Reducing Diagnostic Error: A Practical Workshop

Bob Trowbridge
Harry Hoar
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8:30AM – 4:00 PM

Faculty

- Bob Trowbridge, MD
  Co-Director, Intro to Clinical Reasoning, TUSM
  Director, Faculty Development and General Internal Medicine
  Maine Medical Center

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  Division Chief, Pediatric Hospital Medicine
  Director, Pediatric Simulation
  Baystate Medical Center

- Doug Salvador, MD MPH
  Vice President, Medical Affairs
  Baystate Medical Center
INTRODUCTIONS

WHAT DO YOU WANT TO MAKE SURE WE COVER TODAY?
Session Objectives

- Discuss the epidemiology of diagnostic error
- Describe how cognitive biases contribute to diagnostic error
- Apply a specific tool to analyze diagnostic errors
- Identify methods to minimize errors in diagnosis in the clinical setting

Agenda

- Definition and Impact of Diagnostic Error
- Causes of Diagnostic Error
- Cognitive Errors/How Doctors Think
- Solutions
What is a diagnostic error?

Graber Definition

- A diagnosis that, on the basis of the eventual appreciation of more definitive information, was
  - Unintentionally delayed, or
  - Wrong, or
  - Missed altogether
Singh Definition

The occurrence of a **missed opportunity** to make the **correct** diagnosis in a **more timely** manner.

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IOM Definition

The failure to
- Establish an accurate and timely explanation of the patient's health problem(s) or
- Communicate that explanation to the patient.
A couple of cases

- Split into small groups
- Determine
  - Was this a diagnostic error?

Was this a diagnostic error?

- Seems straightforward, but
  - Requires clinical (diagnostic) expertise
  - Subjective
  - Recreating the context is impossible
    - Limited cognitive insight
  - Hindsight bias
How important is diagnostic error?

- Prevalence
- Impact

How Common is Diagnostic Error?

- Overall, likely rate of diagnostic error is about 10-15%
- Error rate varies by specialty and study
  - Anatomic pathology 2-5%
  - ED up to 12%
  - Medical admitting diagnosis ~6%
Ambulatory Medicine

- Examined frequency of diagnostic error via triggers
- 5% of all outpatient visits associated with a diagnostic error
  - 50% of these with potential to cause serious harm
- 12 million Americans affected annually

Pediatrics and Diagnostic Error

- 45% of pediatricians report making a harmful diagnostic error at least once or twice a year
- 5% of pediatric admissions subject to diagnostic error
What does the IOM say?

“It is likely that most of us will experience at least one diagnostic error in our lifetime, sometimes with devastating consequences.”

How important is diagnostic error?

- Prevalence
- Impact
Do these errors matter?

- Account for up to 17% of adverse events
- 40,000-80,000 US hospital deaths per year attributable to diagnostic error
- 5% of all autopsies show a lethal diagnosis that could have been treated ante-mortem

What do these errors look like?

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Missed on initial evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stroke</td>
<td>9%</td>
</tr>
<tr>
<td>Sub-arachnoid hemorrhage</td>
<td>5%</td>
</tr>
<tr>
<td>Pulmonary Tb</td>
<td>45%</td>
</tr>
<tr>
<td>Acute Coronary Syndrome</td>
<td>2-3%</td>
</tr>
<tr>
<td>Appendicitis</td>
<td>19%</td>
</tr>
</tbody>
</table>
Do these errors matter?

- Account for up to 17% of adverse events
- 40,000-80,000 US hospital deaths per year attributable to diagnostic error
- 5% of all autopsies show a lethal diagnosis that could have been treated ante-mortem
- Tort claims data

### VA Tort Claims 1988-2000

<table>
<thead>
<tr>
<th>Type of Error</th>
<th>Number of Claims</th>
<th>Amount Paid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surgery-related</td>
<td>2625</td>
<td>$77,000,000</td>
</tr>
<tr>
<td>Medication-related</td>
<td>1309</td>
<td>$27,000,000</td>
</tr>
<tr>
<td>Diagnostic</td>
<td>2477</td>
<td>$93,000,000</td>
</tr>
</tbody>
</table>

J Law Med Ethics 2001; 29:335-345
Closed Claims Review

<table>
<thead>
<tr>
<th>Type of Error</th>
<th>Total Claims</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surgery</td>
<td>29%</td>
</tr>
<tr>
<td>Obstetrics</td>
<td>24%</td>
</tr>
<tr>
<td>Diagnosis</td>
<td>29%</td>
</tr>
<tr>
<td>Medication</td>
<td>18%</td>
</tr>
</tbody>
</table>

NEJM 2006; 354:2024-33

NPDB Review

- Reviewed 25 years of claims
- 350,000 total claims
  - Diagnostic error
    - Leading cause of claims (29%)
    - Highest proportion of pay-outs (35%)
    - More often resulted in death (40%)
    - 25 year sum cost of $38 billion
    - Median cost per claim of $213,000

BMJ Quality and Safety 22: 2013
How important is diagnostic error?

