Competency-based Medical Education: Past, Present and Future

GME Day-Boston Children's Hospital

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I have nothing to disclose.

Learning Objectives

- Explain the rationale for the shift to CBME
- Describe the struggles and successes to date
- Discuss how we continue to advance towards true CBME

Setting the Stage: The Late 1990's:

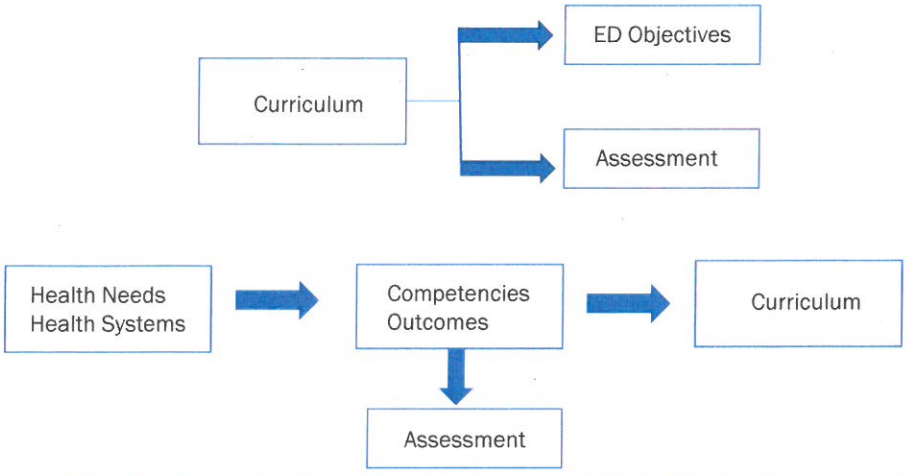
- To Err is Human in the US- 98,000 deaths in hospitals annually due to preventable medical errors[1]
- The Canadian Adverse Events Study- 7.5% of admissions had an adverse event; of these 37% judged to be preventable[2]
- In the UK- 10.8% of acute admissions had an adverse event; 33% of which were associated with severe morbidity/ mortality[3]

1. Kohn LT, et al (eds). To Err is Human. Institute of Medicine. Washington, DC: National Academy Press;.2000.
2. Baker GR. Canadian adverse events study. JAMC.2004;170;1678-1686.
3. Shaw R, et al. Adverse events & near miss reporting in the NHS. Qual Saf Health Care.2005;14:279-283.

The Context for Competency-based Medical Education (CBME)

- Public outcry over their dissatisfaction with health care
- The medical profession's responsibility to self-regulate and focus on care outcomes
  - The ACGME Outcome Project
  - The CanMEDS Roles
  - Good Medical Practice in the UK

Flexnarian System versus CBME



Frenk J, Chen L, Bhutta Z, et al. Health professionals for a new century...The Lancet 2010: 376: 1923-1958.

Definition: CBME

Competency-based education (CBE) is an approach to preparing physicians for practice that is fundamentally oriented to graduate outcome abilities and organized around competencies derived from an analysis of societal and patient needs. It de-emphasizes time-based training and promises greater accountability, flexibility, and learner centredness.

Frank et el. Toward a definition of CBE in medicine: A systematic review of published definitions. *Med Teach*. 2010;32:631-637.

Standardizing the Language

- Domains of Competence
  - Broad distinguishable areas of competence that in the aggregate constitute a general descriptive framework for a profession.
  - Examples:
  - Patient Care, Medical Knowledge, Practice-based Learning & Improvement, Interpersonal & Communication Skills, Professionalism, & Systems-based Practice

Englander, Frank, Carraccio et al. Toward a shared language for CBME. Med Teach 2017;39:582-587

