

Patient safety and laboratory testing: walking the walk

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- **Dr. Matthew Weinger**
- **Dr. James Hernandez**
- **David Marx**

Overview

- **Factors that contribute to errors**
- **Realistic error rates**
- **Interventions to strongly decrease errors.**
- **Conclusions**



“I am vacuuming rather than helping patients”

Latent factors that contribute to lab errors at the point of care

- 1. Incompetence**
- 2. Neglecting patient safety culture**
- 3. Behavior is insufficiently monitored and quantified.**
- 4. Patient safety competes with other goals, and loses.**
- 5. Unclear communication about QI**
- 6. Normalization of Deviance**
- 7. The multi-tasking-fatigue combination**
- 8. Disconnection between lab workers and care providers**
- 9. Favoring weak interventions because they are easier**

Incompetence

Rate of mislabeling errors	
Nurse-Average	0.2%
Nurse - Joe	3.0%
Next lowest performing nurse	0.6%

What would you do with Joe if you could not replace him with a robot?

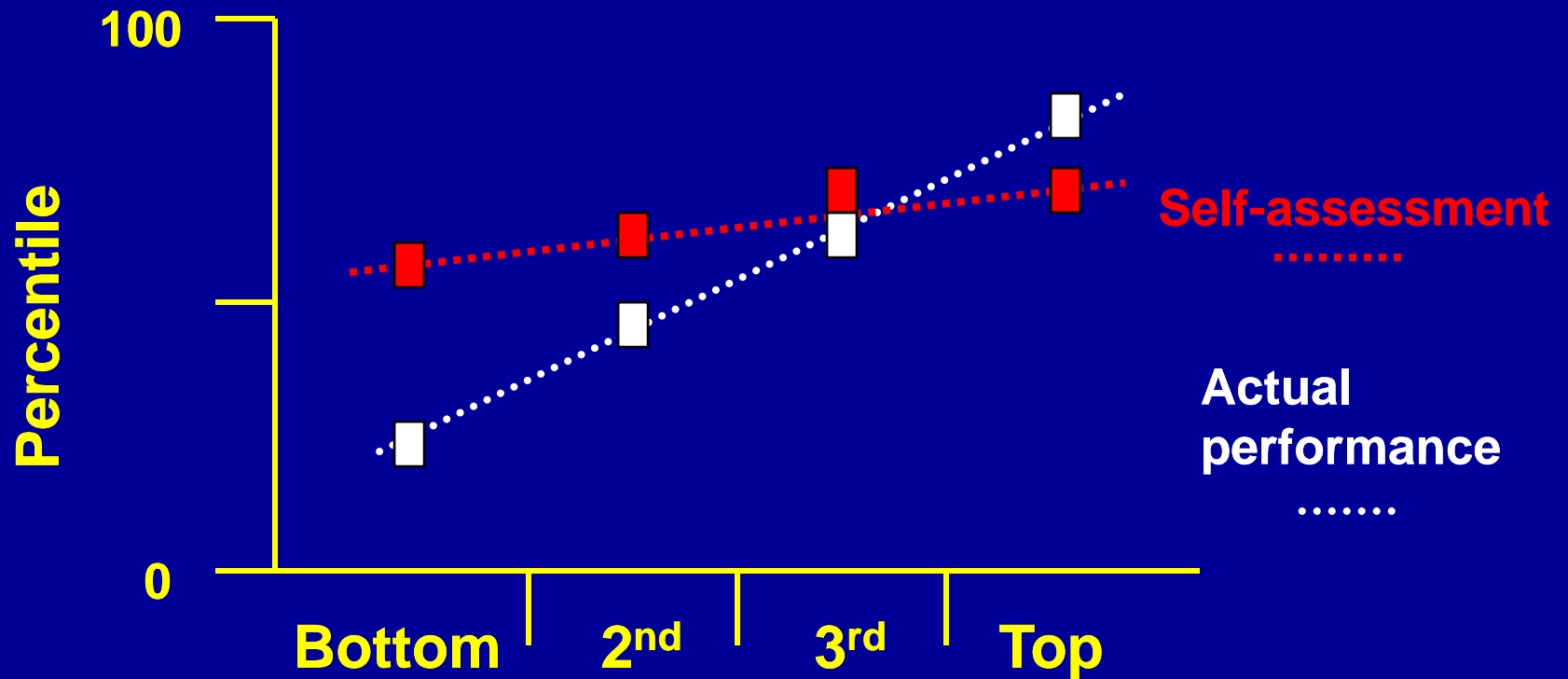
Incompetence

- Mismatch of skills with job duties
 - Error rates >> than peers
 - No obvious impairment or recklessness
- Backbone is required to confront mismatch.
 - Chronic mismatch = move to better fit or terminate
 - Temporary mismatch (e.g., bereavement) = temporary leave from patient care duties



