AMA Innovations in Medical Education Webinar Series

Competency-based assessment across the medical education continuum

Holly Caretta-Weyer, MD, MHPE
Brian George, MD, MA
Eric Holmboe, MD

Today's Host

@Maya_Michigan

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American Medical Association

Professor and Associate Chair for Education
Obstetrics and Gynecology
University of Michigan Medical School

Objectives

Recognize challenges in assessing competencies in CBME

Discuss efforts to align residency selection practices and CBME with societal, specialty, and program outcomes

Review an example of an international collaborative working to improve competence

Presenter

Holly Caretta-Weyer, MD, MHPE

Associate Residency Program Director
Director of Evaluation and Assessment
Department of Emergency Medicine
Stanford University School of Medicine

Presenter

Brian George, MD, MAEd

Chief, Division of Acute Care Surgery
Director, Center for Surgical Training and Research (CSTAR)
Executive Director, Society for Improving Medical Professional Learning (SIMPL)
University of Michigan

Presenter

Eric Holmboe, MD

Chief, Research, Milestones Development and Evaluation Officer
ACGME

What is your primary responsibility in education?

- UME
- GME
- CME
- Medical Student
- Resident
- Allied health profession
- Not for profit organization
- For profit company
- Other

Physicians' powerful ally in patient care

Challenges in Assessing Competencies in CBME

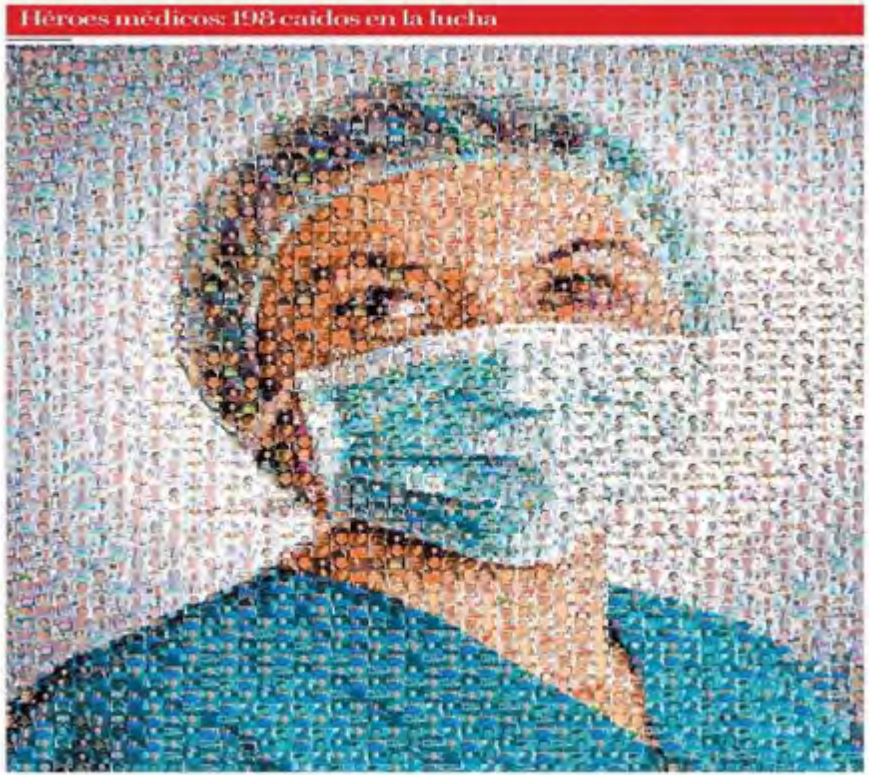
Eric Holmboe, MD

Chief, Research, Milestones Development and Evaluation Officer
ACGME

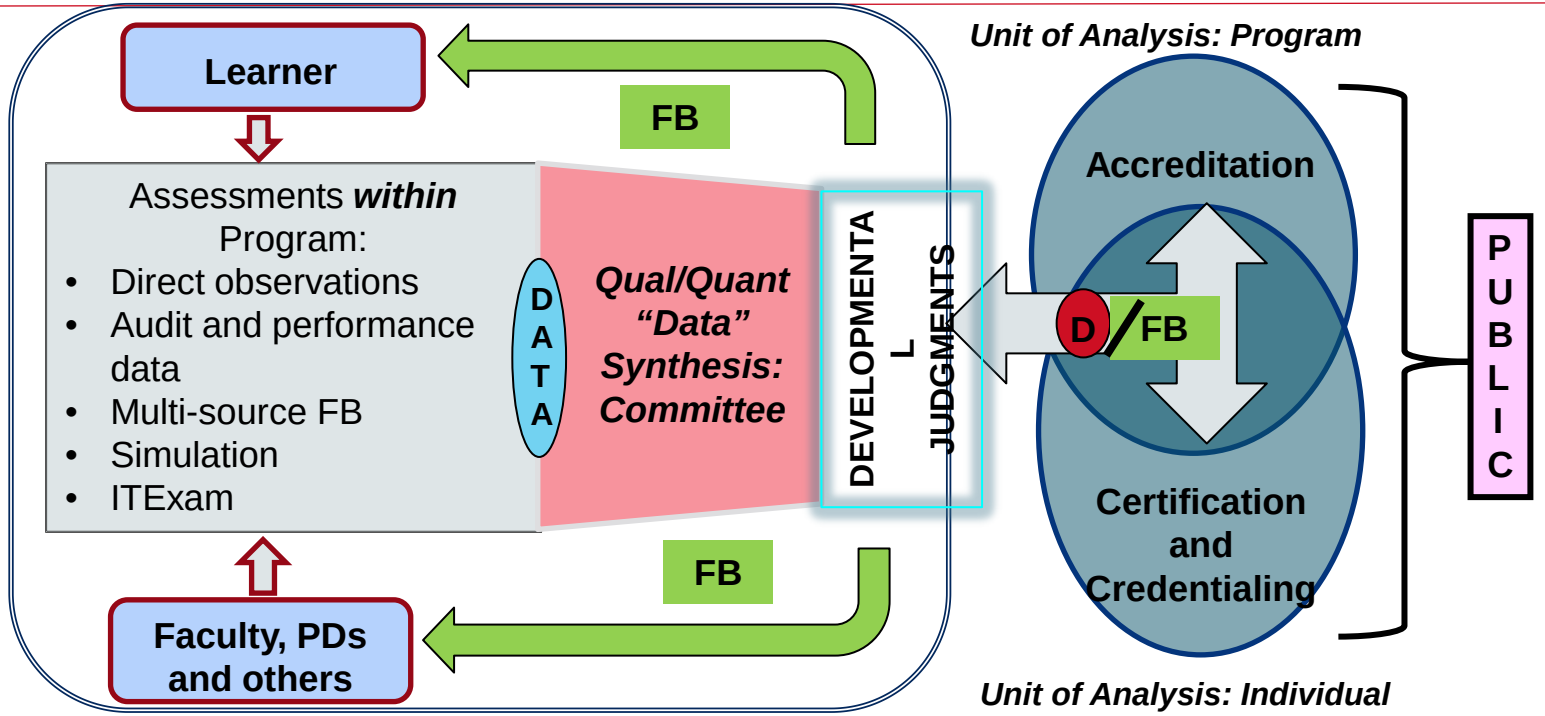
Outline

- The medical education assessment system
- What the pandemic exposed
- Core components framework for CBME
- Thinking developmentally in assessment
- Specific assessment challenges

Thank You
It Has Been a Very Difficult 2+ Years



The MedEd Assessment "System"



What the Pandemic Exposed for MedEd Assessment

- Reliance on time-in-training as proxy for competence untenable
- Usual “proxies” for assessment significantly altered and disrupted:
  - Volume and distribution (e.g. clinical conditions, procedures, etc.)
  - Rotations to ensure clinical experiences
    - Removal or redeployment of learners
  - High stakes examinations
- Highlighted substantial gaps around all transitions
  - UME -> GME; GME -> GME; GME -> practice