Competencies

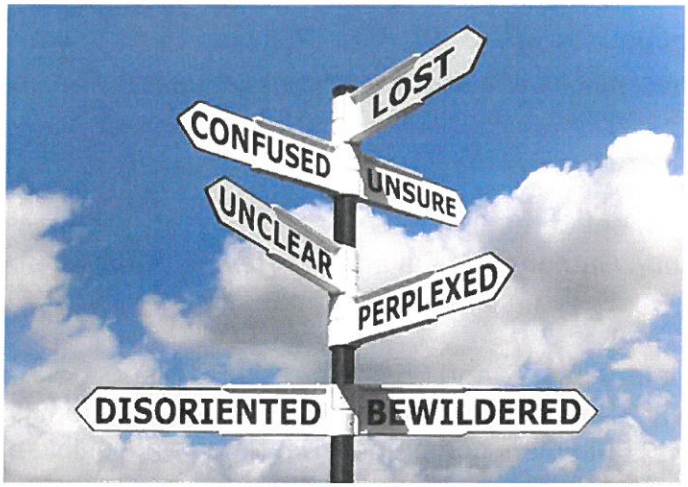
- **Competencies**
  - Observable abilities of a health professional related to a specific activity that integrates knowledge, skills, values, & attitudes.
  - Examples:
  - Domain: Patient Care
  - Competency: Gather essential and accurate information about a patient
    Develop and carry out management plans
  - Domain: Interpersonal and Communication Skills
  - Competency: Communicate effectively with patients, families and the public
    Maintain comprehensive, timely and legible medical records

Milestones

- Defined, observable markers of an individual's ability along a developmental continuum
- **Example:**
  - Domain: Patient Care
  - Competency: Gather essential and accurate information about a patient
  - Milestone: Relies on a **template** to gather information, often either **gathering too little or too much information.** Recalls clinical information in the order elicited, with **limited ability to filter, prioritize, and connect pieces of information** (novice)

Batalden P, Leach D, Swing S, Dreyfus H, Dreyfus S. General competencies and accreditation in GME. Health Affairs 2002:21:103-111.

1999--2009: The Decade of Growing Pains



The Essence of the Assessment Challenge

David Leach said of competency-based assessment that it is --

"dependent on an integrated version of the competencies, whereas measurement relies on a speciated version of the competences. The paradox cannot be resolved easily. The more the competencies are specified, the less relevant to the whole they become."

Ginsburg S, McIlory J, Oulanova O, et al. Toward authentic clinical evaluation: Pitfalls in the pursuit of competency. Acad Med. 2010;85:780-786.

Paradox

- Parker Palmer says of paradox-
- "We split paradoxes so reflexively that we do not understand the price we pay for our habit. The poles of a paradox are like the poles of a battery: hold them together, and they generate the energy of life; pull them apart, and the current stops flowing."

Palmer P. The Courage to Teach. San Francisco, CA: Jossey-Bass; 1998.

Splitting the Paradox

Holding the Paradox Together

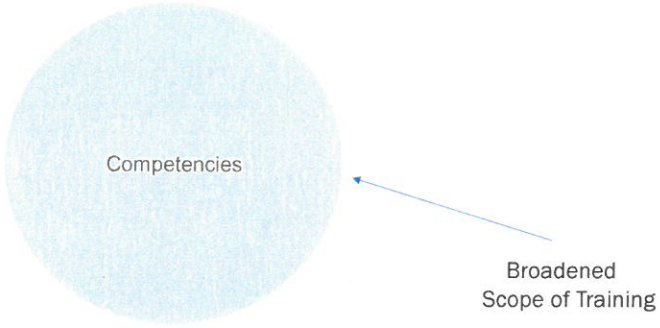
Bundling and Integrating
Competencies/Milestones
&
Entrustable Professional Activities (EPAs)

Entrustable Professional Activities (EPAs)

- Important routine care activities that define a specialty/subspecialty
- Observable & measurable units of work
- Require integration of competencies within/across domains to perform
- Examples: Provide care for a well newborn; facilitate handovers to another care provider
- "Entrustable" refers to readiness to safely perform the activity without supervision

1. Ten Cate, O, Scheele F. Competency-based training: Can we bridge the gap between theory and practice? Acad Med 2007;82:542–547.