- Prevalence
- Impact
Causes of Diagnostic Error

Clinical Data Gathering: Medical Records
- Failure to obtain pertinent records
- Lack of record accessibility
- Prior medical records without key data

Communication
- Failure in hand-off communication
  - Follow-up mechanism in place but not utilized
  - Delay in or omission of communication of test result
  - Failure of communication with staff
  - Failure in communication to consultant

Specific Diagnosis/Presentation
- Is the particular diagnosis difficult to diagnose (e.g. aortic dissection)

Organizational Issues: Physical Context of Care
- Inadequate space to evaluate patient (quiet, private)
  - Inadequate bedside availability on specific units
  - Diagnostic equipment unavailable

Cognitive Process: Faulty Reasoning
- Patient behaviorally difficult
- Patient irritable
- Physician overworked

Affective Factors

Context of Care
- Post-operative patient with multiple consultants
- Patient with rare symptoms
- Complex hospitalized patient
- "Routine" ambulatory patient

Organizational Issues: Clinician Support
- Physician overworked/inadequate backup
- Lack of clinical decision support
- Inadequate follow-up mechanisms in place
- Test performed incorrectly
- Faulty reading of lab test
- Faulty reading or imaging study
- Lack of test availability
- Lack of consultant availability
- Barriers to accessing proper setting for patient
A CASE

Causes of Diagnostic Error

- Three general categories of diagnostic error
  - "No Fault"
    - Very unusual presentations, patient-related error
  - Systems-related
    - Technical failure, organizational issues
  - Cognitive errors
    - Faults in knowledge, data gathering, information processing or affective issues
Systems-related Errors

- Technical Failures
  - Faulty test or data

- Organizational Failures
  - Poor coordination of care
  - Inadequate supervision of trainees
  - Poor communication
  - External interference

Causes of Diagnostic Error

- Three general categories of diagnostic error
  - “No Fault”
    - Very unusual presentations, patient-related error
  - Systems-related
    - Technical failure, organizational issues
  - Cognitive errors
    - Faults in knowledge, data gathering, information processing or affective issues
Basis of Cognitive Errors

- Cognitive Errors
  - Faulty knowledge
  - Faulty data gathering
  - Faulty synthesis
  - Affective error
Basis of Cognitive Errors

Cognitive Errors
- Faulty knowledge
- Faulty data gathering
  - Failure to ask or look
  - EMRs
- Faulty synthesis
- Affective error

Basis of Cognitive Errors

Cognitive Errors
- Faulty knowledge
- Faulty data gathering
- Faulty synthesis
  - Premature closure
  - Misjudging the importance of a finding
  - Faulty context generation
- Affective error
Basis of Cognitive Errors

- Cognitive Errors
  - Faulty knowledge
  - Faulty data gathering
  - Faulty synthesis
  - Affective error
    - Metacognitive failure

Causes of Diagnostic Error

- Three general categories of diagnostic error
  - “No Fault” (7%)
    - Very unusual presentations, patient-related error
  - Systems-related (19%)
    - Technical failure, organizational issues
  - Cognitive errors (28%)
    - Faults in knowledge, data gathering, information processing or affective issues
Cognitive Errors/How Doctors Think
What are these people feeling?
$17 \times 24 = ?$

**Features of ‘System 1’**

- Fast
- Effortless
- Largely below the level of consciousness
- Usually accurate but prone to systematic biases
- Does not understand statistics or logic
- Unable to be turned off
Chicken-sexing: Type 1 reasoning

Features of 'System 2'
- Slow
- Effortful
- Accurate
- Avoided by the 'cognitive miser'

Makes you feel like this:

Muscles tense, HR increases, BP increases, pupils dilate
Vulcan logic: Type 2 reasoning

The interaction of system 1 and system 2

(a)

(b)
We are all chicken-sexers (with Vulcan potential).
Pattern Recognition

- Unconscious activation of the correct diagnosis based on prior experience.