What the Pandemic Exposed for MedEd Assessment

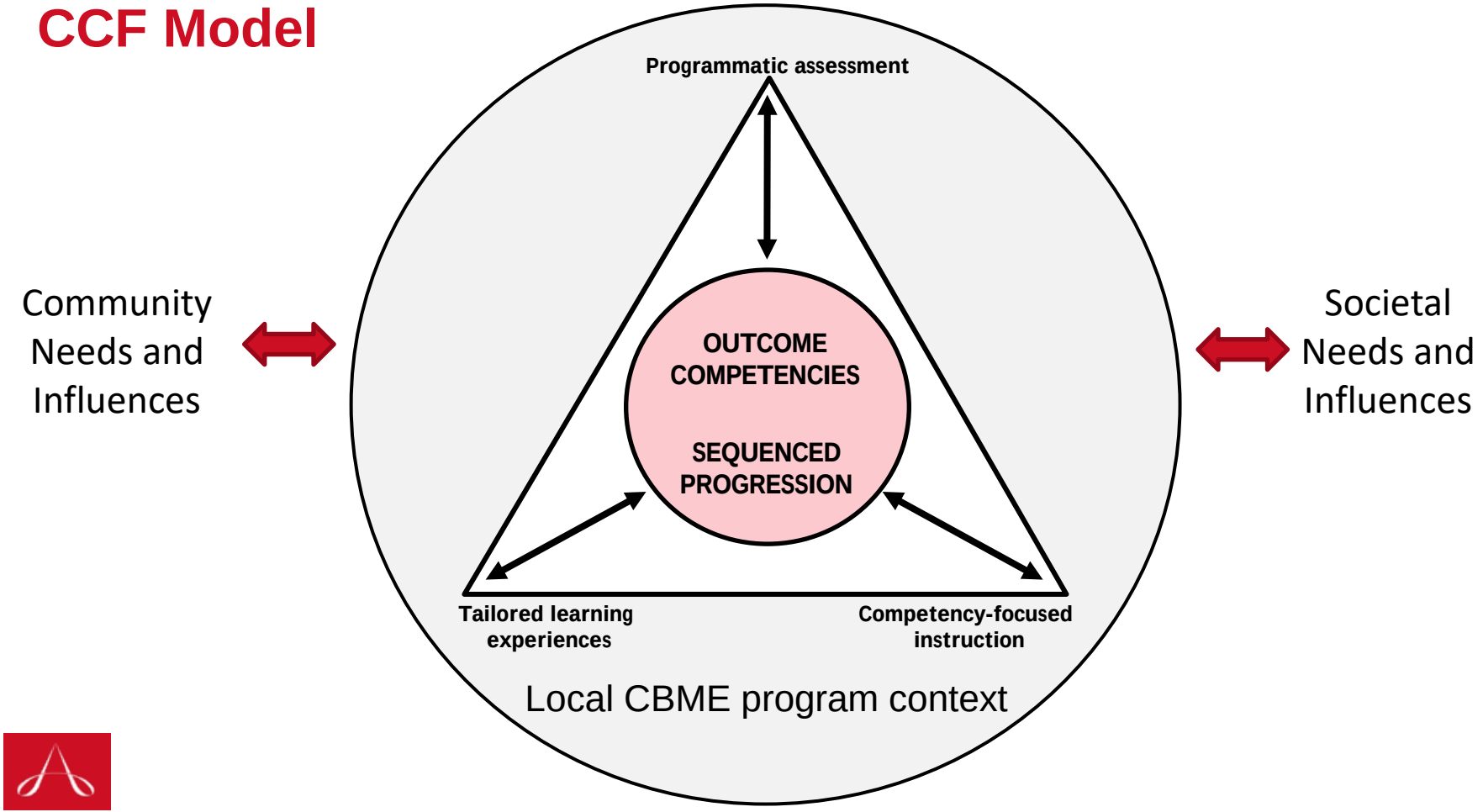
- Further exposed assessment gaps in
  - Patient-centeredness
  - Quality improvement, patient safety
  - Interprofessional teamwork and communication
  - Systems-based practice
- Exacerbation of implicit and explicit bias and prejudice

Core Components Framework: CBME

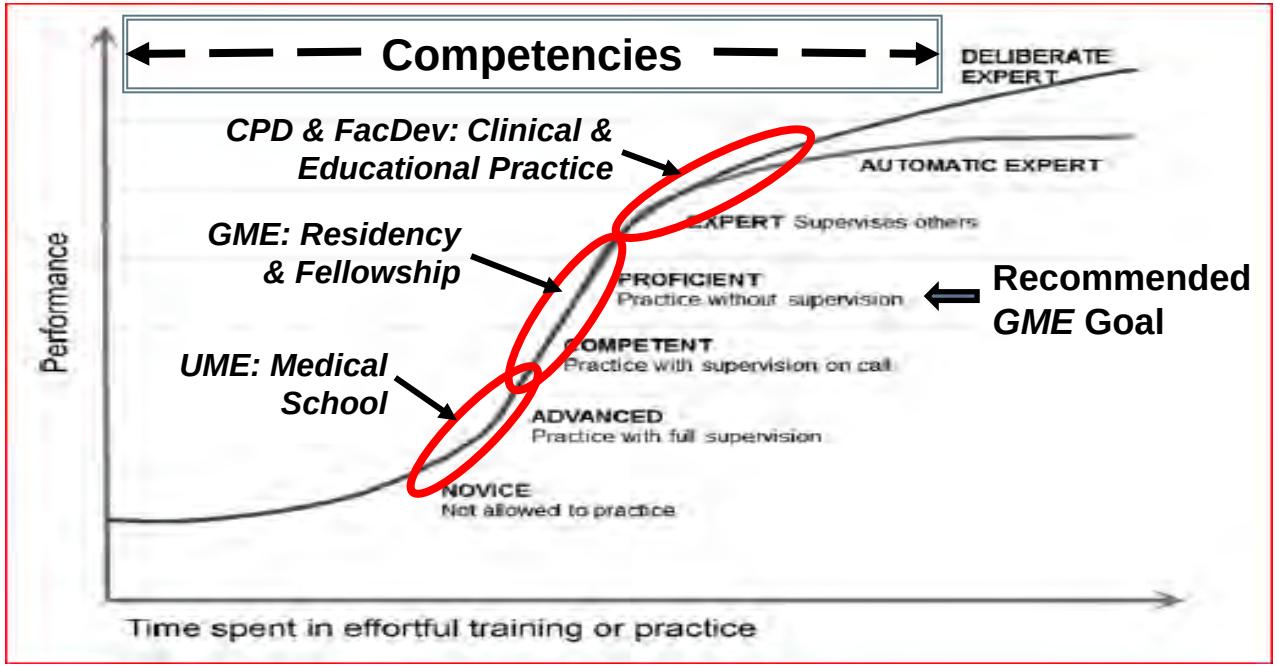
Outcome Competencies	Sequenced Progressively	Tailored Learning Experiences	Competency-focused Instruction	Programmatic Assessment (using Systems Thinking)
Competencies required for practice are clearly articulated.	Competencies and their *developmental* markers are sequenced progressively.	Learning experiences facilitate the *developmental* acquisition of competencies.	Teaching practices promote the *developmental* acquisition of competencies.	Assessment practices support & document the *developmental* acquisition of competencies.

Van Melle E, et. al. A Core Components Framework for Evaluating Implementation of Competency-Based Medical Education Programs. Acad Med. 2019 Jul;94(7):1002-1009.

CCF Model


Programmatic assessment
Community Needs and Influences
Societal Needs and Influences
OUTCOME COMPETENCIES
SEQUENCED PROGRESSION
Tailored learning experiences
Competency-focused instruction
Local CBME program context

Thinking Developmentally in Assessment



Pusic M et. al. Acad Med. 2014

Assessment Challenges

- Shared mental models
- Cognitive Load
- Bias and stereotyping
- Rating scales
- Programmatic assessment

Critical, Overlapping Concepts

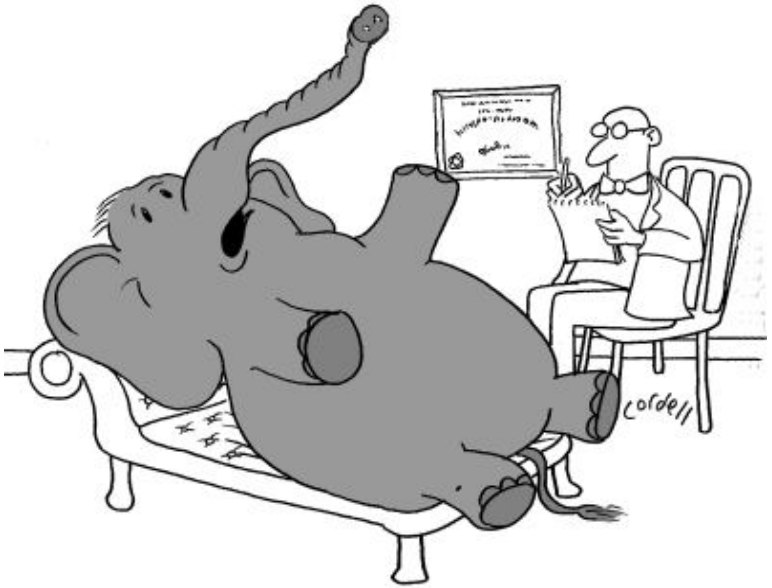
Shared…

- Understanding
- Mental models
- Mental representation of tasks
- Frame of reference

Mental Models (slideshare.net)

The Frame of Reference Problem

Several studies demonstrate that faculty heavily use self as the frame of reference in judging competence and entrustment. Assessment approaches assume faculty "self" is competent.

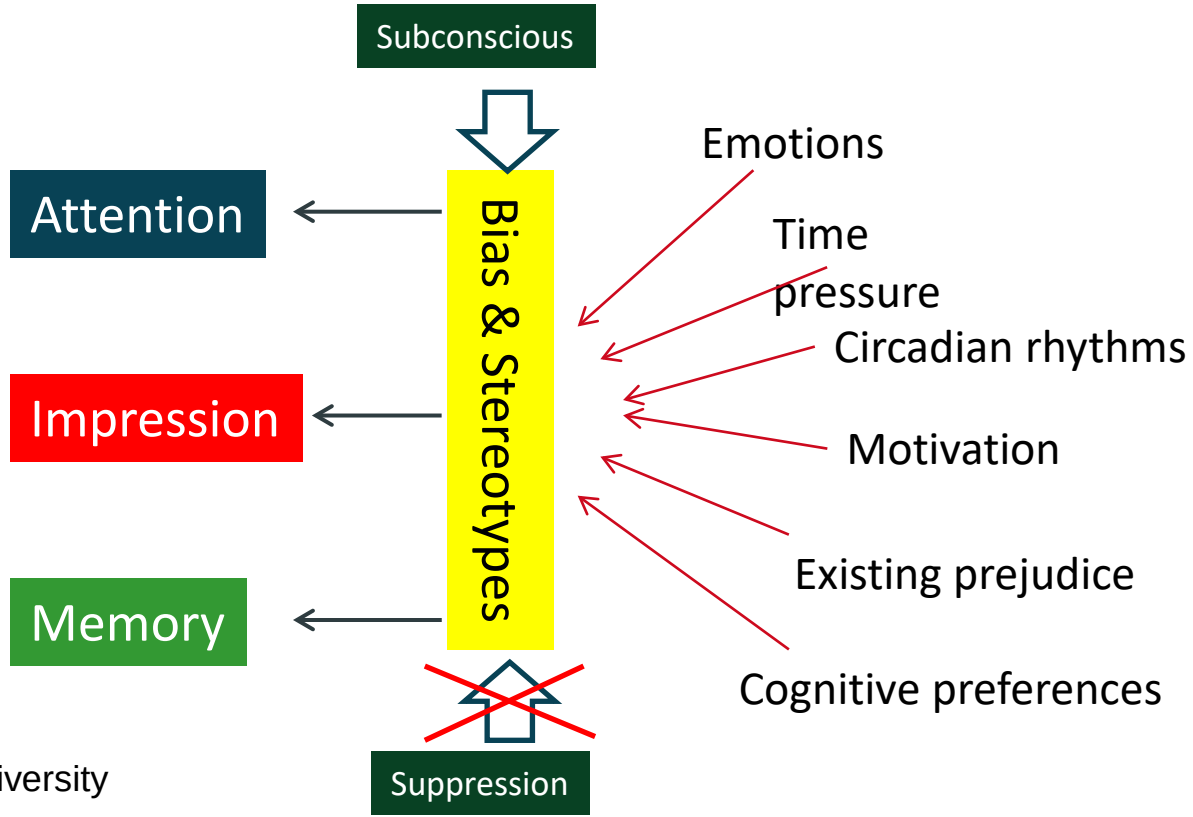


"Whenever I walk in a room, everyone ignores me."