1999: Six Core Domains of Competence and their Competencies



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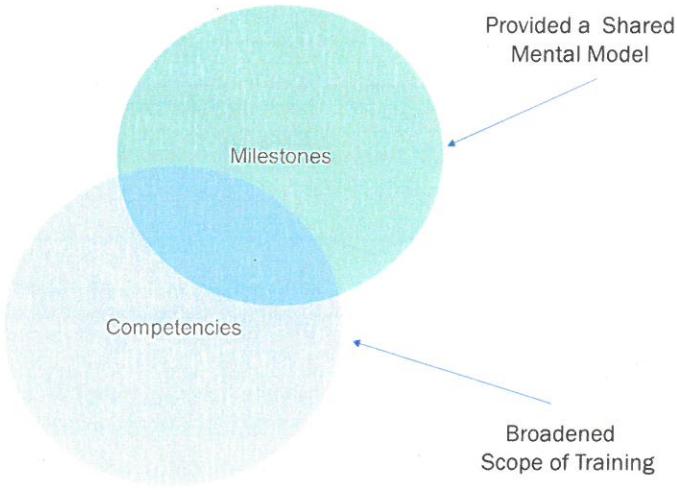
2009: Milestones



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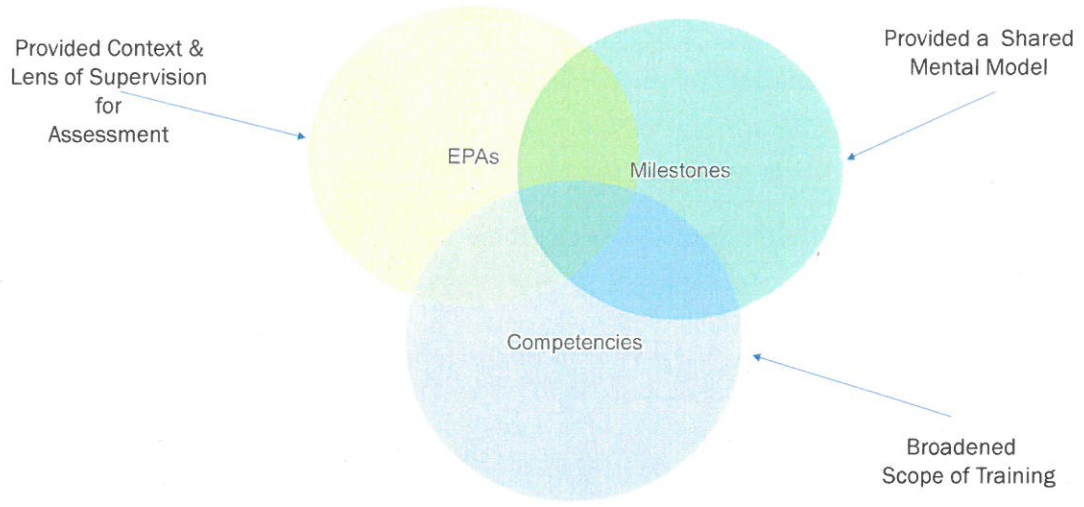
2013 EPAs



