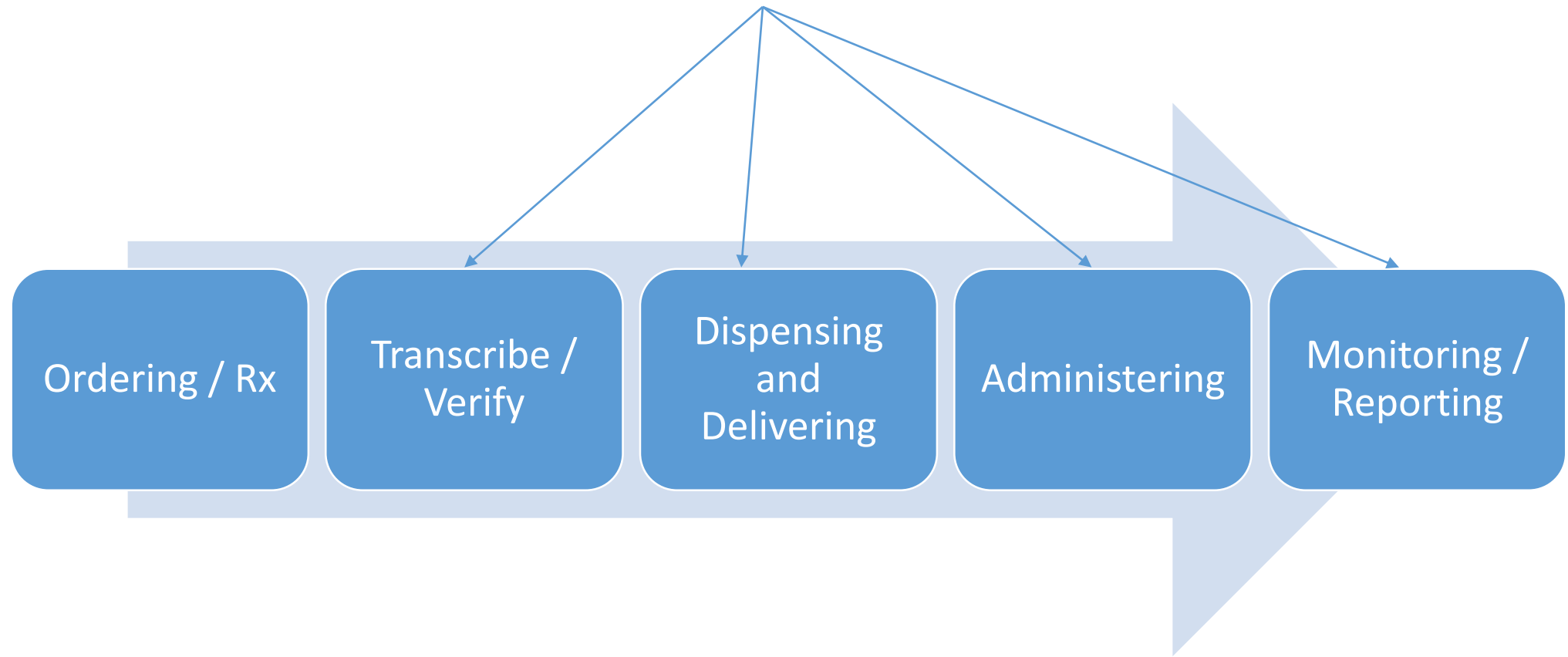
### ▶ Anesthetics

[click for more](#)

## Additional SmartSet Orders

Post-op Admit	<input type="radio"/> Pharmacological Contraindications
Procedure	▼ Medications
Rounding	▼ Antibiotics
Discharge	<input type="radio"/> Cefazolin 2 g dose for patient weighing LESS than or equal 120 kg
Post-op Disc...	<input type="radio"/> Cephalosporin or PCN Allergy Options for patients weighing LESS than or equal 80 kg
Non-surgical	▼ Additional SmartSet Orders

# Can You Imagine That Happening Anywhere?

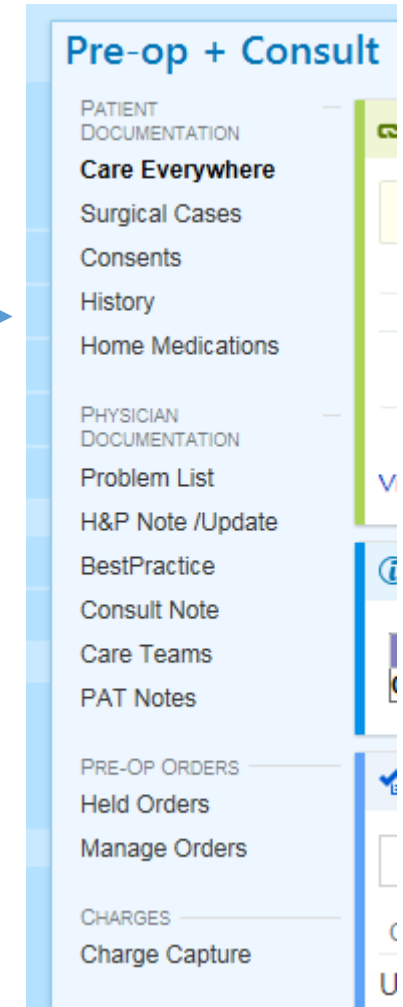
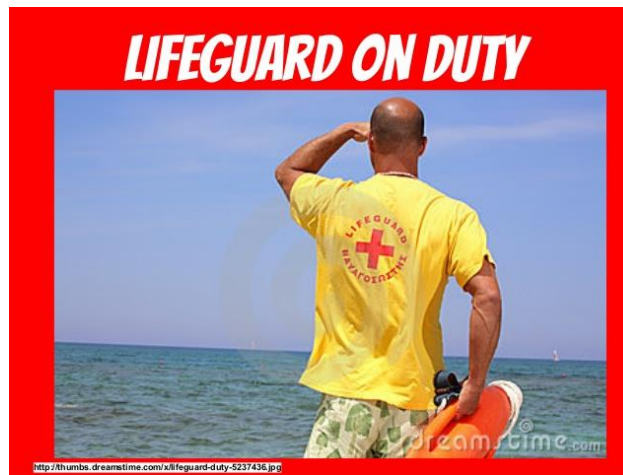