The inaccuracy of self-assessment

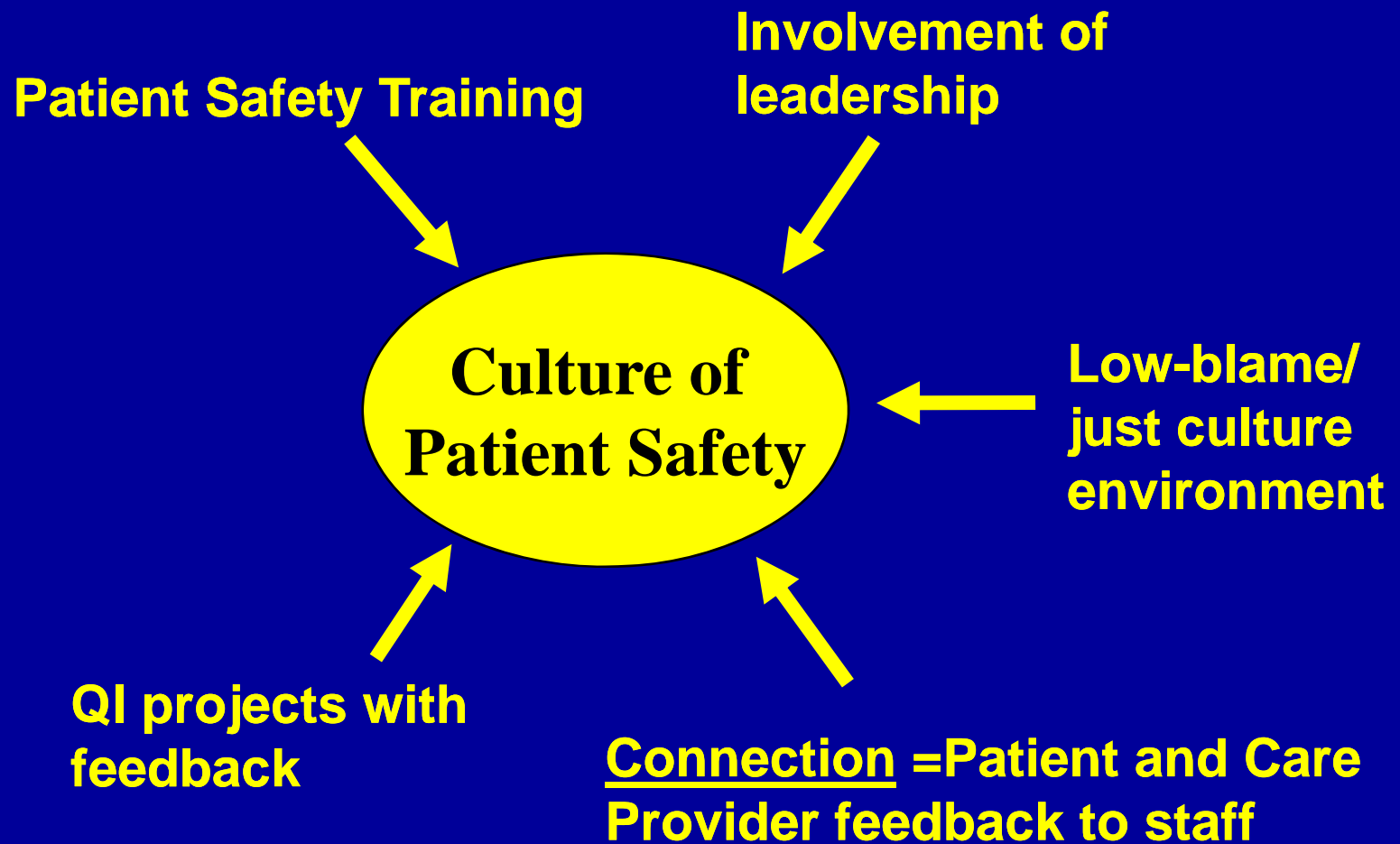
Use objective competency assessment, not self-assessment



Kruger J, Dunning D. Unskilled and unaware of it... *J Personality and Social Psychology*. 1999;77:1121-1134.

Haun DE, et al. Assessing the competence of specimen-processing personnel. *Laboratory Medicine*. 2000;31:633-637.

Contributors to a patient safety culture



Culture: the most important intervention

- Culture is a set of shared attitudes and practices that characterize an organization.
- “We have found that without culture change, you cannot reorganize work or implement safety practices, because people are not playing in the sandbox together.”

Dr. Peter Pronovost. In Conversation with... *AHRQ Web M&M online*. June 2005, accessed 11/17, 2005.
webmm.ahrq.gov/perspective.aspx?perspectiveID=6

Just Culture: 3 errors and the response to them

1. **Honest human errors in error-prone environment**
 - Most, but not all, cases belong here
 - Response: Console error, fix system
2. **Errors due to at-risk behavior**
 - E.g., short-cutting
 - Response: fix system; then coach, monitor
3. **Errors due to recklessness (impairment, intentional)**
 - Response: punish

Just culture: interview with David Marx. *Lab Err Pat Safety*. 2005; 1(6)2-4.