Cognitive Load: Useful Dictum

- The longer the form (or checklist) and the shorter the “exposure” or observation time, the more likely you are to get less useful ratings and information from the evaluation form
  - Long evaluation forms + short faculty rotations = trouble in assessment land

Bias and Stereotypes



Peter Yeates. Keele University

Entrustment Scales and Quality of Care

Condition	Beta Co-efficient[b]	95% CI	P-Value
Asthma	0.030	(0.014, 0.046)	**0.0004**[d]
Bronchiolitis	0.0004	(-0.0161, 0.0169)	0.96
Closed Head Injury	0.012	(-0.006, 0.031)	0.19
Conditions Combined[c]	0.014	(0.004, 0.023)	**0.006**[d]

[a]Parameter estimates are adjusted by post-graduate year, patient complexity, and patient acuity
[b]The change in RSQM composite score associated with a one unit change in entrustment
[c]Combined conditions are adjusted by diagnosis
[d]Significant at $p<0.01$

Schumacher D, et. al. Resident-Sensitive Quality Measures in the Pediatric Emergency Department: Exploring Relationships with Supervisor Entrustment and Patient Complexity and Acuity. Acad Med. 2019.

Bottom Line - Scales

- Numeric scales are nothing more than a synthesis “code” for the observations/questioning by the assessor
  - Numbers are convenient and can be analyzed quantitatively over time, however…
  - The “code” must be associated with a descriptive, shared mental model of the competency being assessed
- Entrustment scales “more comfortable” to use, but do not fix the frame of reference challenge

Assessment Program Success Principles

1. Centrally coordinated plan
2. Multiple assessment tools used longitudinally
3. Learners require ready access to information-rich feedback
4. Coaching is essential
5. The program of assessment fosters self-regulated learning behaviors
6. Expert groups make summative decisions about readiness for advancement

Hauer K, et. al. Acad Med.

Minimal Assessment Components

- Faculty summary evaluations
  - Potentially multiple competencies
- Direct observations (+/- questioning)
  - PC, ICS and MK (Clin Reasoning “in vivo”)
- Multi-source FB
  - Prof, ICS and SBP
- Audit and performance data (including patient experience)
  - PBLI and SBP
- Simulation (when applicable)
  - Procedures (PC and ICS)
- ITExam (if available)
  - MK (“in vitro”)

Improving Assessment in CBME Will Require…

- Transition away from over-reliance on time and volume-based proxies
- Embracing developmental thinking in assessment
- Greater engagement from learners as “active agents” - coproduction
- Evolution of effective practices for competency milestones and EPAs
- Effective group judgment
- Embrace more narrative assessment; reduce reliance on scales
- Enhance programmatic assessment
- Leverage technology

Thank You

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Competency-Based Assessment and Residency Selection

Holly Caretta-Weyer, MD, MHPE
Stanford University School of Medicine

No Official Disclosures


Why Listen to Me?

CBME Critical Activities

FRAMEWORK	Competencies required for practice are clearly articulated
PROGRESSION	Competencies and their developmental markers are sequenced progressively
TAILORED EXPERIENCES	Authentic, work-based learning environments organized to facilitate the developmental acquisition of competencies
COMPETENCY-FOCUSED INSTRUCTION	Teachers who act as coaches in a way that promotes the developmental acquisition of competencies
PROGRAMMATIC ASSESSMENT	Assessment practices support & document the developmental acquisition of competencies

EPAs Rebranded: Everyday Physician Activities

5

Programmatic Assessment

- There are multiple points and methods for data collection
- Methods for data collection match the quality of the competency being assessed
- Emphasis is on workplace observation
- Emphasis is on providing personalized, timely, meaningful feedback
- Progression is based on entrustment
- There is a robust system for decision-making

FIVE CORE COMPONENTS

1. An Outcomes Competency Framework
2. Progressive Sequencing of Competencies
3. Learning Experiences Tailored to Competencies
4. Teaching Tailored to Competencies
5. Programmatic Assessment

1 DIRECT OBSERVATION

2 MULTI-SOURCE FEEDBACK

3 SIMULATION

4 PROCEDURAL SKILLS

5 ELECTRONIC HEALTH RECORD

6 OSCE AND STANDARDIZED PATIENTS

7 IN-TRAINING EXAMS

8 QI AND SCHOLARLY PROJECTS

Entrustment

Ad hoc entrustment

Summative Entrustment


Selection


Comparing

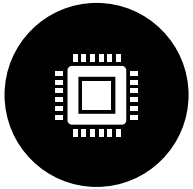
To What End?

BEST OF THE BEST

METRICS TO PREDICT FUTURE PERFORMANCE OR PROBLEMS

FIT OR ALIGNMENT

DIVERSITY, EQUITY, AND BIAS



LOGISTICS

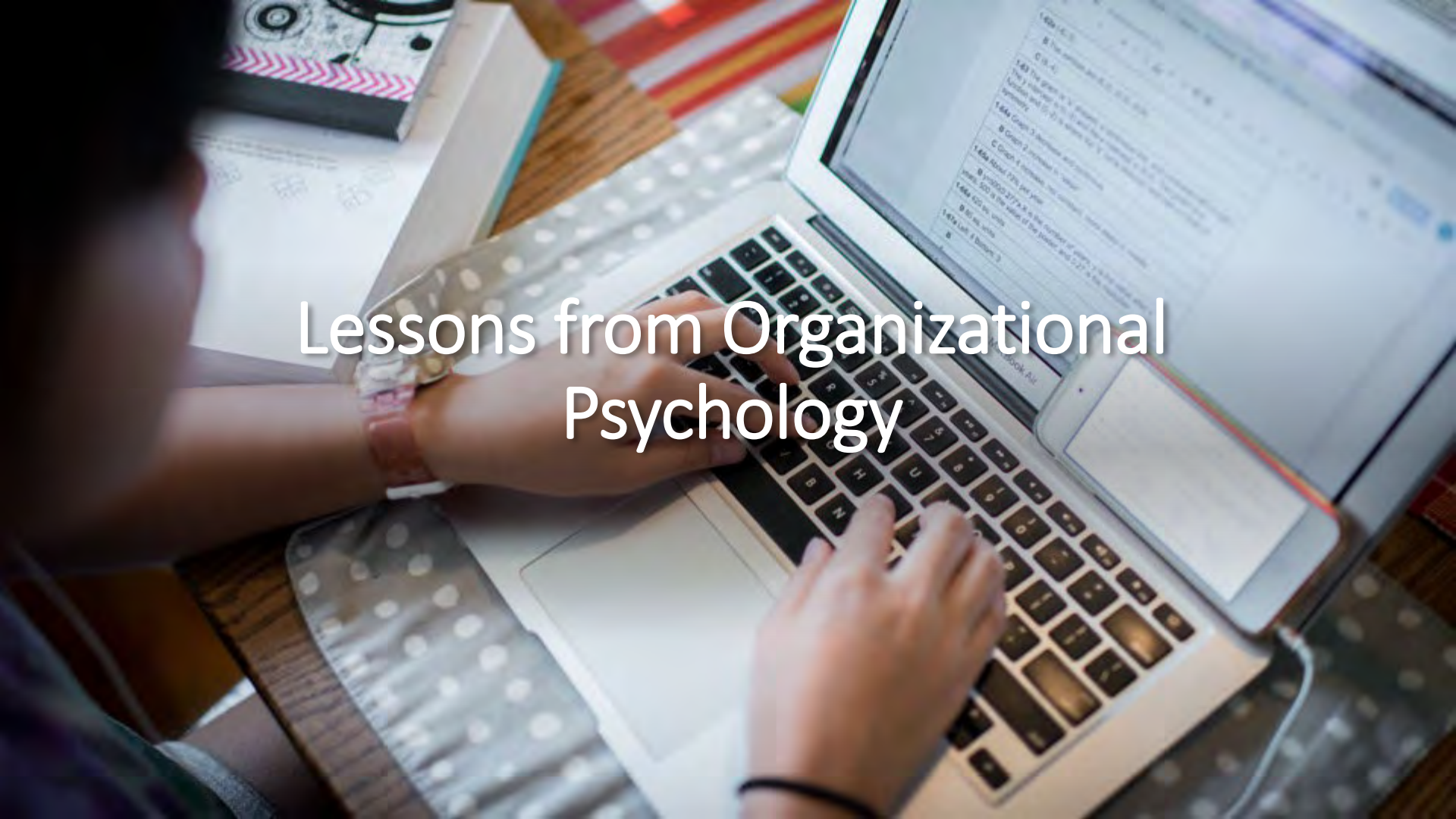

Avalanche of Applications

DUAL-PURPOSING OF ASSESSMENT

Meaningful Comparison and CBME Can Coexist!