# Mitigation Strategies for Skill-based errors

## Minimize Distractions

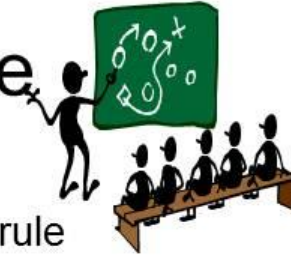


- Other workplace design
- Fatigue management
- Checklists
- Independent double checks
- Active supervision



# Rule-Based Performance

## What You're Doing At The Time



Responding to a situation by recalling and using a rule that you learned either through education or experience

Errors You Experience	Error Prevention Strategy
<b>Used the wrong rule</b> – You were taught or learned the wrong response for the situation	<b>Educate about the right rule</b>
<b>Misapplied a rule</b> – You knew the right response but picked another response instead	<b>Think a <i>second</i> time</b>
<b>Non-compliance</b> – Chose not to follow the rule (usually, thinking that not following the rule was the better option at the time)	<b>Reduce burden, increase risk awareness, improve coaching</b>

1 in 100 choices made in error  
(not too bad!)

# Example of Rule-Based

- Misapplication of “Good Rule”
  - “Good Rule” is one that has worked in past
  - The more it has worked, the “stronger” it is
  - First exception
    - All patients sleeping throughout night are having a “good” night





# Patient with gout no other hx

- Order for pegloticase (Krystexxa)

**WARNING: ANAPHYLAXIS and INFUSION REACTIONS;  
G6PD DEFICIENCY ASSOCIATED HEMOLYSIS and  
METHEMOGLOBINEMIA**

*See full prescribing information for complete boxed warning.*

- Anaphylaxis and infusion reactions have been reported to occur during and after administration of KRYSTEXXA. (5.1, 5.2)
- Anaphylaxis may occur with any infusion, including a first infusion, and generally manifests within 2 hours of the infusion. However, delayed-type hypersensitivity reactions have also been reported. (5.1)
- KRYSTEXXA should be administered in healthcare settings and by healthcare providers prepared to manage anaphylaxis and infusion reactions. (5.1, 5.2)
- Patients should be pre-medicated with antihistamines and corticosteroids. (5.1, 5.2)
- Patients should be closely monitored for an appropriate period of time for anaphylaxis after administration of KRYSTEXXA. (5.1)
- Monitor serum uric acid levels prior to infusions and consider discontinuing treatment if levels increase to above 6 mg/dL, particularly when 2 consecutive levels above 6 mg/dL are observed. (5.2)
- Screen patients at risk for G6PD deficiency prior to starting KRYSTEXXA. Hemolysis and methemoglobinemia have been reported with KRYSTEXXA in patients with G6PD deficiency. Do not administer KRYSTEXXA to patients with G6PD deficiency. (4, 5.3)



# The importance of similarity and frequency

- When cognitive operations are *under-specified*, they tend to default to contextually appropriate, high frequency responses..
- True both for physical context and semantic

- **What do you call the tree that grows from acorns?**
  - **OAK**
- **What do we call a funny story?**
  - **JOKE**
- **What sound does a frog make?**
  - **CROAK**
- **What is another word for cape?**
  - **CLOAK**
- **What do you call the white of an egg?**



# What did you see?



Look at the chart and say the COLOUR not the word

YELLOW	BLUE	ORANGE
BLACK	RED	GREEN
PURPLE	YELLOW	RED
ORANGE	GREEN	BLACK
BLUE	RED	PURPLE
GREEN	BLUE	ORANGE

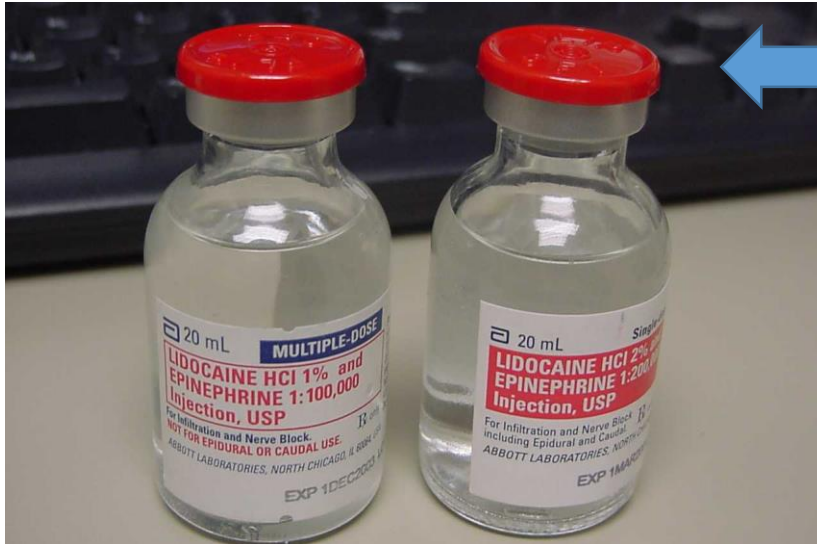
### Left – Right Conflict

Your right brain tries to say the colour but your left brain insists on reading the word.