All systems, whether based on humans or robots behave better if they are being monitored.

- **Examples from life**
 - **The report card**
 - **The marriage**
 - **Cubicle window**
- **Lab examples**
 - **The call center**
 - **“Open lab” layout**
 - **Lab utilization report cards**

4th grade report card: Mike Astion
Teacher: Miss Morgan

Math: A

Reading: A-

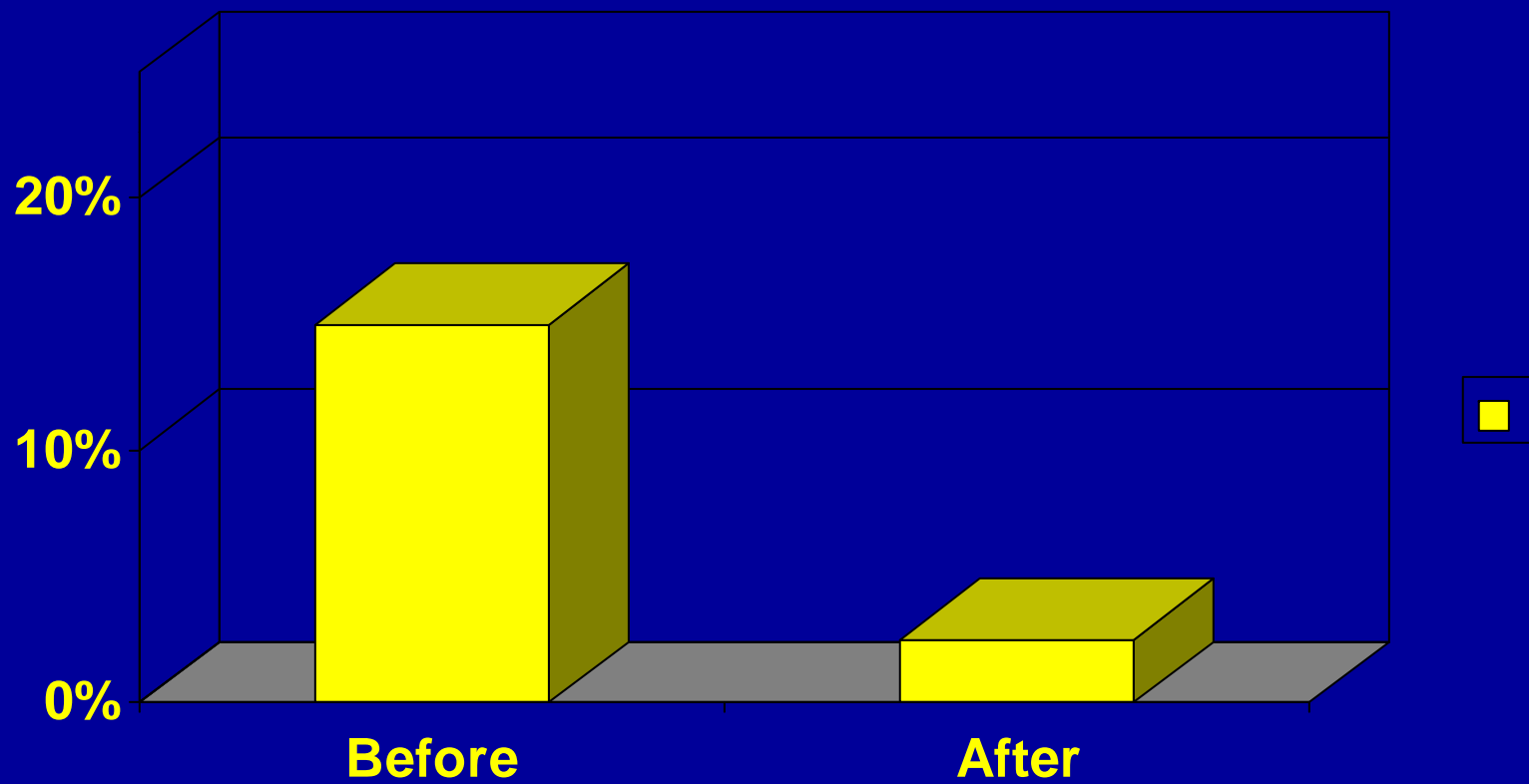
Behavior: C

Penmanship: C+

Comments:

Michael talks too much in class

Abandon call rates for a reference lab in the western United States before and after implementation of a call center



If it is important, it should be measured

Are we doing it right?