Heuristics

- Shortcuts or “rules of thumb” that are learned “on the job”
- Quick, practical, and usually adequate
- > 60 different heuristics have been described in medicine
- Classic example - representativeness heuristic: If it looks like a duck, quacks like a duck…

It’s usually a duck…, but not always.

System 1 Failures- Cognitive and Affective Biases

Croskerry P, A Universal Model of Diagnostic Reasoning. Academic Medicine, Vol. 84, No. 8 / August 2009
How fast were the cars going when they **bumped** into each other?

How fast were the cars going when they **smashed** into each other?
Framing effects (framing bias)

The manner in which a case is presented (framed) influences subsequent thinking about the case.

Write down the last 2 digits of your SSN.
How much would you pay for this bottle of wine?

Crisp and vibrant, gaining lift to the structure from acidity and fine tannins, with dark berry and coffee flavors. Lingers pleasantly. Rating: 87 - Wine Spectator

Anchoring

- Relying too heavily on initial impressions and failing to adequately adjust in light of new information
- “You never get a second chance to make a first impression”
Confirmation bias

- The tendency to look for evidence that confirms our suspicions and ignore or misinterpret data that does not
More fun with wine…

$13  

$90

Think, pair, share…

- Refer back to the spinal epidural abscess case
- Think about any examples of framing, anchoring, and confirmation bias that occurred in this case
- Turn to someone next to you and discuss
- Share as a group
The cognitive cascade

Diagnosis Momentum

- Tendency for a particular diagnosis to become established without adequate evidence.
- The farther along it gets, the more momentum it has and the less likely anyone is to question the diagnosis.

Premature closure

- Concluding that a patient has a particular diagnosis before there is actually enough evidence to make that diagnosis
- Premature closure tends to stop any further thinking about the diagnosis


Think, pair, share…

- Refer back to the spinal epidural abscess case
- Think about how the provider’s affect/emotional state(s) may have influenced their decisions
- Turn to someone next to you and discuss
- Share as a group

### Principal Characteristics of Type 1 and Type 2 Decision-Making Processes*

<table>
<thead>
<tr>
<th>Cognitive style</th>
<th>Type 1</th>
<th>Type 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Computational principle</td>
<td>Associative</td>
<td>Rule based</td>
</tr>
<tr>
<td>Responsiveness</td>
<td>Passive</td>
<td>Active</td>
</tr>
<tr>
<td>Capacity</td>
<td>High</td>
<td>Limited</td>
</tr>
<tr>
<td>Cognitive awareness/control</td>
<td>Low</td>
<td>High</td>
</tr>
<tr>
<td>Automaticity</td>
<td>High</td>
<td>Low</td>
</tr>
<tr>
<td>Rate</td>
<td>Fast</td>
<td>Slow</td>
</tr>
<tr>
<td>Reliability</td>
<td>Low</td>
<td>High</td>
</tr>
<tr>
<td>Errors</td>
<td>Relatively common</td>
<td>Rare</td>
</tr>
<tr>
<td>Effort</td>
<td>Low</td>
<td>High</td>
</tr>
<tr>
<td>Emotional attachment</td>
<td>High</td>
<td>Low</td>
</tr>
<tr>
<td>Scientific rigor</td>
<td>Low</td>
<td>High</td>
</tr>
</tbody>
</table>

System 2 failures are caused by:

- Inattentiveness
- Distractions
- Fatigue
- Time pressure
- Incomplete information
- Cognitive “miserliness”

“System 2 approaches can be employed by well-rested, well-slept decision makers under conditions in which there are no distractions or untoward intrusion of affect and all the required data are available.”
SO HOW DO WE IMPROVE OUR COGNITIVE PROCESSING?
Lessons from chicken-sexers

Illness Scripts

- Stored mental model for a particular diagnosis
- ‘Script’ is composed of the predisposing conditions, pathophysiologic cause, and clinical manifestations of the disorder
- Diagnosis involves mentally scanning for the illness script that most closely resembles the clinical presentation

Educational implications

- Clinical teaching should start as early in training as possible
- Teaching should focus on developing illness scripts
  - Case-based teaching
  - Compare and contrast similar illnesses
- Immediate feedback from more experienced providers is needed

Is chicken-sexing enough?