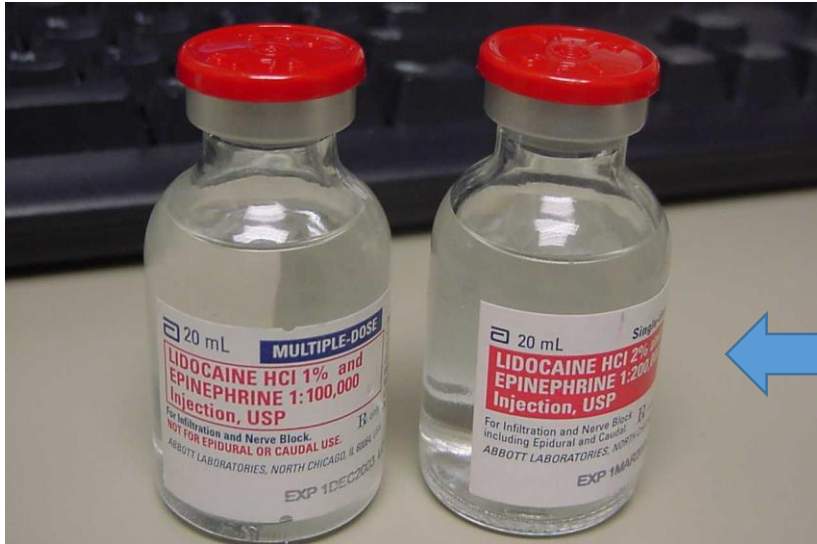
# Encoding Deficient Rule



- Red top means lidocaine with Epinephrine



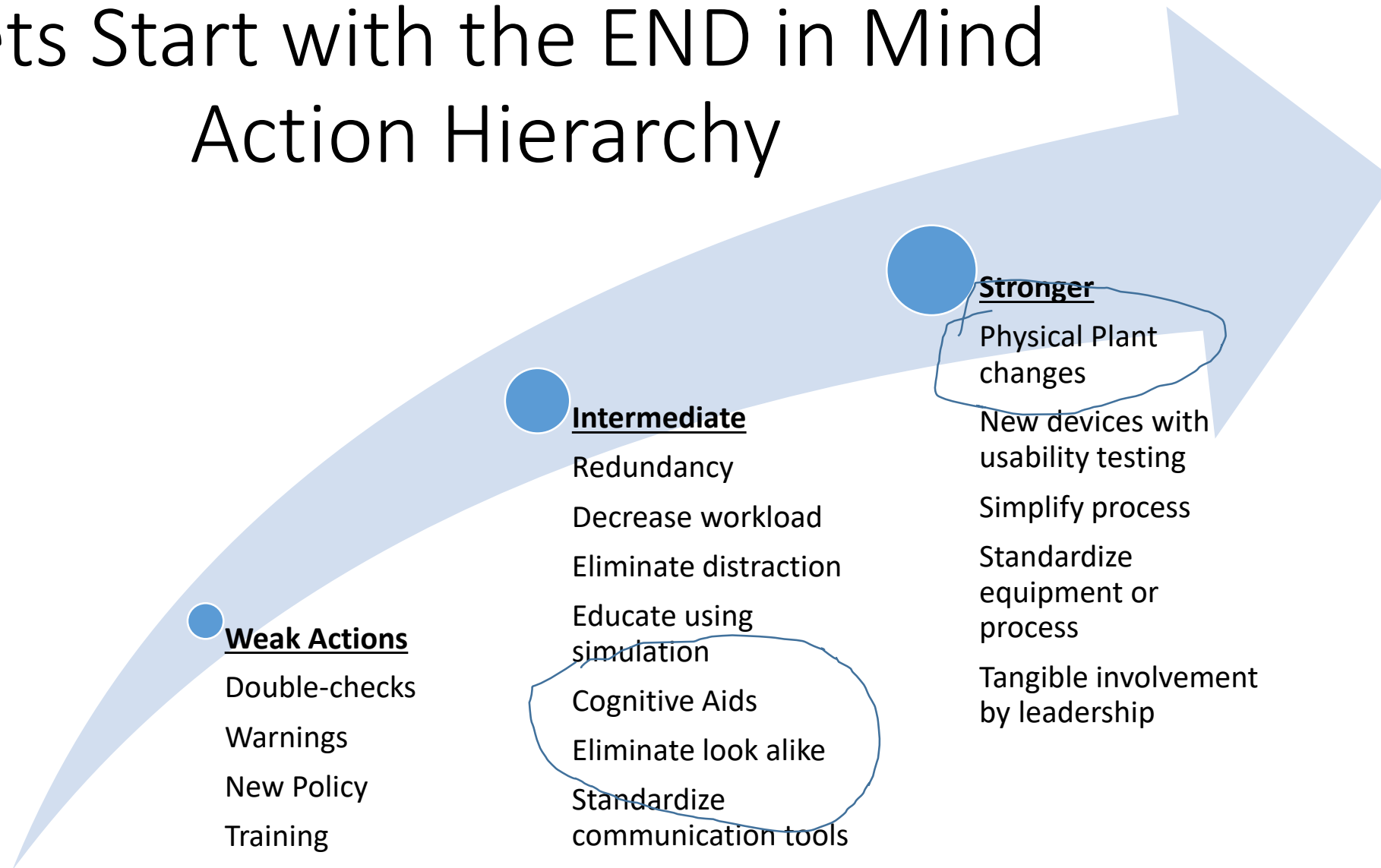
# Encoding Deficient Rule



- Red top means lidocaine with Epinephrine
- AND red letters on white background means CONTAINS preservative and White letters on RED background NO preservative