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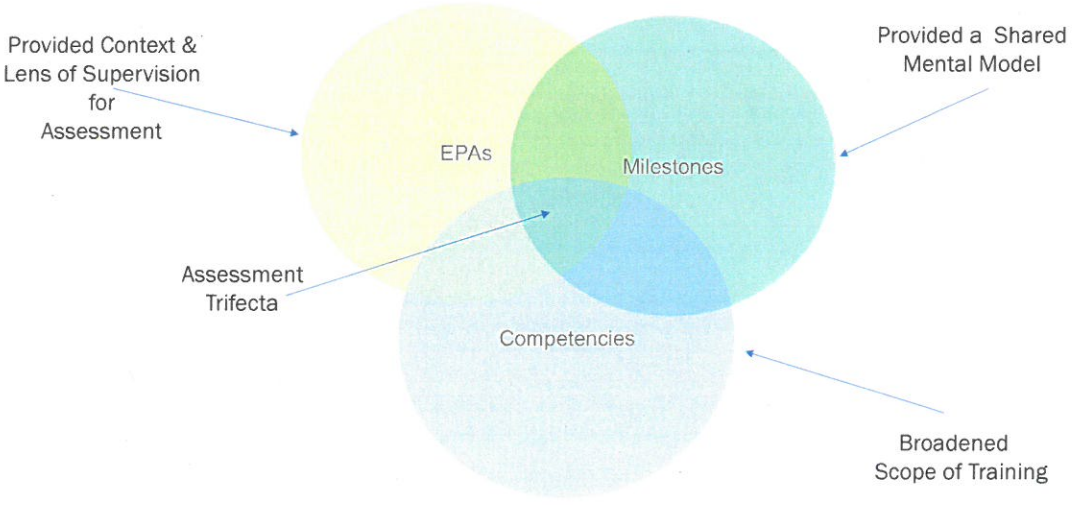

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EPAs & Competencies/Milestones: Both Are Critical to Assessment

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EPA : Handovers	Milestone 1	Milestone 2	Milestone 3	Milestone 4	Milestone 5
PC Domain					
Organization			Narrative descriptions		
Transition					
PBLI Domain					
Feedback			Narrative descriptions		
IT					
ICS Domain					
Communicate			Narrative descriptions		
Document					

Workplace Assessment

Four General Principles[1]:

- The response scale should be aligned to the role of the assessors[2]
- The assessment should focus on competencies that are central to the activity observed
- Judgements rather than objective observations should be sought[3]
- The assessors who are best placed to judge performance should be asked to participate

1. Crossley J, Jolly B. Making sense of workplace assessment. Medical Education 2012: 46: 28–37
2. Crossley J, Johnson G, Booth J et al. Good questions, good answers: Construct alignment improves the performance of WBA scales. Med Educ 2011; 45:560-569.
3. Regehr G, MacRae H, Reznick RK, Salzey D. Comparing the psychometric properties of checklists and global rating scales for assessing performance on an OSCE –format examination. Acad Med. 1998;73:993-997.

Putting the Principles of Workplace Assessment into Practice

Resources Needed:

- Time
- A program of assessment
- Faculty development for a cadre of assessment experts who can make judgements

Putting Theory Into Practice

- 2012- ACGME announced that each subspecialty was required to create milestones, but ABP pleaded the case to develop EPAs with our subspecialties instead based on:
  - The need to develop a context for the context independent competencies and milestones for each subspecialty to make assessment meaningful
  - The novice to expert scale developed for milestones covered the fellowship years

EPA Work Completed Over the Last 5 Years

- Engaged with our community in a grassroots effort
- Identified 17 EPAs for general pediatrics (GP), 7 common subspecialty(SS) EPAs and 3-6 SS-specific EPAs
  - Developed the functions necessary to carry out each EPA
  - Mapped EPAs to critical competencies & their milestones
  - Developed 3-4 page curricular component documents for each EPA
- Sent to APPD & CoPS for review; revisions based on feedback
- All work posted to ABP website
  - https://www.abp.org/entrustable-professional-activities-epas
  - https://www.abp.org/subspecialty-epas

EPA Studies in Progress

- General Pediatrics EPA Studies
- Subspecialty EPA Studies
- Education in Pediatrics Across the Continuum (EPAC)

Our Community Networks

Longitudinal Educational Assessment Research Network

Subspecialty Investigators Research Network

GP EPA Study

- Twofold purpose:
  - Determine expectations of program directors for level of supervision leading to entrustment for each EPA at the time of program completion & whether entrustment is required for graduation
  - Determine actual performance by following a cohort of residents over 3 years
- 20 programs with geographic and size variation; > 1,000 trainees
- Initial expectations survey completed
- Biannual reporting began in Spring 2016; 1 data collection to go