- Courier arrival time
- Ave time to answer phone
- Abandon call rate
- % of AM draw results available by AM rounds
- % of mislabeled specimens
- % of relabeled specimens
- % of contaminated specimens
- Corrected reports
- Cancel and credits
- Log in errors
- Lost specimens
- % of errors that harm patients

Workflow / productivity

- # specimens processed per hour per FTE
- # specimens decanted per shift

HR

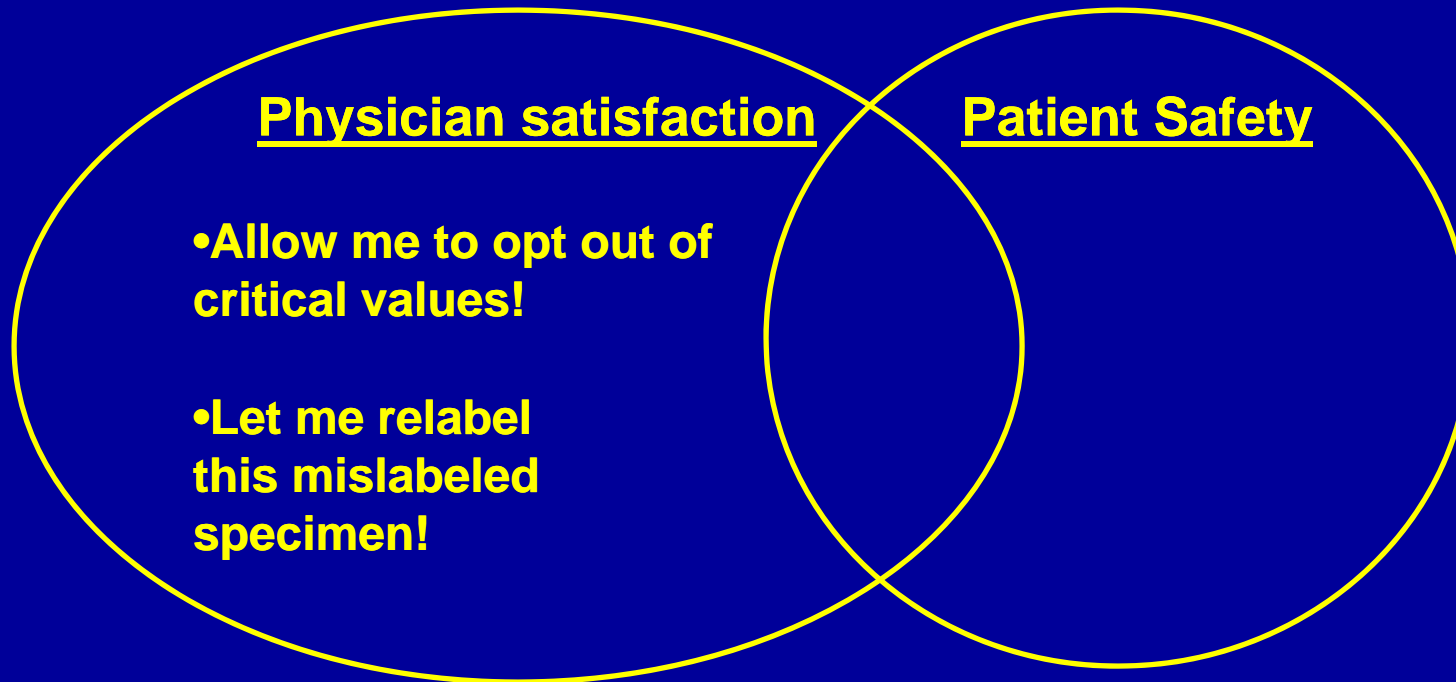
- Attendance
- Fraction of time a supervisor was present on the shift

What is going on financially?

- Receipts per client
- Client bill receipts
- 3rd party receipts
- Payer report card

Organizations have multiple competing goals. Patient safety is not the same as ...

- Physician /nurse satisfaction
- Patient satisfaction
- Compliance
- Efficiency
- Employee safety
- Other employee satisfaction
- Fiscal responsibility
- Risk management
- Reputation