# Lets Start with the END in Mind

## Action Hierarchy



## Physical Plant Changes



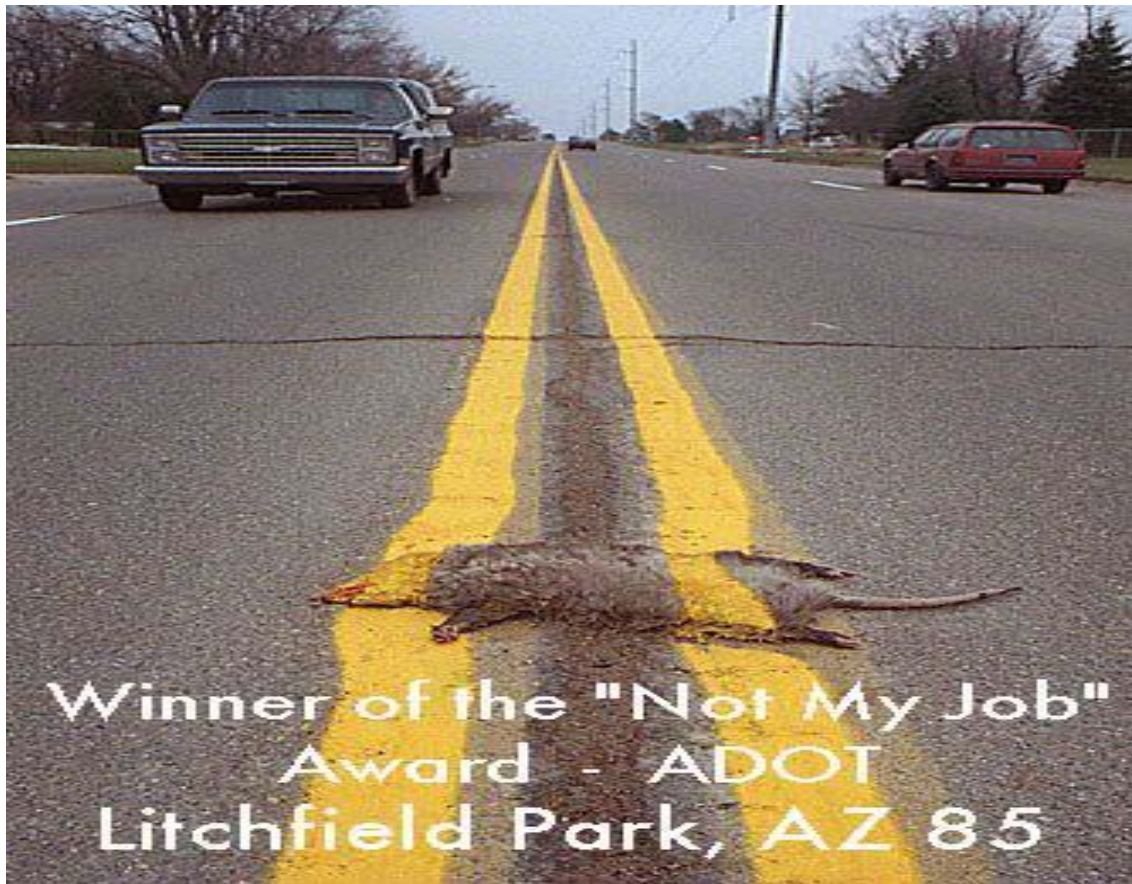




- One tubing ONLY fits Epidural Pump and One ONLY fits IV pump

# Action-deficient rule

- Rules in which the consequence is inappropriate, inefficient or otherwise maladaptive