Chicken-sexing with vulcan tendencies

How likely is each diagnosis on your differential?
What else could this be?
What is the worst thing this could be?
How did you arrive at that diagnosis?
What data does NOT FIT with your working diagnosis?
Is vulcan chicken-sexing enough?

Experience vs. Expertise

“Whereas researchers have identified important expert-novice differences in physicians’ organization and use of knowledge, researchers also increasingly recognize that not all physicians achieve the same level of expert performance, with some merely ‘swelling the ranks of the mediocre.’

Expertise

“While one can become experienced by simply seeing more patients, one becomes expert only by engaging in activities specifically designed to improve performance.”

Good to Great in 4 Steps

1. Progressive problem solving
2. Feedback on outcomes of our decisions
3. “Simulation” exercises
4. Deliberate practice

Dhaliwal G. Academic Medicine 2012

Butterfield. ACP Internist May 2014.
Regehr, Dhaliwal, Holmboe. Diagnostic Error in Medicine
Creating better diagnosticians

- Teach trainees about the diagnostic process
  - Metacognition
  - Cognitive debiasing
- Make system 1 more accurate
  - Experience matters
  - Progressive problem solving
  - Feedback on diagnostic decisions
- Activate system 2 more frequently
  - Cognitive forcing strategies
  - Checklists
  - With time, activating system 2 can become automated…

SOLUTIONS
What are you doing at your institution to improve diagnosis?

Diagnostic Error Driver Diagram

- Raise Awareness
- Improve Cognitive Performance
  - Engage Key Organizational Leaders
  - Improve Identification of Diagnostic Errors
  - Measurement and Feedback for Learning
  - Add clinical reasoning curriculum
  - Diagnostic Checklists
Raise Awareness

Modified Graber Checklist

- Obtain a complete history
- Perform a complete but focused exam
- Use a systematic approach to obtain diagnostic possibilities to be considered
- Take time to pause and reflect (SAFER)
- Be a skeptic

Ely JW, Diagnosis 2014;1(1):131-34
Winters BD et al, Academic Medicine 2011;86(3):279-81
Diagnostic Checklist in Action

Diagnostic Checklist

SAFER
- Serious diagnoses
- Alternative diagnoses
- Feelings affecting thinking
- Extraneous data…is it really extraneous?
- Reasons why this happened
Diagnostic Error Driver Diagram

Improve Diagnostic Process

Process to follow lab and radiology results

Improve teamwork

Make medical notes accessible to patients

Encourage patients to report diagnostic errors

Inform patients about the diagnostic process

Engage Patients

Early Recognition of Spinal Epidural Abscess (SEA)

Back/Neck pain (new onset or acute worsening of chronic) in the absence of overt non-infectious causes

PLUS

Recent Hx of spinal abscess infection (discitis, vert osteo, AMS)

NOT

Current or Known Spondylitis (past 6 months)

PLUS

Neurological signs or symptoms (e.g., deficit, paresthesias, radicular pain)

No

Risk factors

• IDU
• Intravenous vascular catheters or foreign body
• Recent spinal procedures
• ESRH
• Rheumatoid arthritis

Yes

Temp >39.4°C over past 24h and/or

CPR or ESR > 20

 Evaluate for other ID and non-ID causes of Se

STAT MRI

Timing depends on

SEPositive

* MRI confirmed, CT spine or myelography, based on discussion with attending radiologist

+ SEAs may also be seen in rare cases of post-infectious eSRH, SIH, or Spondylitis

Medical Emergency

• Neurology attending becomes point person
• Radiology attending communicates directly to Neurology attending
• Neurology attending calls Neurology attending for STAT adrenaline coverage
• Neurology attending calls ID attending for prophylactic antibiotics

* STAT MRI

Sickle <2h
• SMT Neuro

Correct

STAT MRI

Sickle >4h

Evaluate for other ID and non-ID causes of Se

* If MRI contraindicated, CT spine or myelography, based on discussion with attending radiologist

Early Recognition of Spinal Epidural Abscess (SEA)
Patients are Members of the Team!