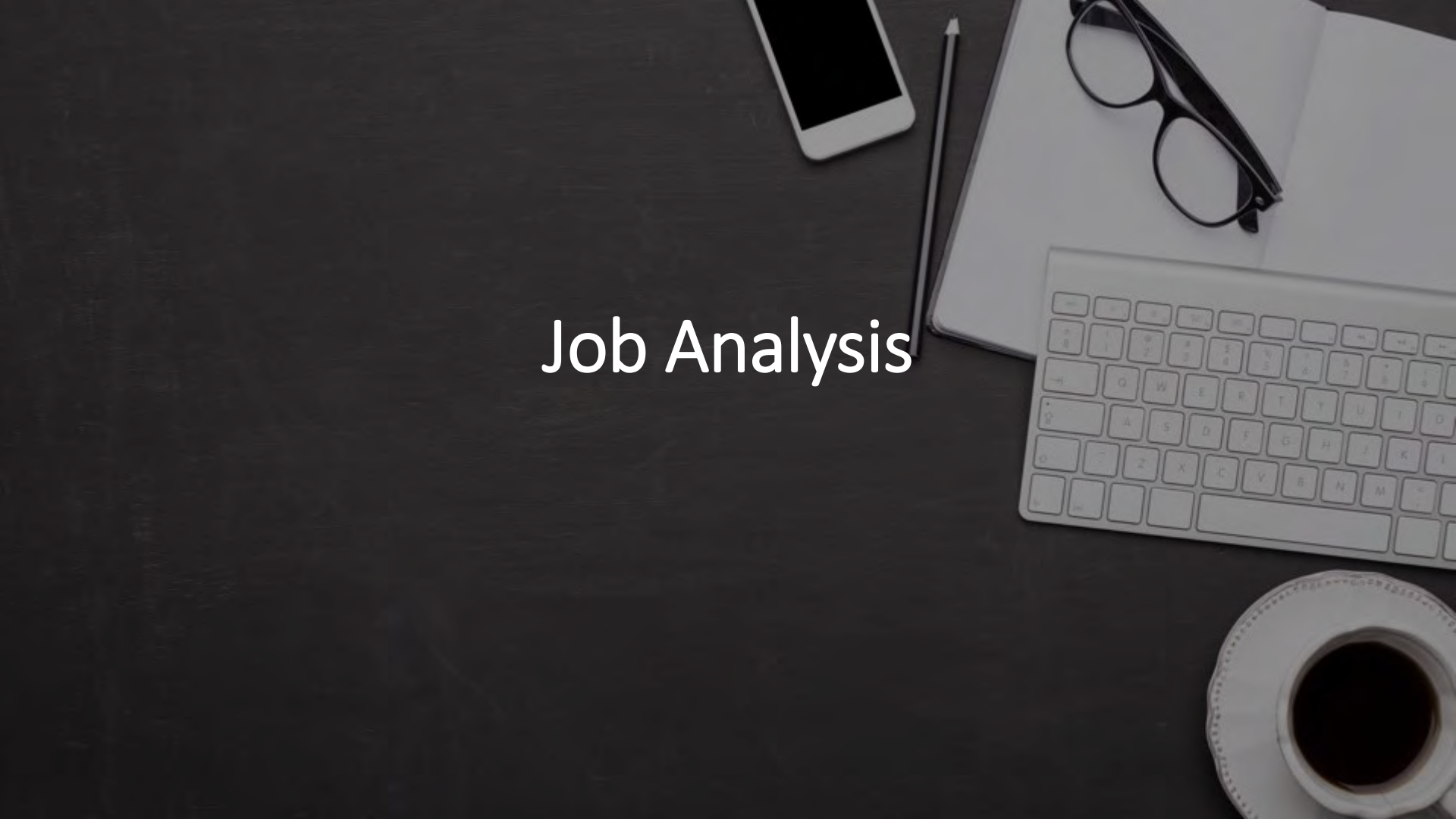
Must Consider All Stakeholders and Priorities

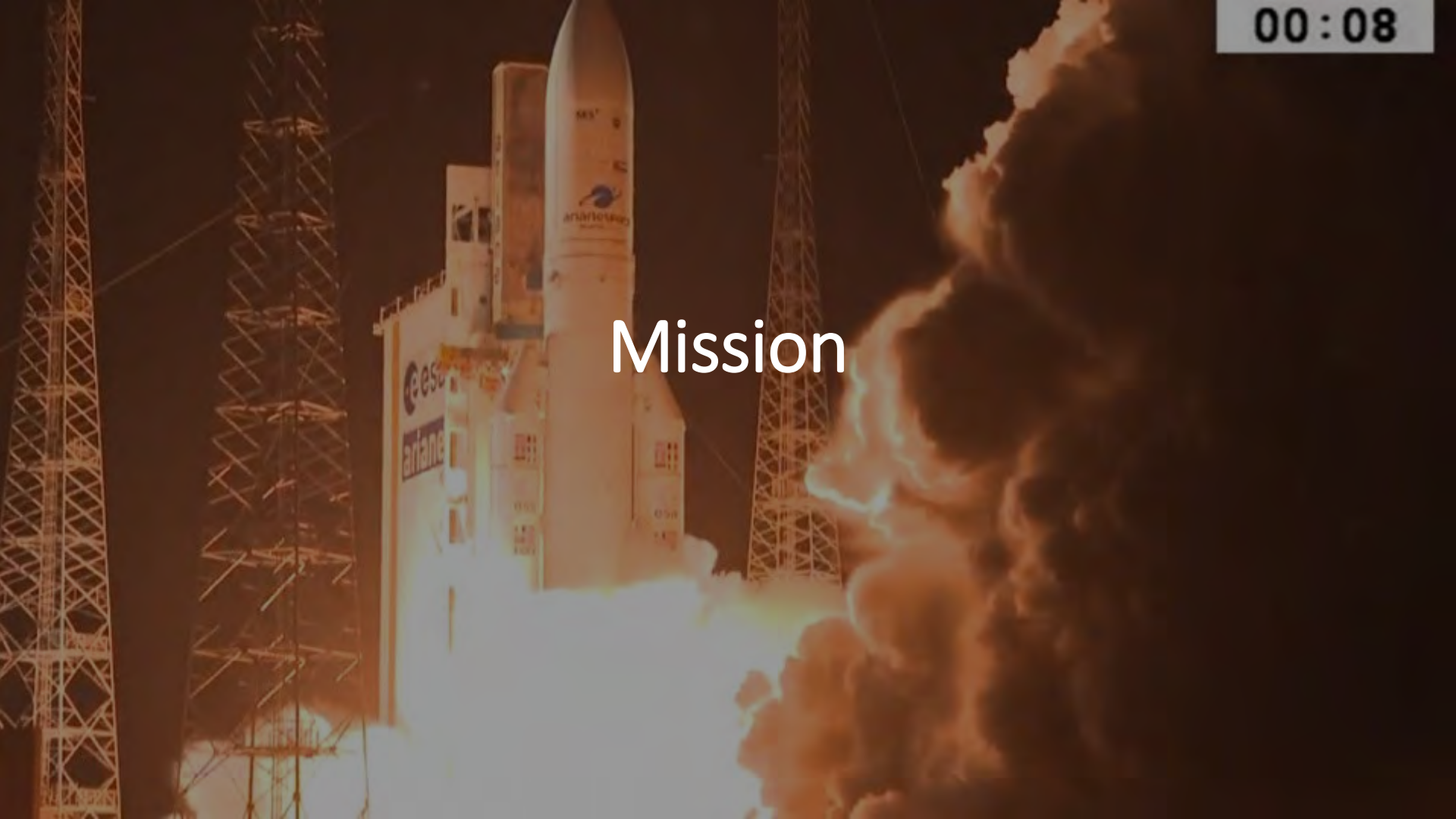
- Individual achievement and priorities
- Competence overall and to do the work of the chosen profession and specialty
- Responsibility to meet the outcomes of a diverse society