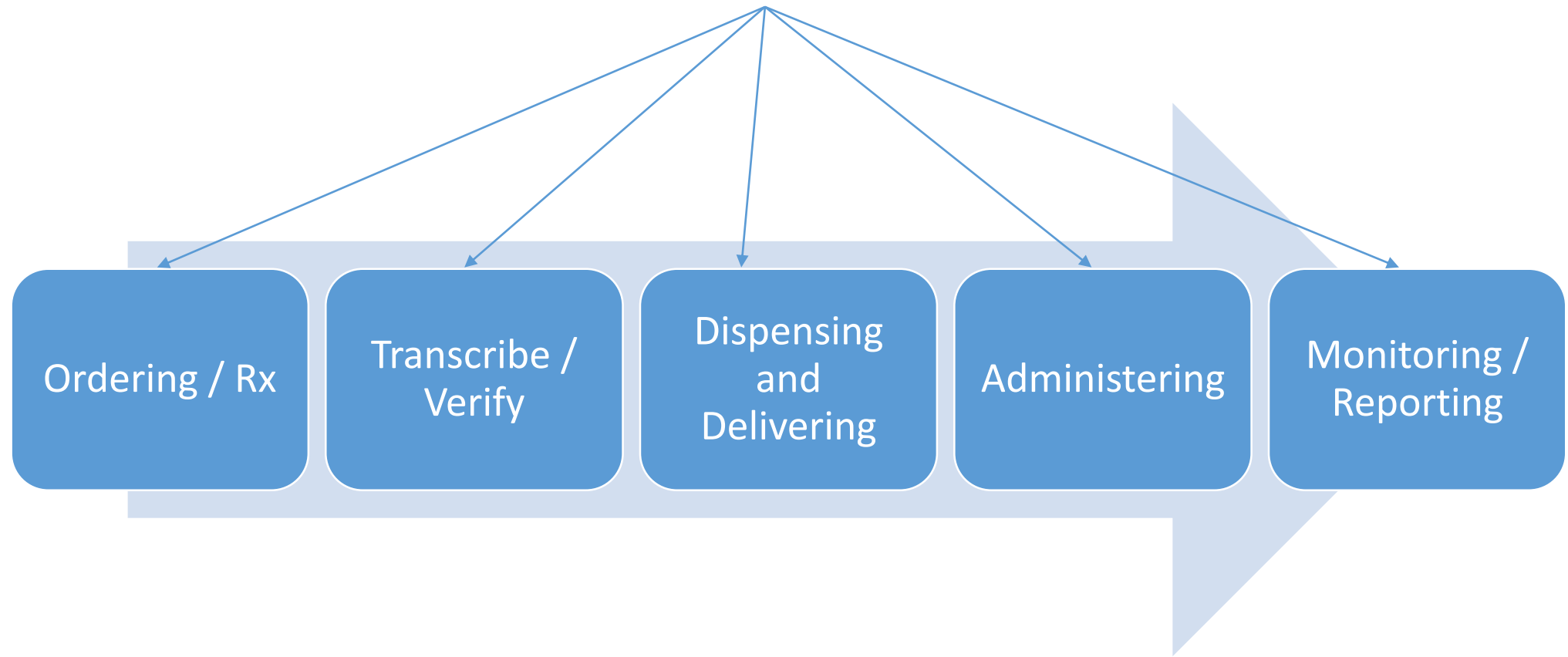


# Mitigation Strategies for Rule Based errors

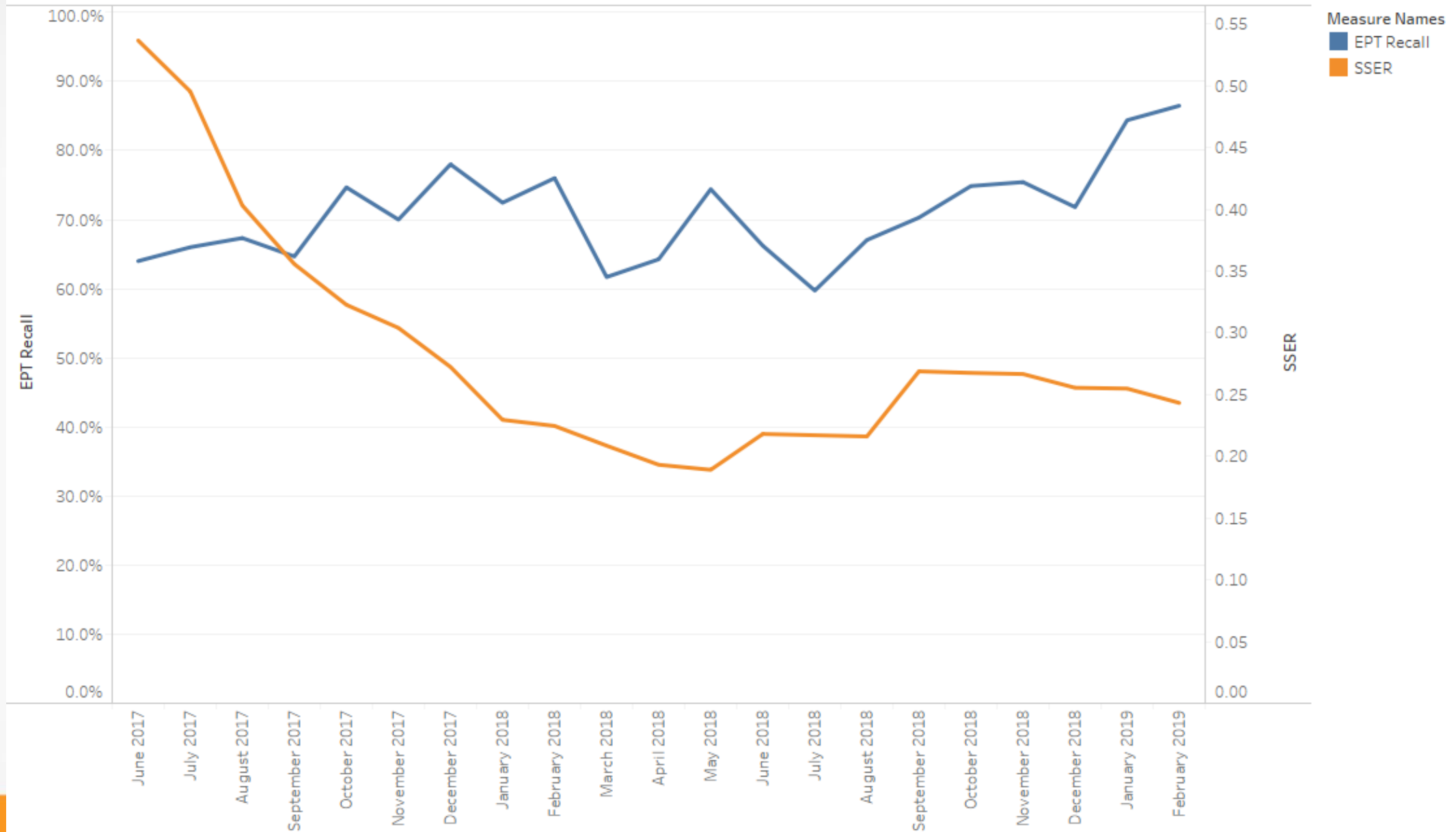
- Train for exceptions
  - What if patient is PCN allergic?
- Good team climate
  - Peer Checking / Coaching
  - Ask a Question / Request a change