Patient satisfaction is not the same as patient safety

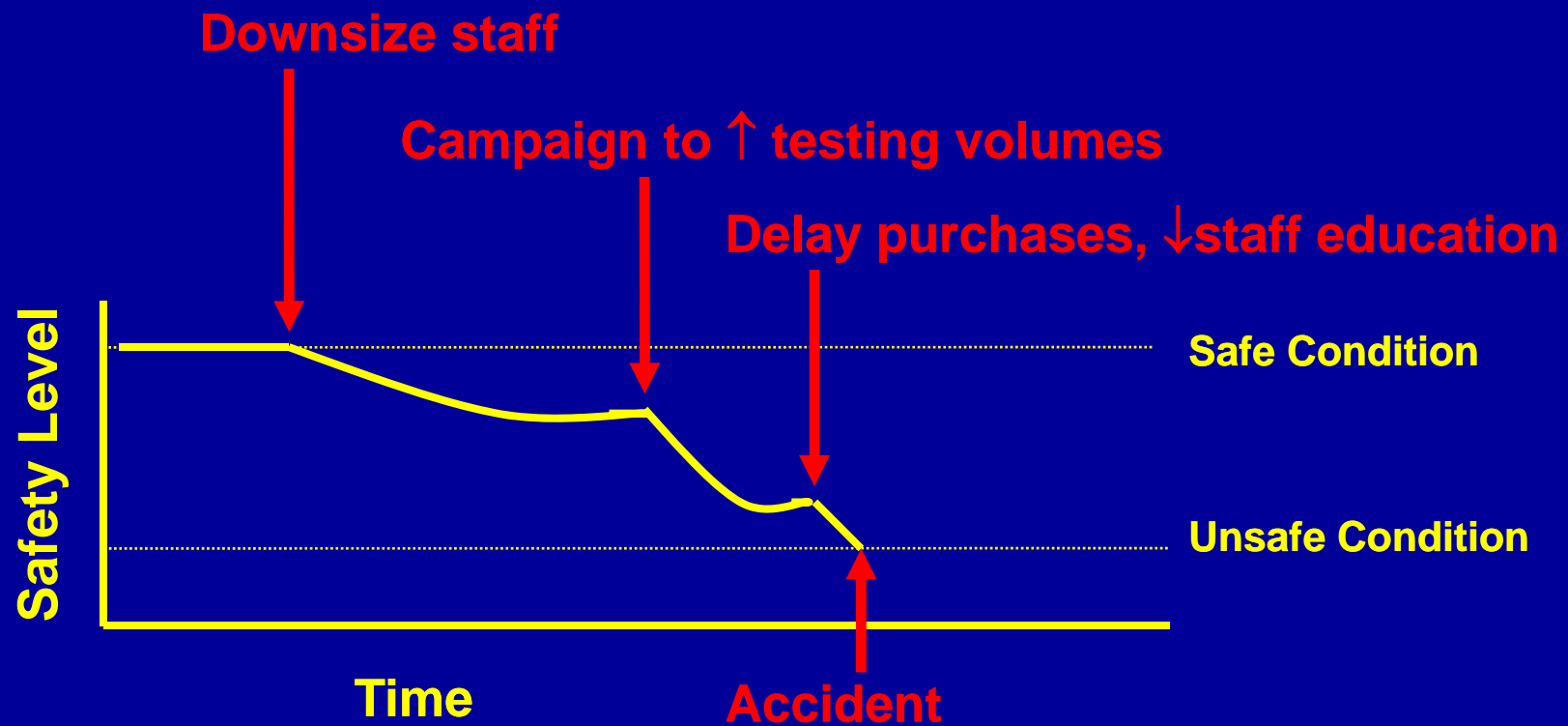
©Istock photo



**John, Peter
Peter, John**

**Patient not fasting before
fasting blood test**

How organizations drift into failure: incremental decisions seem safe at the time, but they are unsafe.



Dekker S. Field Guide to Human Error Investigations. Ashgate Publishing. Aldershot, United Kingdom, 2002.

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Health care workers and Communication: Room for Improvement

When talking to staff, what is the most specific and meaningful way to refer to an error in antimicrobial susceptibility testing leading to incorrect treatment and prolonged, painful infection?

- A. We had an adverse occurrence.**
- B. The patient had a painful infection lasting longer than expected because of the error in susceptibility testing.**
- C. We had an incident leading to an event.**

Responses from 5200 lab staff from 200 labs:

A: 11%

B: 72% (Correct answer)

C: 17%

Reed et al. A 2-Year Study of Patient Safety Competency Assessment in 29 Clinical Laboratories. *Am J Clin Path* 2008; 129: 959-962.

**Normalization of deviance: Gradual acceptance of
↑ error rates, and deviant work behavior**

- **Skip QC**
- **Repeat QC until it's in**
- **Batch labeling back at the nurses' station**
- **No labeling**
- **Allow relabeling of mislabels**
- **Accept old / suboptimal specimens**
- **Occasionally falsify result for a test not performed**
- **Order BMP, CBC on everyone**



Error classification, a useful approach

- Noncognitive errors: Most errors (e.g. data entry errors, mislabeling errors) are due to lapses in concentration
 - Distractions
 - Interruptions
 - Fatigue
- Cognitive errors: A smaller % of errors are due to lack of knowledge



Mihcael Astion

Michael Astion

Lab work prone to fatigue-associated errors

Work situation	Example(s)
Rare signal needs detecting	<ul style="list-style-type: none">• Detecting rare error flag• Detecting low-abundance, pathogenic organism on a microscope slide
Multitasking / prioritization	<ul style="list-style-type: none">• Responsibility for operating multiple instruments on the same shift• Operating instruments + phones
Time gap between when information appears and when it is used	<ul style="list-style-type: none">• Critical value calls requiring MD call back.
Work requiring creative thought	<ul style="list-style-type: none">• Managing a crisis caused by a spill• Troubleshooting uncommon errors• Manually validating an infrequent result

Fatigue and error: An interview with Dr. Matthew B. Weinger. 2009. *Clinical Laboratory News*. 35(1):10-11.