Sir William Osler

"Listen to your patient, he is telling you the diagnosis"
Ten Things Nurses Can Do Tomorrow

1. Know your patients’ diagnoses
2. Be the voice of your patients and their advocate in navigating their health care.
3. Be the eyes of the diagnostic team in detecting changes in your patients’ condition
4. Be the monitor of the diagnostic team. Is your patient responding to treatment as expected?
5. Facilitate communication between your patient and the care team

http://www.improvediagnosis.org/page/Education

Ten Things Nurses Can Do Tomorrow

6. Be the watchdog for appropriate care coordination
7. Educate patients about the diagnostic process
8. Learn about how diagnostic errors arise and how they can be avoided
9. Educate patients about diagnostic tests and explain why they are needed, what the patient will experience, and what the results will reveal
10. Help patients with the emotional and psychological aspects of the diagnostic process
Diagnostic Error Driver Diagram

- Improve the Diagnostic Environment
  - Give providers more time to complete the diagnostic process
  - Improve culture
  - Support diagnostic redundancy

- Information Technology Support for the Diagnostic Process
  - Implement automated decision support
  - Improve documentation of critical thinking
  - Use a differential diagnosis generator

KP Safety Nets, since 2009

Kaiser Permanente Creatinine Safety Program: A Mechanism to Ensure Widespread Detection and Care for Chronic Kidney Disease

John J. Sim, MD, Mark P. Rutkowski, MD, David C. Selman, BS, Michael Batech, BSN, Rayanan Tawfik, RN, Jeff M. Slack, MS, Steven J. Jacobson, MD, PhD, Michael R. Kaster, MD

Division of Nephrology and Hypertension, Kaiser Permanente Los Angeles Medical Center, Los Angeles, Calif; Regional Quality and Clinical Analysis, Southern California Permanente Medical Group, Kaiser Permanente Southern California, Pasadena; Department of Research and Evaluation, Kaiser Permanente Southern California, Pasadena.

Abstract

BACKGROUND: Chronic kidney disease is highly prevalent but is challenging to diagnose because of the need to establish chronicity. Within the current healthcare environment, a single abnormal creatinine measurement alone can go without a follow-up, which can lead to missed diagnoses of diagnostic errors. The Kaiser Permanente Southern California creatinine safety program (KPCreatinineSafetyNet) was created to help ensure that all single abnormal creatinine results had a follow-up evaluation.

METHODS: In the period February 1, 2010, to March 1, 2014, the electronic health records were used to identify individuals with single abnormal creatinine results that were ≥1.4 mg/dl without a repeat measurement. A consortium of nephrologists via a centralized regional site and providers used e-mail to communicate with patients and order a repeat creatinine measurement.

RESULTS: A total of 2,199 individuals were identified (44% minority race/ethnicity). A total of 58% were identified via an e-mail notification. A total of 731 individuals were identified via an e-mail notification. Over the 4 years, 79% patients had their documentation of their chronic kidney disease and 55% patients had nephrotists' consultations.

CULTURE
Psychological Safety

Pediatrics, 2015

The Impact of Rudeness on Medical Team Performance: A Randomized Trial

*Aaron E. Raskas, MD, MPH*; *Amy Emr, PhD*; *Trevor A. Fack, BBA*; *Amir Kajarian, MD*; *Alysa Gower, MD, MPH*; *Shira RN, BBA*; *Ennemer A. Rosen, Peter A. Sambrook, PhD*

**Background and Objectives:** Latrogenesis often results from performance deficiencies among medical team members. Team-targeted rudeness may underlie such performance deficiencies, with individuals exposed to rude behavior being less helpful and cooperative. Our objective was to explore the impact of rudeness on the performance of medical teams.

**Methods:** Twenty-four NICU teams participated in a training simulation involving a preterm infant whose condition acutely deteriorated due to necrotizing enterocolitis. Participants were informed that a foreign expert on team reflexivity in medicine would observe them. Teams were randomly assigned to either exposure to rudeness (in which the expert’s comments included mildly rude statements completely unrelated to the teams’ performance) or control.
Diagnostic Performance