Lessons from Organizational Psychology

Job Analysis



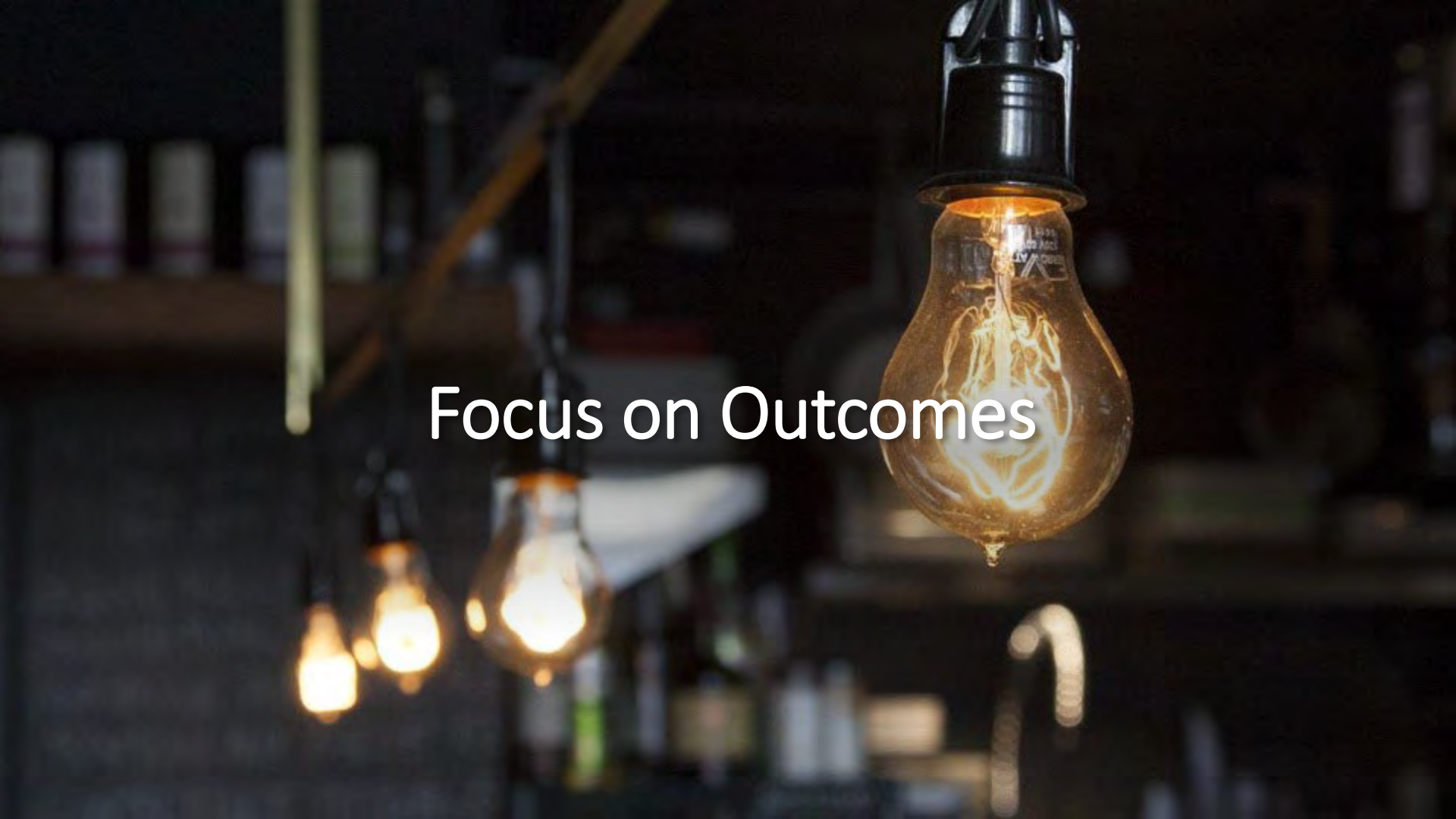


Mission


Teams

Society


Defensibility


Focus on Outcomes

Physicians' powerful ally in patient care

A SIMPL approach to improving competency

Brian C. George MD MAEd

Director, UM Center for Surgical Training and Research

Executive Director, Society for Improving Medical Professional Learning

Senior Scholar, The Center for Professionalism & Value in Health Care

C-STAR Center for Surgical Training and Research

SIMPL

The Center for Professionalism & Value in Health Care

Disclosures

The Society for Improving Medical Professional Learning (SIMPL) is a 501c3 non-profit.

All of my work on behalf of SIMPL is on a volunteer basis.

I have no other vested financial interests.

Thank you!

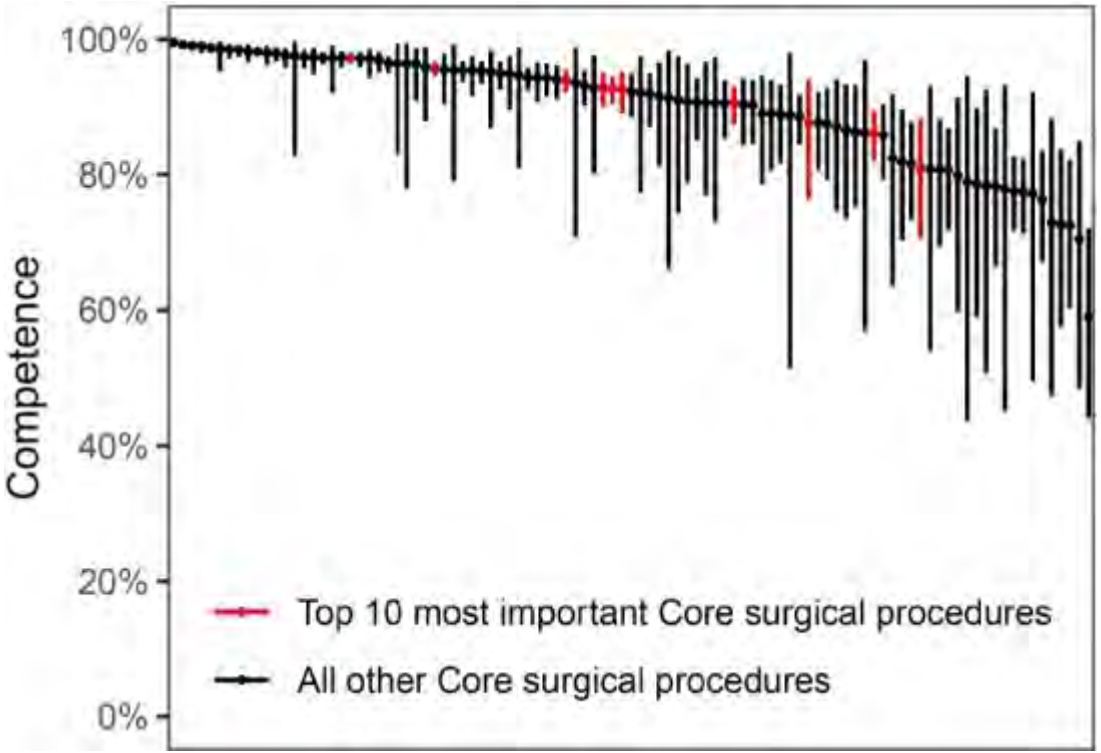
How well is our system of medical education working

?

Let’s look at general surgery

Competency for “Core” surgical procedures

N= 54 general surgery programs, 1,861 surgical residents, 29,885 observed procedures



Abbott et al., *Annals of Surgery* 2021

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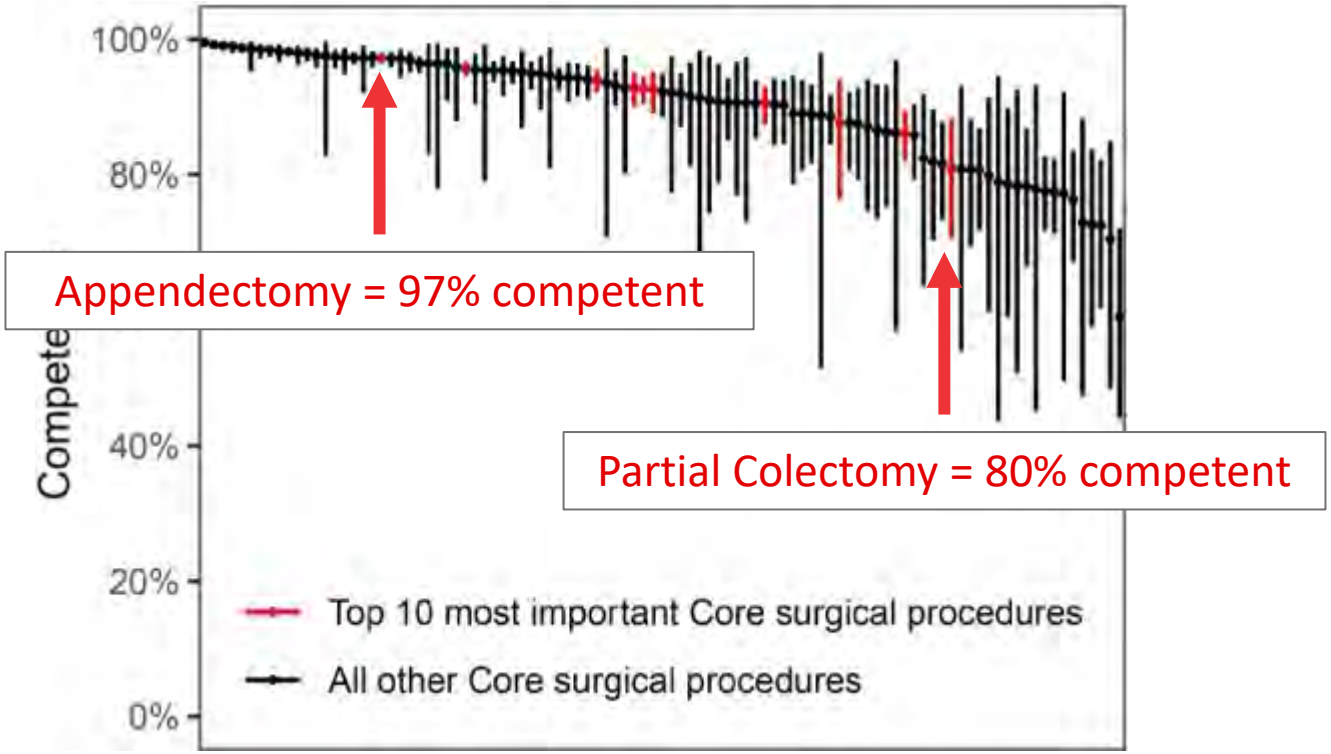
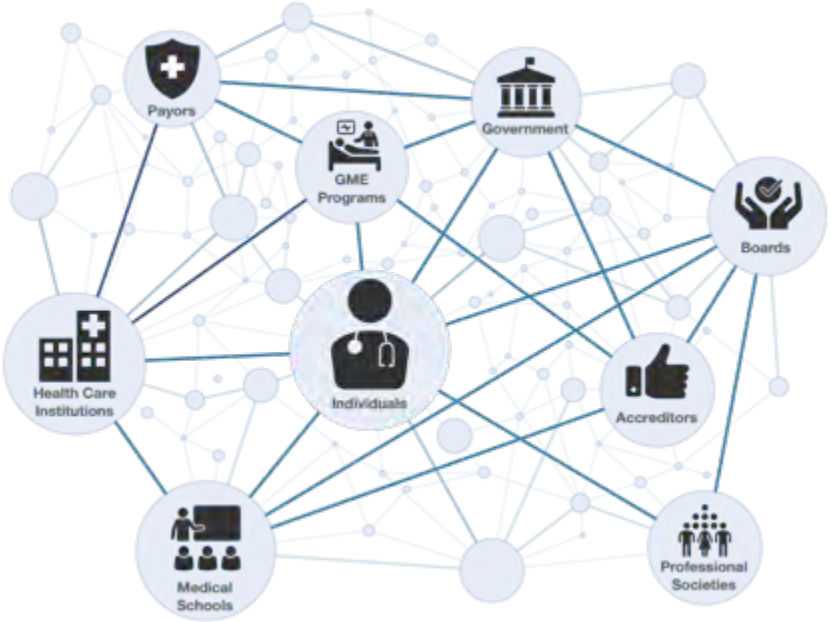