Common Subspecialty EPAs

- Apply public health principles and improvement methodology to improve population health
- Provide consultation to other healthcare providers caring for children & adolescents & refer patients requiring consultation to other subspecialty providers if necessary
- Contribute to the fiscally sound, equitable & collaborative management of a practice
- Facilitate handovers to another healthcare provider
- Lead an interprofessional health care team
- Lead within the subspecialty profession
- Engage in scholarly activities through the discovery, application, and dissemination of new knowledge (broadly defined)[1]

1, Mink R, Myers A, Turner D, Carraccio C. Competencies, Milestones & Supervision Scale for Scholarship EPA. Acad Med (In Press)

Common Subspecialty EPA Study

- Dual Purpose:
  - Develop evidence for validity of the supervision scales created
  - Test relationship between 6 common subspecialty EPAs and the critical competencies & milestones to which they map

	Fall 2014	Spring 2015
Institutions	78	81
Fellowship programs	208	209
Fellows	1040	1058

Level of Supervision Scales

Facilitate Handovers

1	Trusted to observe only
2	Trusted to execute with direct supervision and coaching
3	Trusted to execute with indirect supervision with verification of information after the handover for selected simple and complex cases
4	Trusted to execute with indirect supervision with verification of information after the handover for selected complex cases
5	Trusted to execute without supervision

Mink R, Schwartz A, Herman B, et al. Validity of supervision scales...Acad Med 2018;93:283-291

Common Subspecialty EPA Study

- Supervision scales that we created showed:
  - Significant differences in ratings for fall vs spring & across the 3 years of training ($p<0.001$)
  - Internal reliability using Cronbach's alpha =0.92
  - Interrater reliability across EPAs = 0.74 in spring & fall

Common Subspecialty EPA Study

- Correlation of mean unweighted milestone scores with level of supervision for the EPA ranged from 0.69 to 0.76 which shows a strong relationship between milestone level and level of supervision
- Confirmatory factor analysis found that the relationships among milestone scores more closely fit the mapped EPAs than the domain of competence to which the competency/milestones belonged ($p<.001$)

Common & Subspecialty-Specific EPA Survey

- Aim: Learn expectations of PDs regarding level of trainee performance for each common and subspecialty-specific EPA at the time of program completion & whether entrustment is required for graduation
- Method: Survey
- Results on the common EPAs
  - Mean # of responses across subspecialties (660/802) 82%
  - Data to be presented at PAS
  - Spoiler- not all EPAs are created equal ➡ not all require entrustment at the end of fellowship training

On the Horizon for GP and Subspecialties

- Longitudinal study of actual fellow performance for the remaining common subspecialty EPA (scholarly activity) and the SS-specific EPAs
- Implementation research for both GP and SS to study factors that facilitate or challenge EPA assessment at the level of the Clinical Competency Committees (CCC)
  - Qualitative studies interviewing participants in the previous studies
  - Focus on program director and other CCC members

EPAC: A Model of Competency-based Advancement Using an EPA Framework

Education in Pediatrics Across the Continuum (EPAC)