Load Shedding: Multitasking individuals...

- **tend to choose high priority tasks and neglect low priority tasks.**
- **Or, get lost in low priority task and never return to patient care**
 - **Supervisor planning parties, not supervising**
 - **Safety committee worried about toxicity of hand soap**
- **Load shedding can also describes groups and even whole organizations.**



“I’ll get back to that emergency at work later.”

Temporary ways to reduce fatigue

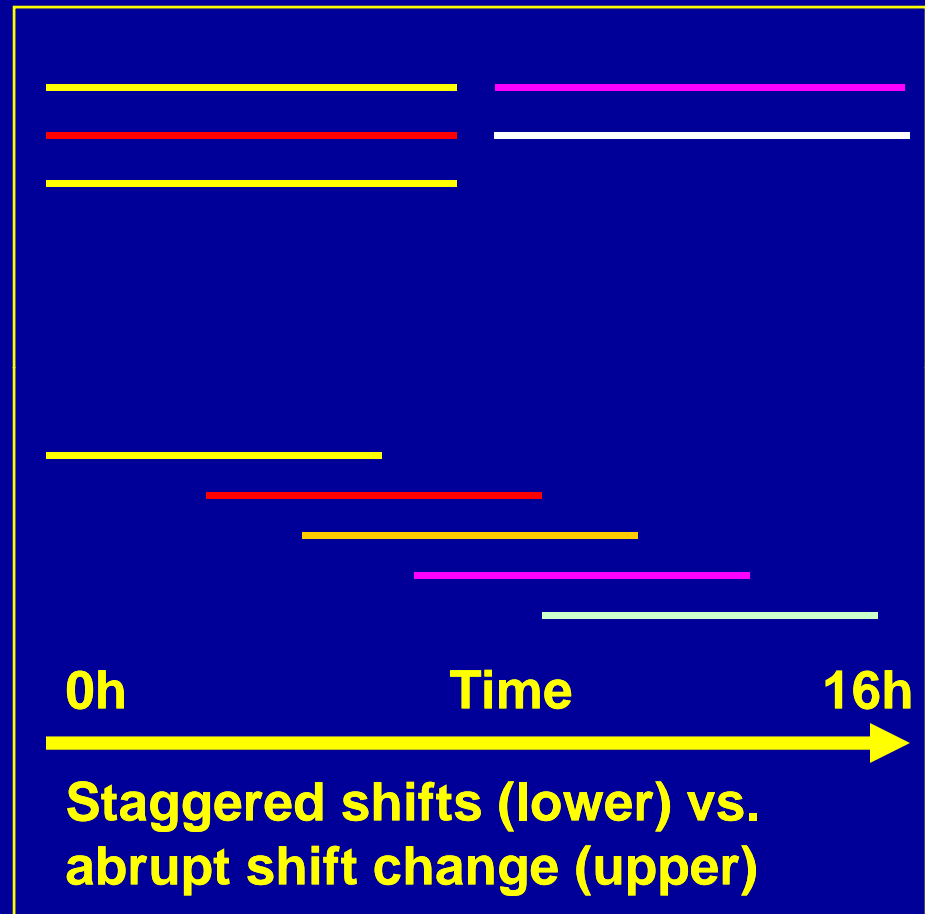
- Stimulants (coffee)
- Conversation
- Brighter lights
- Physical activity
- Avoid heavy meals
- Napping, but it has significant tradeoffs.



Fatigue and error: An interview with Dr. Matthew B. Weinger. 2009. *Clinical Laboratory News*. 35(1):10-11.

More permanent ways to reduce fatigue

- **Staggered shifts**
 - ↓ fatigue
 - Allows freshest workers to handle hardest work
 - Improves handoffs
- **Permanent night shift workers (not rotating nightshift).**
- **Avoid double shifts when short staffed.**



Fatigue and error:...Dr. Matthew Weinger. *Clin Lab News*. 2009: 35(1):10-11.

To reduce errors due to fatigue, also use these strategies...

- **Automation**
- **Checklists**
- **Remove phones**
- **↓ distractions**
- **Simplify procedures**
- **Workflow-labor matching**

- Milk
- Coffee
- Tylenol
- AA batteries
- Red wine
- Pepto

**A method to improve memory
(and 6 of the most important
purchases in my life)**

Disconnection as a latent error

- Lab staff are isolated from patient outcomes and patient care providers
- ↑ connection = ↑ urgency for quality improvement.
- Example: Error rates ↓ when care providers and anatomic pathologists develop relationships with accountability.