Abbott et al., *Annals of Surgery* 2021

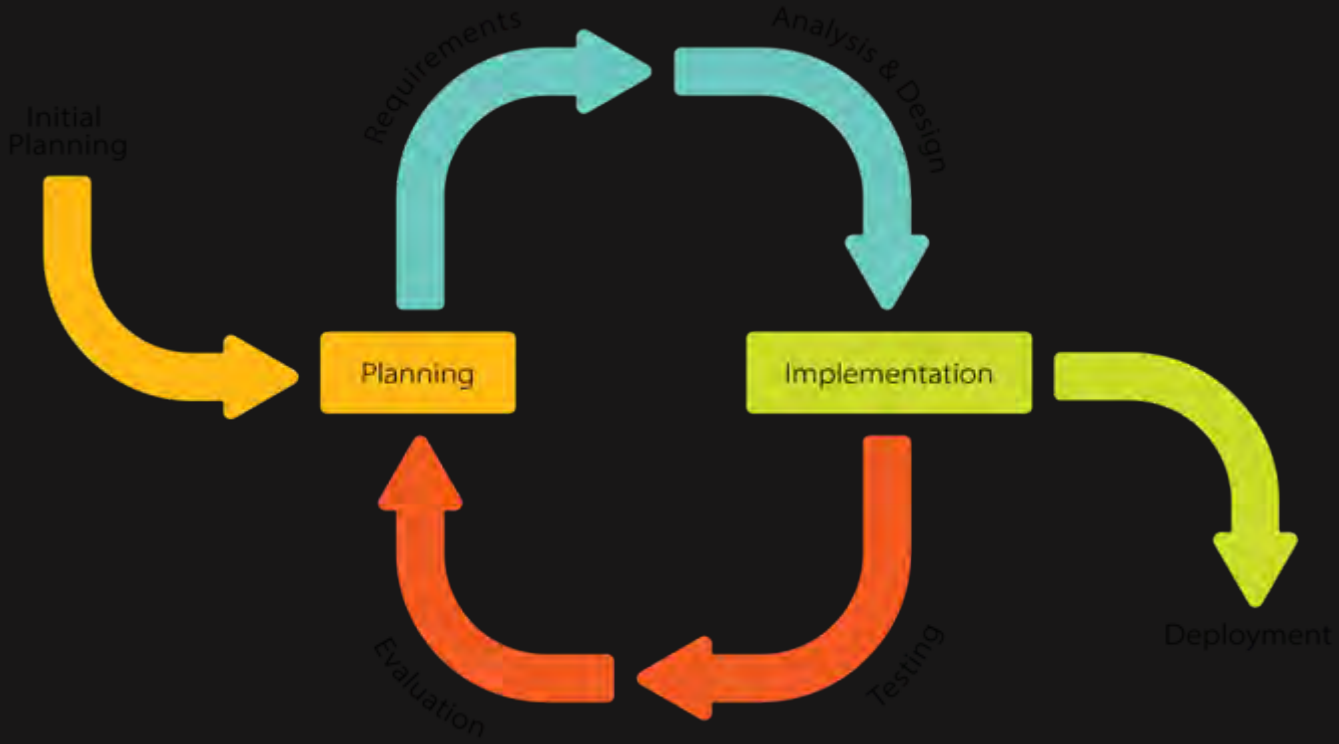
How can we improve competency?



Where to intervene?

How to intervene?

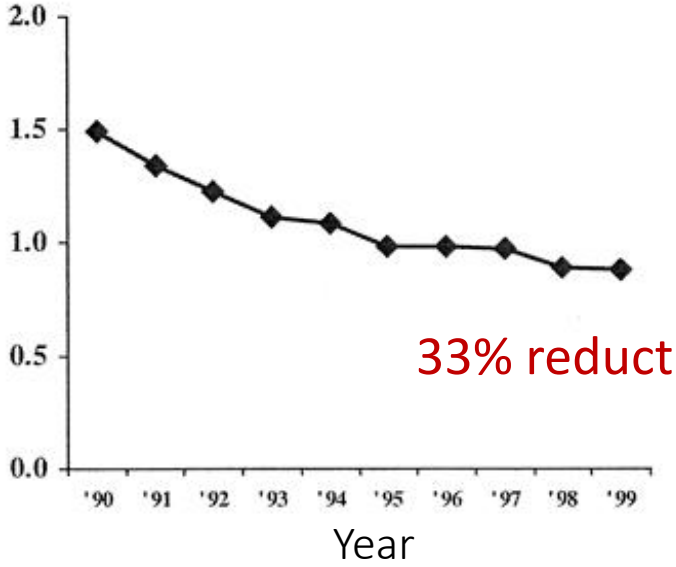
Insight #1: Medical education is a complex system and is best updated with an iterative "improvement approach"



A Decade's Experience With Quality Improvement in Cardiac Surgery Using the Veterans Affairs and Society of Thoracic Surgeons National Databases

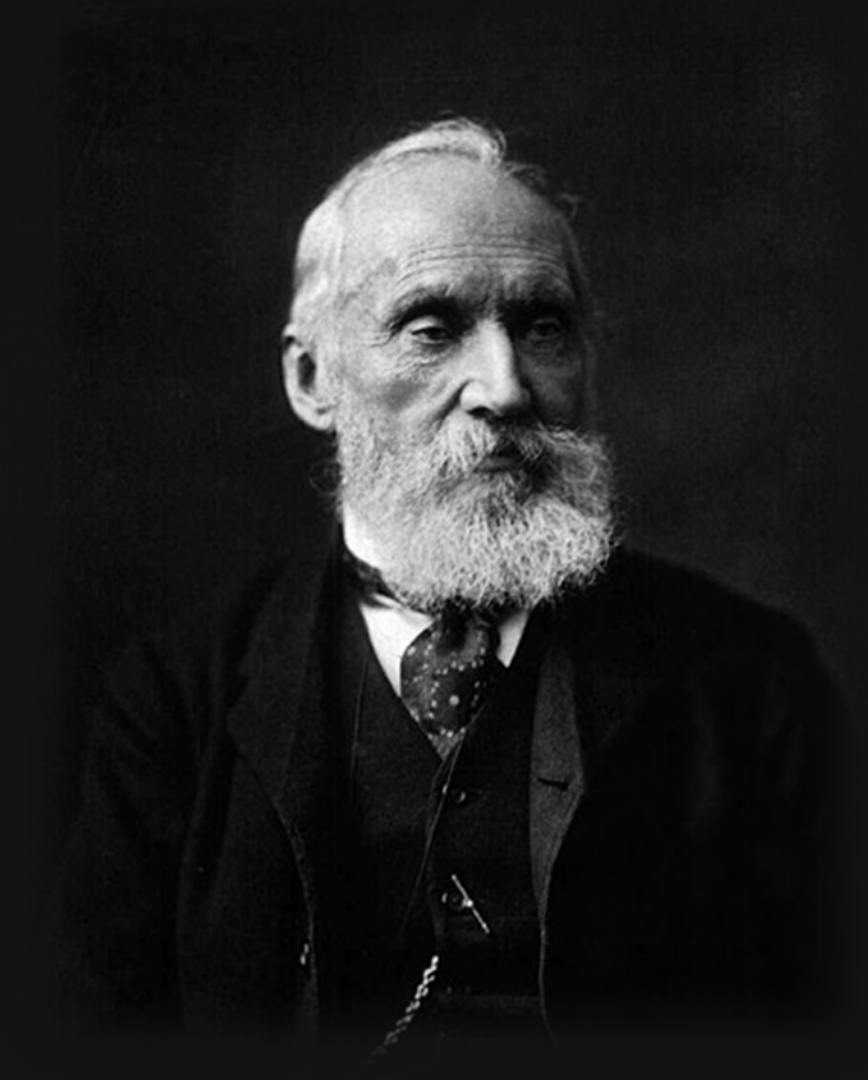
Frederick L. Grover, MD,* A. Laurie W. Shroyer, PhD,* Karl Hammermeister, MD,* Fred H. Edwards, MD,† T. Bruce Ferguson, Jr., MD,‡ Stanley W. Dziuban, Jr., MD,§ Joseph C. Cleveland, Jr., MD,* Richard E. Clark, MD,‖ and Gerald McDonald, MD¶

Observed-to-Expected Ratio for Death
All Isolated CABG Patients, 1990 - 1999



33% reduction in mortality

Insight #2: Measurement is essential



If you can’t measure it,
you can’t improve it

- Lord Kelvin (paraphrased)

Insight #3: Educators often lack the resources to implement and sustain innovation at scale

Working in silos

Implementation barriers

Changes are difficult to sustain


~~PROBLEM~~
OPPORTUNITY

Society for Improving Medical Professional Learning (SIMPL)

Collaboratively Addressing Systemic Problems in Medical Education

A 501(c)3, volunteer-led organization

185 training programs, 9,000 physicians, 19 specialties, 5 countries

Lots of Collaborative, Multi-Institutional Research (>50 publications)