University of Minnesota

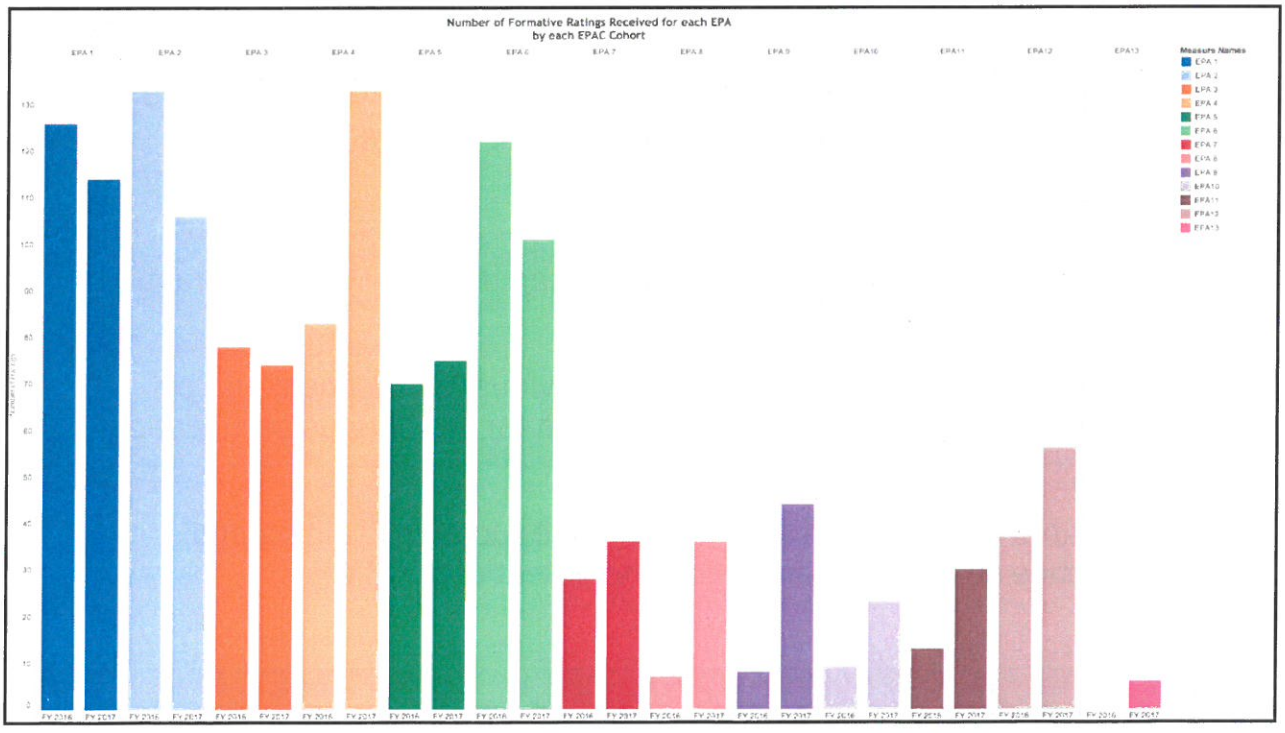
University of Colorado Denver

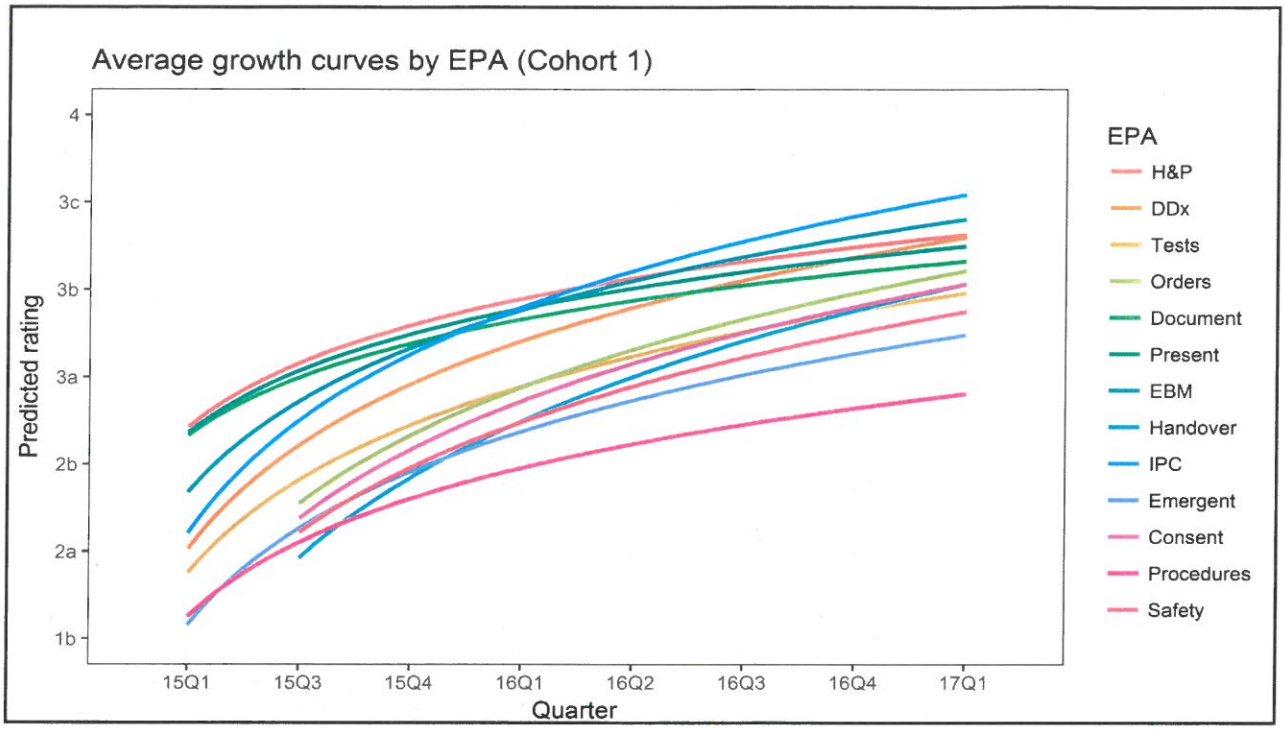
UCSF University of California San Francisco

The University of Utah

- Education in Pediatrics Across the Continuum (EPAC); small pilot [1]
- Advancing from UME to GME and GME to practice based on competence rather than time
- EPA performance is the basis for transition decisions[2,3]