	What we believe in...	What we do...
S	Supporting the Team	<ul style="list-style-type: none"><li>• Practice Peer Checking and Peer Coaching <i>Example: Incorrect sponge count. Tech notified physician (peer coaching) and together (teamwork) they kept looking until they found the sponge.</i></li></ul>
A	Asking Questions	<ul style="list-style-type: none"><li>• Speak Up for Safety – Ask a question, Request change, voice a Concern, use the Chain of command</li><li>• Practice with a Questioning Attitude: Validate and Verify <i>Example: Nurse notices odd amount of fluid in IV, asks pharmacy questions, discovers the mixture is incorrect.</i></li></ul>
F	Focusing on Task	<ul style="list-style-type: none"><li>• Always Stop, Think, Act, Review <i>Example: Before sending an email, stop a moment, think about what's in the email, make changes if needed, then review before sending.</i></li></ul>
E	Effective Communication Every Time	<ul style="list-style-type: none"><li>• Use Read and Repeat Backs</li><li>• Ask Clarifying Questions</li><li>• Effective handoffs</li><li>• Notifications – Situation, Background, Assessment, Recommendations/Request <i>Example: Validate and verify your steps every day. Communicate everything - if something seems wrong or you did something important others may need to know about, talk about it.</i></li></ul>

# Where could we USE th 11 Error Prevention Tools ?



## EPT Recall and SSER for Facility: ALL





# Lack Of Knowledge-Based Performance

## What You're Doing At The Time

Problem solving in a new, unfamiliar situation.  
You come up with the answer by:

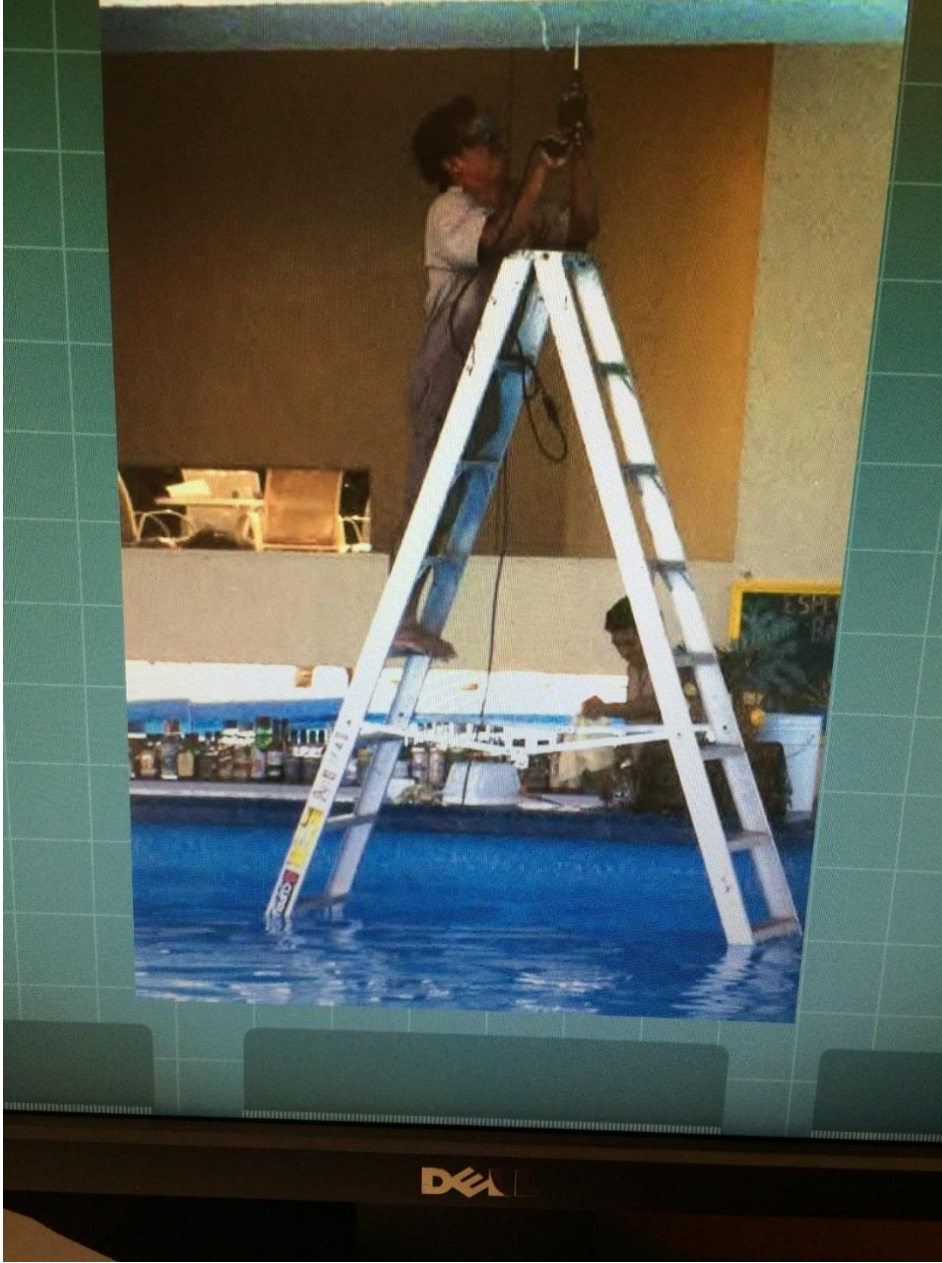
- Using what we do know
- Taking a guess
- Figuring it out by trial-and-error



Errors You Experience	Error Prevention Strategy
You came up with the wrong answer (a mistake)	<b>STOP and find an expert who or that knows the right answer</b>

30-60 of 100 decisions made in error  
(yikes!)