Mission

Establish and maintain the

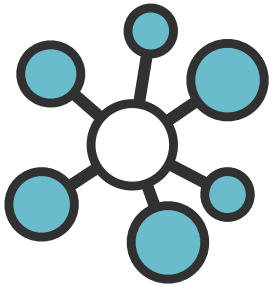
data, analytic, operational, and collaborative

infrastructure

to support

continuous quality improvement

of the medical education system



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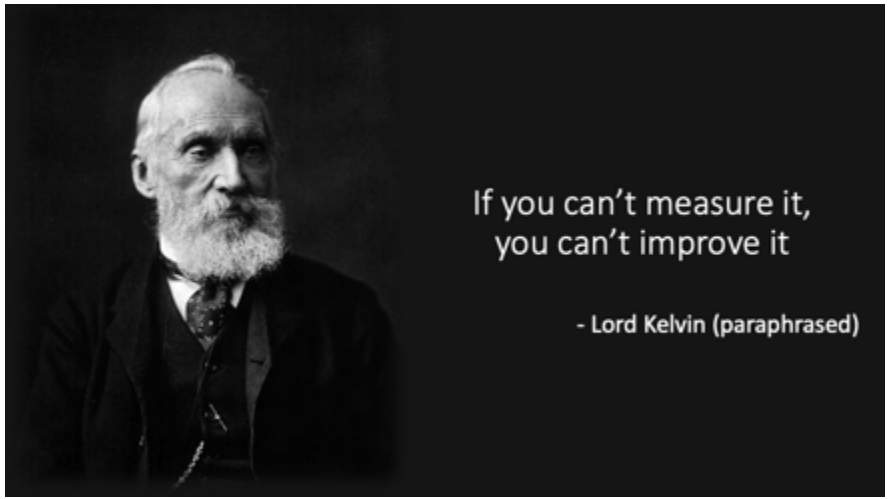
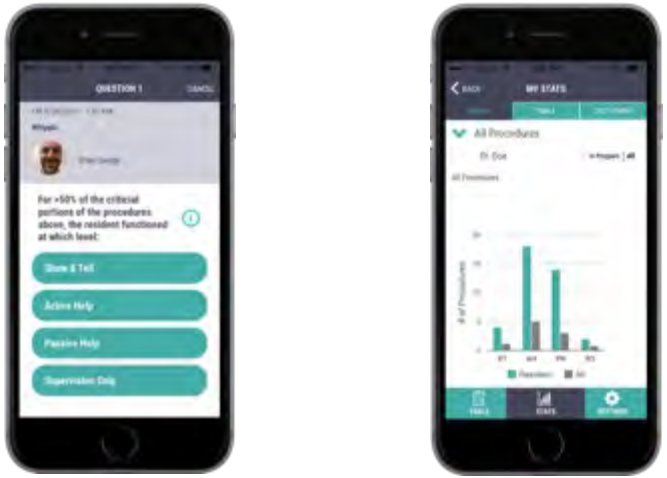


Step 1:
Implement competency measures that can be scaled

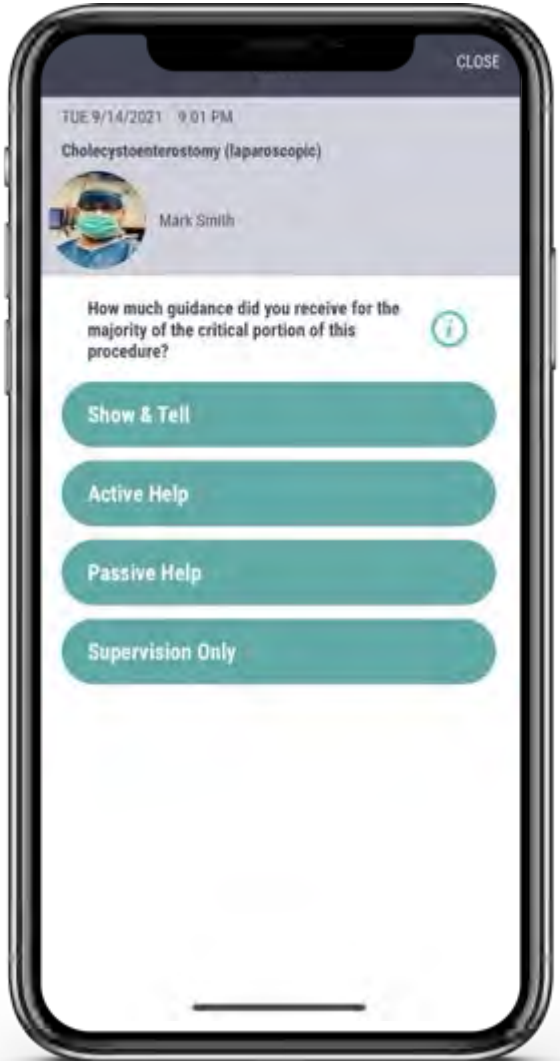
SIMPL

SIMPL app 1.0: an evidence-based workplace assessment tool



Collaboratively developed and collectively supported by members of the Society for Improving Medical Professional Learning (SIMPL)

SIMPL



Autonomy

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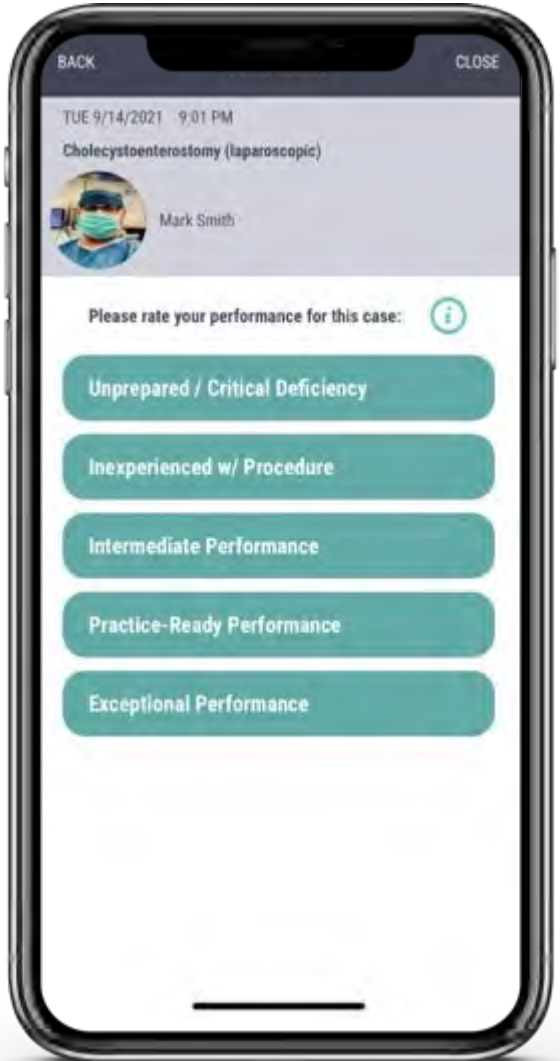
Retrospective Entrustment

The SIMPL 1.0 app

SIMPL



Readiness

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Prospective Entrustment

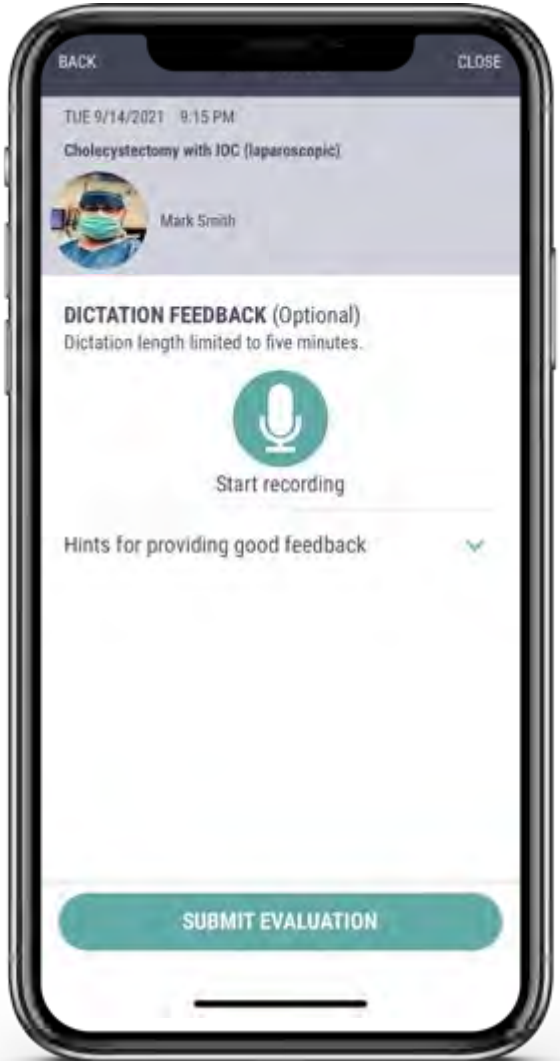
The SIMPL 1.0 app

SIMPL

Context-Specific Case Complexity

The SIMPL 1.0 app

SIMPL



Feedback dictated by faculty

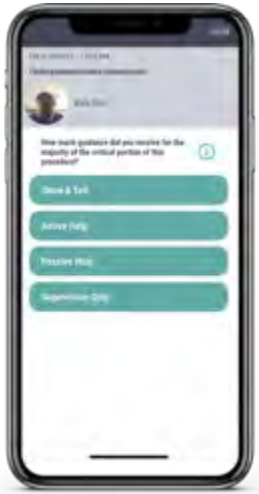
Recording immediately available to trainee

Recording also transcribed automatically for PD and CCC

The SIMPL 1.0 app

Next Steps for the SIMPL app

SIMPL 1.0



SIMPL 2.0

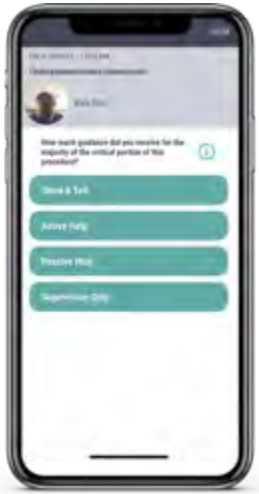
SIMPL 2.0

Direct support for CBME and other educational quality improvement efforts, including implementation of EPAs