Disconnection from patients and care providers as a latent error in pathology and laboratory medicine: An interview with Dr. Stephen Raab. 2009. *Clinical Laboratory News*. 35(4): 14-15.

Overcoming disconnection

- Have lab staff meet with physician and nursing staff regularly.
- Have lab staff attend patient rounds
- Bring patients to lab meeting



Disconnection from patients and care providers as a latent error in pathology and laboratory medicine: An interview with Dr. Stephen Raab. 2009. *Clinical Laboratory News*. 35(4): 14-15.

Realistic Error Rates: Hard to be better than 1 / 1000 error rate without advanced design and technology.

10⁻¹	Clear process, reliance on education, vigilance to achieve goal	•Failure to wash hands
10⁻²	Clear process using basic human factors principles, reliance on education, vigilance	•Errors in filling out lab requisition •Failure to give test results to patients •Suboptimal specimen
10⁻³	Clear process using human factors + systems for error identification and mitigation	•Mislabeled specimens
10⁻⁴, 10⁻⁵	Advanced designed + automation (!!Robots+computers), error ID/ mitigation	•Specimen loss •Computer interface errors

Resar RK. Making noncatastrophic health care processes more reliable... *Health Serv Res.* 2006; 41:1677-1689.

Intervening to reduce errors: A guide to intervention strengths

(VA National Center for Patient Safety, courtesy Dr. John Gosbee)

- **Weaker interventions**

- **Training**
- **Call for enhanced vigilance**
- **Double checks**
- **Warning labels**
- **Memos**

MEMO 4/7/06

To: All Lab Staff

From: Dr. BigEgo, Lab Director

Re: Lab errors

Stop making errors immediately. Be more careful when performing tests, and when entering data. All of you need to go to keyboard training to learn how to type. For god sakes, do a better job. You all don't know what you are doing.

Intermediate strength interventions

<u>Intervention</u>	<u>Example</u>
Reduce distractions	Call center ↓ phone distractions
<u>Computerized Reminders</u>	•Flagging of critical values
Other intermediate software enhancements	•Autovalidation •Auto fax replaces manual fax
Enhanced inter-personal communication	Read back
Workflow adjustments	Match work flow to staffing
Checklists	Instrument maintenance checklist