# Using What We Know to Solve New Problem



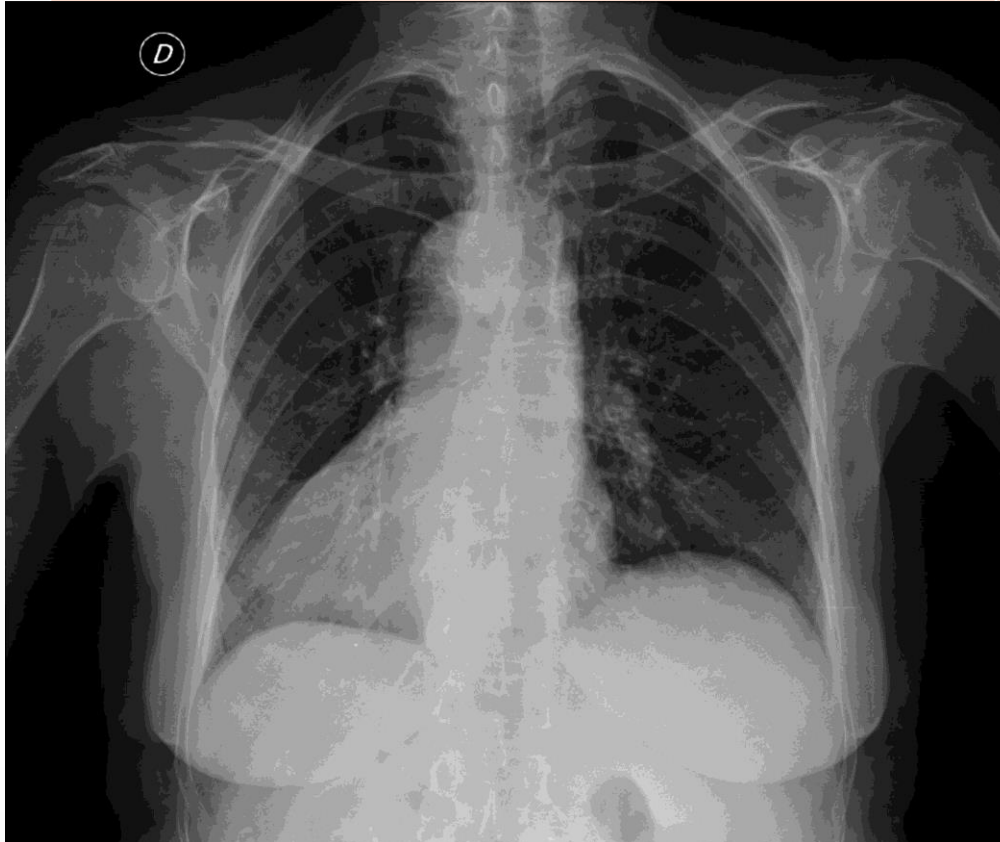
# Knowledge Based Human Failures

Characteristics	Typical Control Measures
<ul style="list-style-type: none"><li>• No rules or routines available to handle an unusual situation</li><li>• Confirmation bias<ul style="list-style-type: none"><li>➤ Tendency for people to favor information that conforms to their beliefs or hypothesis</li></ul></li><li>• Overconfidence effect<ul style="list-style-type: none"><li>➤ Bias in one's own confidence in judgment</li><li>➤ Unconsciously incompetent</li></ul></li></ul>	<ul style="list-style-type: none"><li>• Stop and find an expert</li><li>• Establish rules</li><li>• Use evidence based best practice</li><li>• Work specialization</li><li>• Diagnostic tools and decision making aids</li><li>• Competency checks</li><li>• Share experiences of unusual events</li></ul>



# Knowledge Based Human Failures

## Characteristics



## Typical Control Measures

- Stop and find an expert
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# Knowledge Based Human Failures