- Had 2/3 of cohort 1 transition from UME to GME early in 4th year and 1/3 transition transition in 2nd half of 4th year

1. Andrews J, Bale, J, Soep J. EPAC: First step towards realizing the dream of CBE. Acad Med. 2018;93:414-420.
2. https://members.aamc.org/eweb/upload/Core%20EPA%20Curriculum%20Dev
3. Carraccio, Englander, Gilhooly et al. Building a framework of EPAs....Acad Med. 2017:92:324-330.

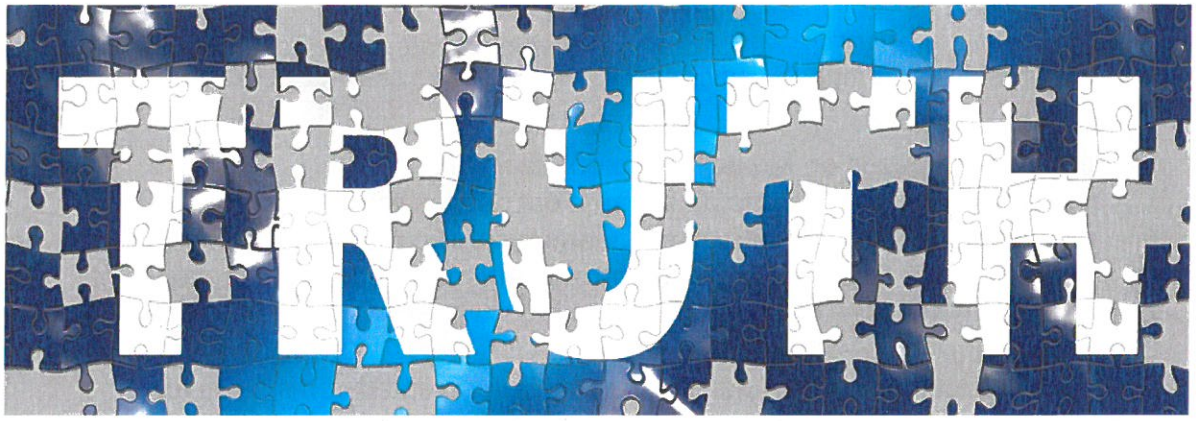




The Future Role of EPAs, Competencies and Milestones: Building the Bridge to Practice