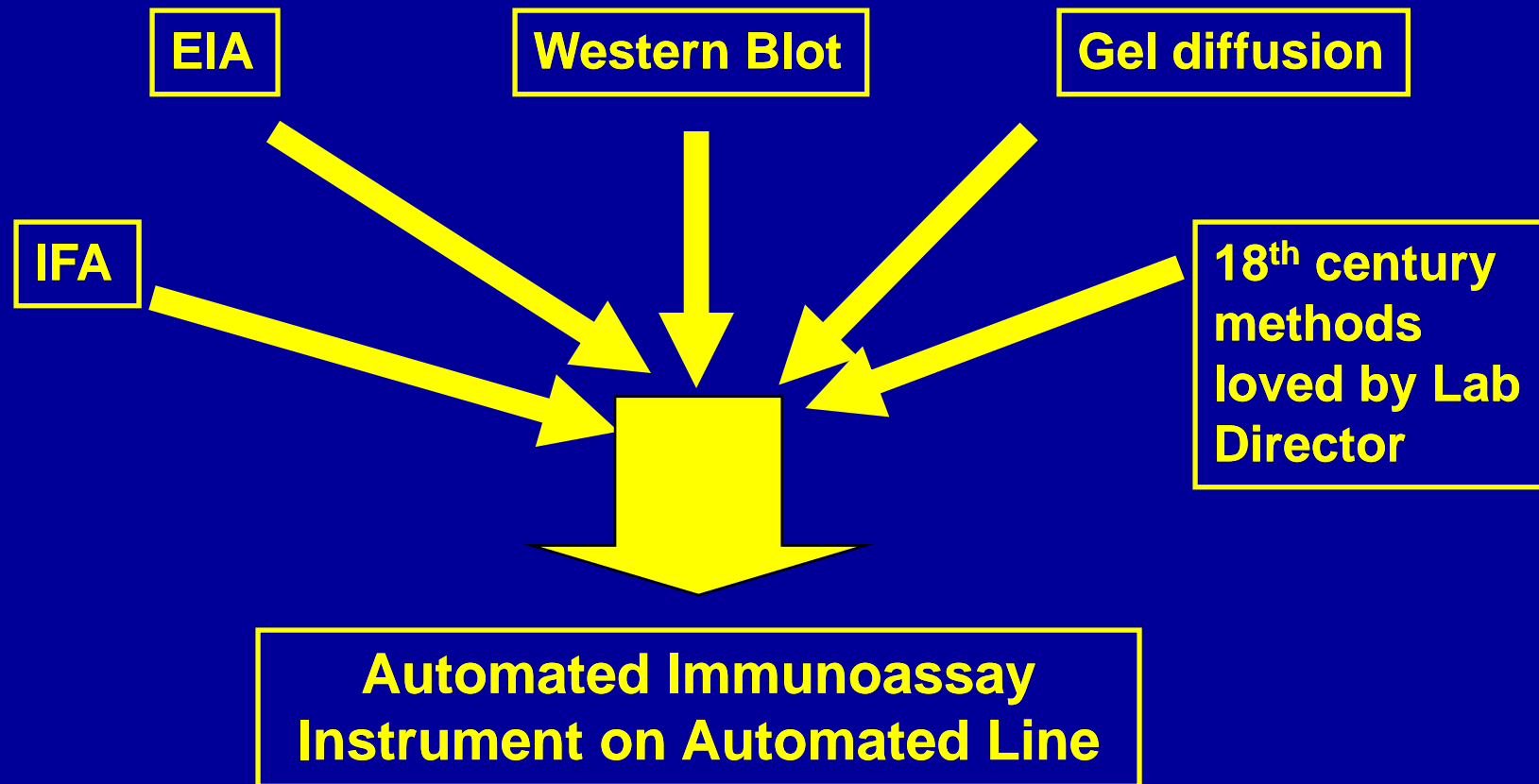
Stronger interventions

<u>Intervention</u>	<u>Example(s)</u>
Physical plant change	Automation zone
Major software enhancement	<ul style="list-style-type: none">•CPOE•Autovalidation•POC-LIS-EMR interfaces
Eliminate steps	<ul style="list-style-type: none">•Analyzer consolidation•Direct tube sampling
Equipment standardization Personnel standardization	<ul style="list-style-type: none">•One glucometer for POC sites•Limit staff allowed do do a particular task•Standard phlebotomy trays•Front-end automation
Involvement by leadership in patient safety	Lectures, email, newsletters regarding safety initiatives

Example of a strong intervention: Immunoassay Consolidation

Sell the project as LEAN; LEAN is strong

↓steps, ↓motion, ↓specimen requirements, ↓TAT



Dear Mike, Thanks for telling us about Lean. We are saving paper by not using any margins. We are all drinking milk directly from our cartons. Even though this is disgusting, we have reduced the number of milk pouring errors dramatically, as well as the wasted time of washing, and sometimes breaking dishes. Also, we are all wearing our pajamas to work and changing our underwear every other day. By increasing our underwear maintenance interval we are saving lots of time, and we are still well within most people's smell tolerance, although on one hot day in the summer, we had a variance and it got very ripe in the laboratory. Thanks for being such a great consultant. Sincerely, The idiots who took a great philosophy like LEAN and ruined it.

Usability testing / site visits

- **Best way to ↓risks associated with implementing technology**
- **Usability testing: not always possible, but great if you can do it**
- **Site visits better than talking on phone**



Cell phone usability testing

The difference between talking on the phone and a site visit

- **Phone:**
 - Me: “Do you like your new immunoassay analyzer”
 - Respondent from peer lab: “Yes, we like it.”
- **Site visit:**
 - Me: “I see your immunoassay analyzer is on fire and the techs are all crying.”
 - Respondent from peer lab: “Please evacuate the lab.”

Intervention strength is not well understood by lab workers

- **Reed et al. 2 year study of patient safety competency using online method (www.medtraining.org).**
 - **875 staff from 29 labs used online competency exams**
 - **Each person completed 40 questions over 2 years**
 - **5 topic areas covered**
 - **workplace culture**
 - **classifying errors**
 - **intervention strengths**
 - **prioritizing QI**
 - **general concepts**

Reed et al. A 2-Year Study of Patient Safety Competency Assessment in 29 Clinical Laboratories. *Am J Clin Path* 2008; 129: 959-962.

Weakest area:

Understanding the Strength of Various Interventions

- **“Which is best regarding getting doctors to stop ordering an obsolete test?”**
 - **Only 70% correctly chose: “Eliminate test from the requisition form”**
 - **30% selected the weaker intervention: “Send an educational memo to all physicians.”**

- **“Which will most significantly reduce pipetting errors?”**
 - **Only 69% correctly chose “Implement robotic pipetting after usability testing”**
 - **29% selected the weaker: “Warning label near pipettes...”**
 - **2% chose the worst: “Quietly tell techs to be careful.”**

Conclusions

- **There are a variety of reasons why lab errors occur.**
- **The best approach to lab errors is to implement stronger interventions. You cannot train or “be careful” your way out of errors.**
- **Stronger interventions usually involve technology (robots, computers), backbone (e.g. staffing adjustments), and monitoring (watching people).**
- **Strong interventions are difficult.**
 - **Involve changes to the way we work**
 - **Sometimes involve upfront \$, but can see good return.**
 - **↓risk with site visits, talks with peers, usability testing**
- **Thank you.**