AMA

Next Steps for the SIMPL app

SIMPL 1.0

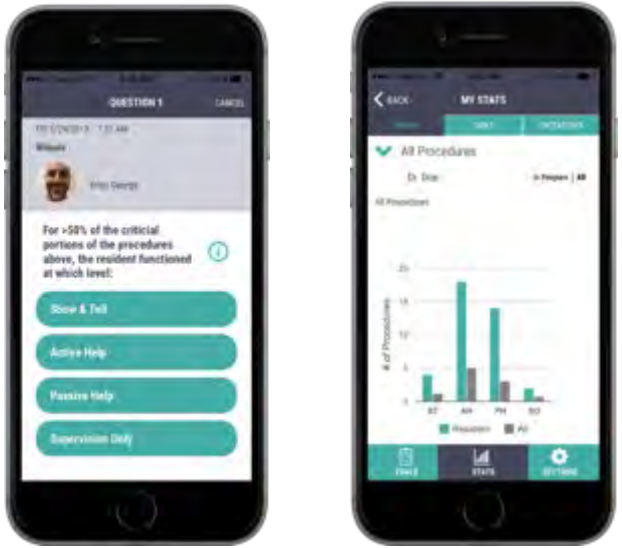


SIMPL 2.0

SIMPL 2.0

Direct support for CBME and other educational quality improvement efforts, including implementation of EPAs

Data collection is important, and we also need to use the data to improve



Making real-time competency predictions with SIMPL data

Andrew Krumm PhD

Assistant Professor
Learning Health Sciences
University of Michigan

C-STAR
Center for Surgical Training and Research

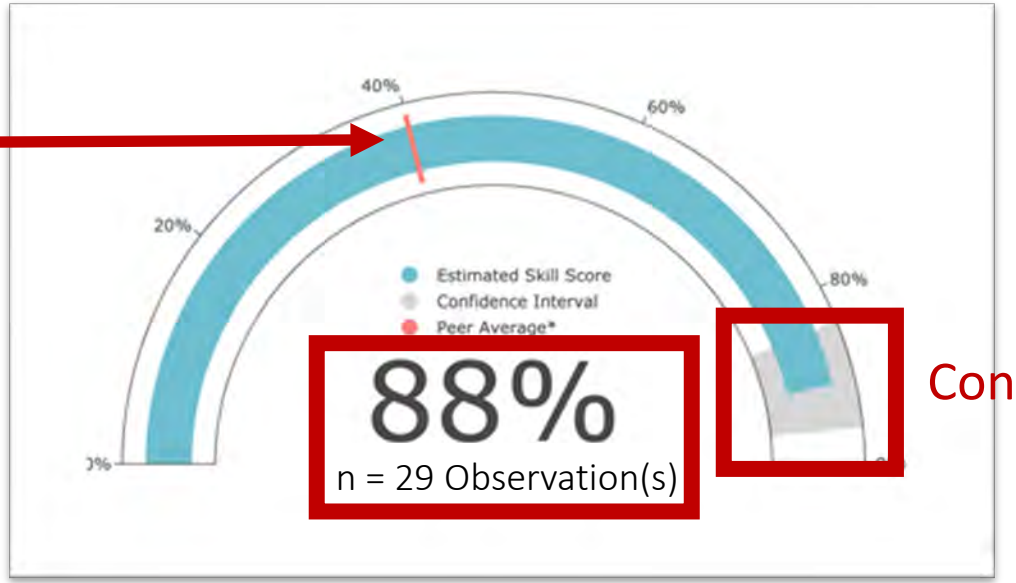
Activity-specific dashboard (e.g. laparoscopic appendectomy)

SIMPL

Probability of Being Deemed Competent on Next Laparoscopic Appendectomy

Bayesian mixed effect models fitted to population-level SIMPL data

Peer Average



Confidence Intervals

These are competency-based predictive analytics

SIMPL

Again, these investments in competency measures are a first step.

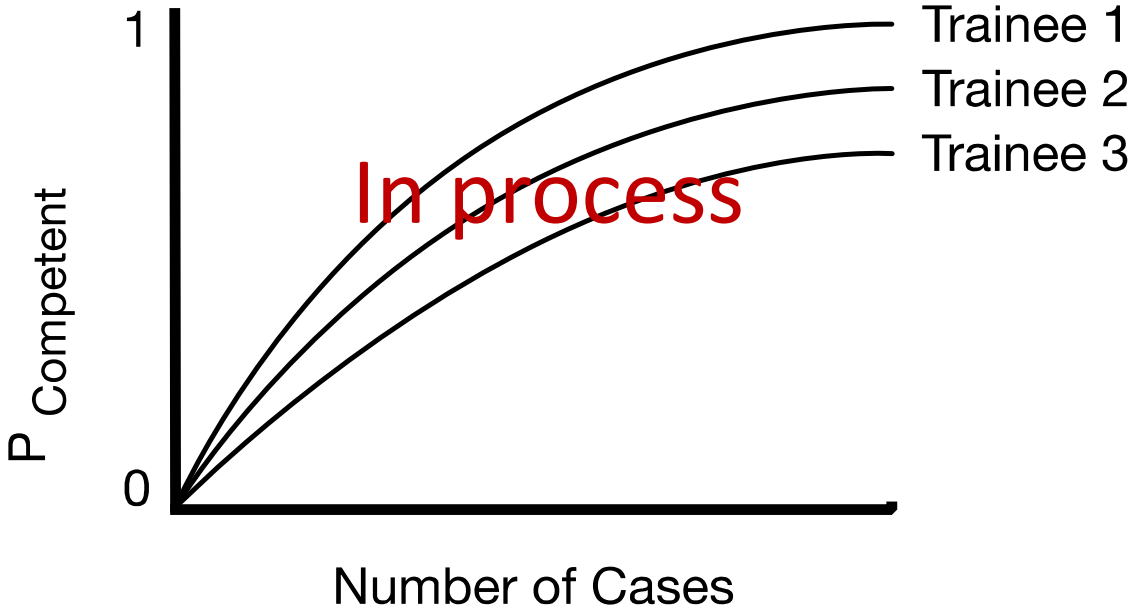
The longer-term goal is collaborative development of evidence-based educational standards

Example: Using the SIMPL infrastructure to inform ACGME (RRC) case log standards

How much experience does a surgical resident need to be competent?

Limited evidence, standard setting guided primarily by expert consensus

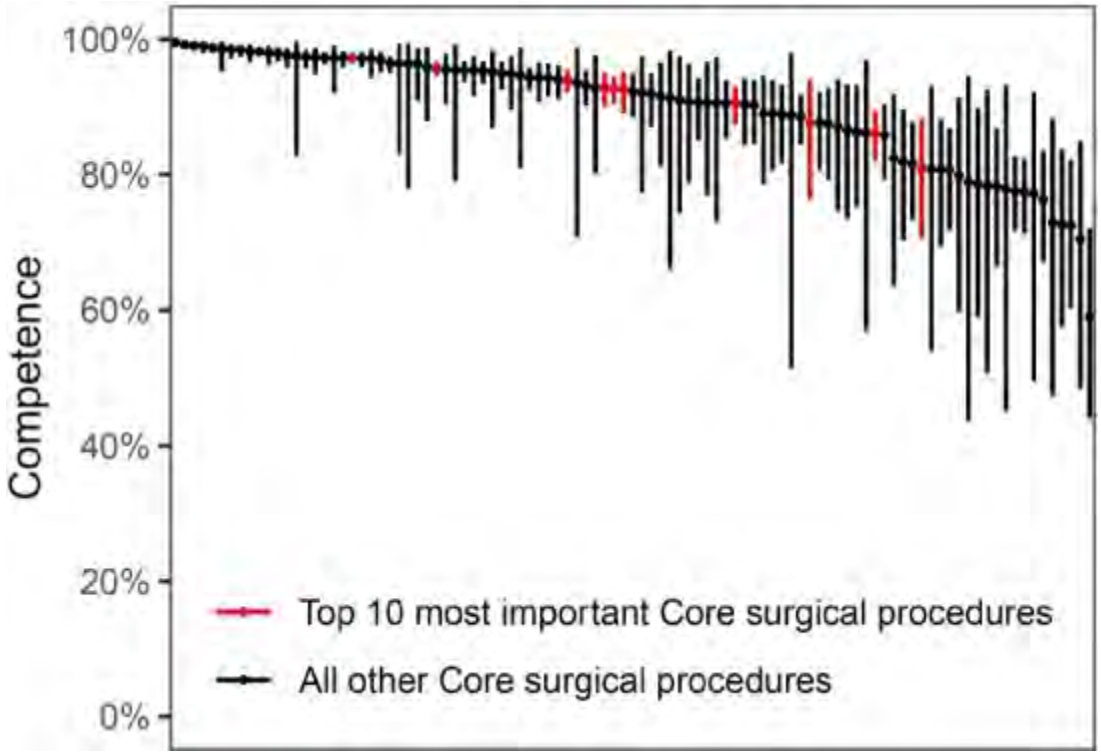
Variability in Trainee Autonomy and Learning in Surgery (VITALS) Trial: learning curves



NBME

SIMPL

To address this challenge…



Measurement and collaboration are key

Thank you

@bcgeorge
@SIMPLCollab

C-STAR Center for Surgical Training and Research

SIMPL

The Center for Professionalism & Value in Health Care

AMA
AMERICAN MEDICAL ASSOCIATION

AMA Innovations in Medical Education Webinar Series

Competency-based assessment across the medical education continuum

Questions

Physicians' powerful ally in patient care