**TABLE 2: Comparison of Mean Diagnostic Performance Variables (N = 72)**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Control Group (n = 35)</th>
<th>Rudeness Group (n = 35)</th>
<th>t Test</th>
<th>P (One-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diagnosed respiratory distress</td>
<td>3.39 1.07</td>
<td>3.20 1.00</td>
<td>0.772</td>
<td>0.415</td>
</tr>
<tr>
<td>Diagnosed shock</td>
<td>2.88 1.32</td>
<td>2.68 1.08</td>
<td>2.636**</td>
<td>0.03</td>
</tr>
<tr>
<td>Suspected infection</td>
<td>3.13 1.07</td>
<td>3.06 1.15</td>
<td>0.272</td>
<td>0.695</td>
</tr>
<tr>
<td>Diagnosed NIC</td>
<td>3.08 1.25</td>
<td>2.82 0.95</td>
<td>1.78</td>
<td>0.085</td>
</tr>
<tr>
<td>Good stage 1 diagnostic skills</td>
<td>3.22 0.59</td>
<td>2.61 0.75</td>
<td>1.498</td>
<td>0.195</td>
</tr>
<tr>
<td>Diagnosed determination</td>
<td>4.05 0.75</td>
<td>3.54 0.89</td>
<td>2.562**</td>
<td>0.015</td>
</tr>
<tr>
<td>Suspected perforation of bowel</td>
<td>2.60 1.47</td>
<td>1.54 0.96</td>
<td>2.277*</td>
<td>0.025</td>
</tr>
<tr>
<td>Diagnosed cardiac tamponade</td>
<td>3.18 1.50</td>
<td>2.15 1.40</td>
<td>3.114**</td>
<td>0.002</td>
</tr>
<tr>
<td>Good stage 2 diagnostic skills</td>
<td>3.13 1.21</td>
<td>2.35 1.07</td>
<td>2.881**</td>
<td>0.005</td>
</tr>
<tr>
<td>Overall diagnostic</td>
<td>3.18 0.50</td>
<td>2.65 0.89</td>
<td>2.786**</td>
<td>0.0035</td>
</tr>
</tbody>
</table>

*P < .05, **P < .01.

Procedural Performance

**TABLE 3: Comparison of Mean Procedural Performance Variables (N = 72)**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Control Group (n = 35)</th>
<th>Rudeness Group (n = 35)</th>
<th>t Test</th>
<th>P (One-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Performed resuscitation well</td>
<td>3.05 0.84</td>
<td>2.49 0.73</td>
<td>3.00**</td>
<td>0.002</td>
</tr>
<tr>
<td>Ventilated well</td>
<td>3.43 0.96</td>
<td>3.01 0.81</td>
<td>2.059**</td>
<td>0.025</td>
</tr>
<tr>
<td>Ventilated place of tube wall</td>
<td>3.36 0.88</td>
<td>2.83 0.62</td>
<td>3.492**</td>
<td>0.005</td>
</tr>
<tr>
<td>Asked for right radiographs</td>
<td>3.29 1.23</td>
<td>2.96 1.50</td>
<td>0.994</td>
<td>0.32</td>
</tr>
<tr>
<td>Asked for right laboratory tests</td>
<td>3.78 0.88</td>
<td>3.16 0.64</td>
<td>2.586**</td>
<td>0.011</td>
</tr>
<tr>
<td>Gave right resuscitation medications</td>
<td>3.55 0.81</td>
<td>3.17 1.08</td>
<td>1.639</td>
<td>0.15</td>
</tr>
<tr>
<td>Stopped percutaneous central line on time</td>
<td>2.95 1.55</td>
<td>2.56 1.44</td>
<td>1.764*</td>
<td>0.041</td>
</tr>
<tr>
<td>Prepped and performed pericardiocentesis</td>
<td>2.71 1.55</td>
<td>2.24 1.39</td>
<td>1.501</td>
<td>0.099</td>
</tr>
<tr>
<td>Good general technical skills</td>
<td>3.17 0.89</td>
<td>2.61 0.73</td>
<td>2.669**</td>
<td>0.005</td>
</tr>
<tr>
<td>Overall procedural</td>
<td>3.30 0.72</td>
<td>2.77 0.87</td>
<td>2.974**</td>
<td>0.002</td>
</tr>
</tbody>
</table>

*P < .05, **P < .01.
Planning Exercise

- Complete in small groups, feel free to get together with others from your home institution.

- Think about where your institution is currently and what is possible. Fill in blank primary, secondary drivers and action items you can work on back home.

- Discuss in small group and be prepared to share your drivers and actions in the large group.
Wrap Up

- Review Goals of the day
- Questions
- Follow-up

Doug.SalvadorMD@baystatehealth.org

Harry.HoarIIIMD@baystatehealth.org

TROWBR@mmc.org

First Year Medical Student

https://www.youtube.com/watch?v=V8l8_G_ce_Q
Diagnosis Celebration

https://www.youtube.com/watch?v=rRBq-6IVxzU&feature=related