## Characteristics

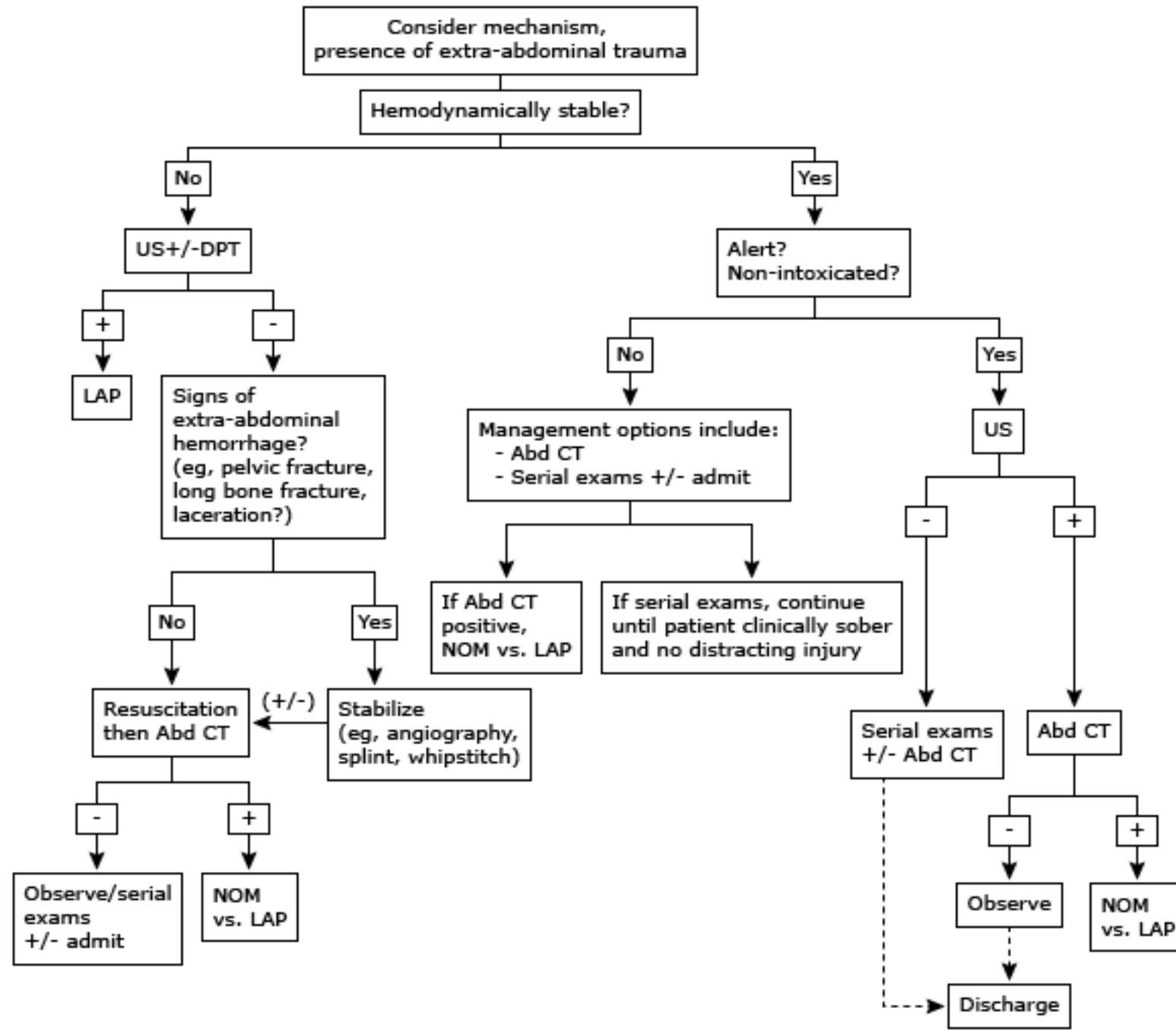


Source: K.J. Knoop, L.B. Stack, A.B. Storrow, R.J. Thurman:  
The Atlas of Emergency Medicine, 4th Edition,  
[www.accessemergencymedicine](http://www.accessemergencymedicine)  
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## Typical Control Measures

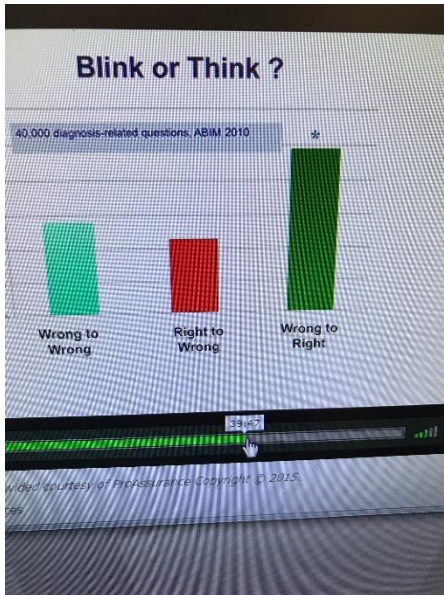
- Stop and find an expert
- Establish rules
- Use evidence based best practice
- Work specialization
- Diagnostic tools and decision making aids
- Competency checks
- Share experiences of unusual events

## Blunt abdominal trauma ED management



# Additional Strategies for Knowledge-Based errors

- Solving unique / complex problems
- Do not proceed in face of uncertainty



	What we believe in...	What we do...
<b>S</b>	Supporting the Team	<ul style="list-style-type: none"> <li>Practice Peer Checking and Peer Coaching <i>Example: Incorrect sponge count. Tech notified physician (peer coaching) and together (teamwork) they kept looking until they found the sponge.</i></li> </ul>
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# Summary

- Hospital Medication is one of the safest hospital processes
  - (in terms of incident rate)
  - Opportunities remain in each of the 5 stages of Medication Process
- Understanding HOW we fail as Humans helps develop strategies to ANTICIPATE and MITIGATE our errors
  - Understand the modality in which the brain is working (Skill-based, Rules-based or Knowledge based)
  - Fit the strategy to the failure modality (recognize that not all strategies are equal; some stronger than others)
- Broad use of the 11 Error Prevention tools is a good “safe bet, no regrets” to mitigate ALL forms of error



**I have no idea what I am talking about...**



**...so here's a bunny with a pancake on its head.**

# References

- **Chapter 37 Medication Administration Safety**
  - **Ronda Hughes; Mary Blegen Patient Safety and Quality” An Evidence-Based Handbook for Nurses 2008**
- **James Reason Human Error Cambridge Press 1990**
- **PHC Pharmacy Data Scott McCauley PHC pharmacy lead**
- **Fortune Magazine April 2019 “Death by a 1000 Clicks”**