- The learning curve remains steep during the early years of practice
- Therefore – EPAs important to an individual's practice could be carried over into the improvement plan for continuous certification
- It's time that we have a continuum of education, training and practice so that we can realize the potential of CBME

Putting All The Pieces Together ....



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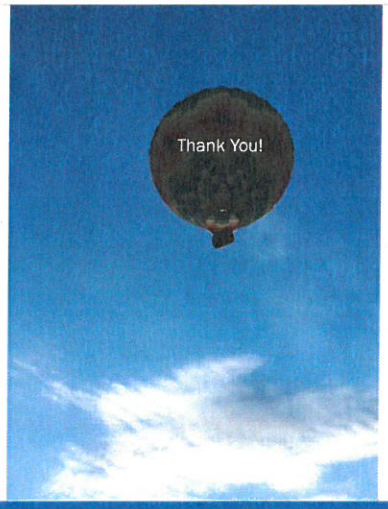
42

Comments/Questions/Reflections



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Pediatrics Milestones Assessment Collaborative (PMAC)

- APPD, NBME and ABP developed an assessment system and tools to inform competencies and milestones critical to making progression decisions
- Modular build based on key advancement decisions
  - Ready to care for patients on an inpatient service with direct supervision
  - Ready to care for patients on an inpatient service with indirect supervision
  - Ready to supervise others in the care of patients, without the presence of an onsite supervisor
- 2 data collections per module: 1) tests the newly created items/tools for purposes of revisions to improve them, and 2) gathers validity evidence

Pediatrics Milestone Assessment Collaborative

- Multi-institutional Study started in 2014
- Participation
  - 8-18 programs participating in each data collection (4-12 months)
  - 165-289 learners involved in each module
  - Total #completed instruments 1,373-2,181 for each of the modules to date
- Tools
  - Multi-source feedback
  - Structured clinical observations

Pediatrics Milestone Assessment Collaborative

- Module 1 [1]
  - Generalizability coefficients > 0.80 with 6 completed MSFs (2 rotations)
  - Program directors, CCC members, interns reported value added especially in the area of feedback specificity
- Module 2 (analyses still in progress)
  - Preliminary results suggest that adjusting for workload impacts assessment[2]
- Module 3 (ongoing)

1. Hicks PJ, Margolis MJ, Carraccio CL, et al. A novel workplace-based assessment for competency-based decisions and learner feedback. Medical Teacher. (In press).
2. Park YS, Hicks PJ, Carraccio C, et al. Does Incorporating a Measure of Clinical Workload Improve Workplace-Based Assessment Scores? AMEE 2018.

Principles of Assessment	Structure/Process	Competency-based
Typical Context	Proxy / Removed	Authentic / "In the trenches" Direct observation in the workplace
Typical Tool(s)	Single or few, often multiple choice questionnaires	Multiple, subjective as well as objective; aligned with what is being assessed
Timing	Emphasis on summative; Norm referenced	Emphasis on formative; Criterion referenced
Assessors	Supervisors	Team members including patients and self
Role of trainee	Passive	Self-directed assessment seekers; portfolio presenters/defenders

Supervision Scales for Majority of GP EPAs
Trusted to observe the EPA
Trusted to practice the EPA only under proactive, full supervision as a **coactivity with the supervisor**
Trusted to practice the EPA only under proactive, full supervision with the **supervisor in the room and ready to step in** as needed
Trusted to practice the EPA only under reactive, on-demand supervision **with supervisor immediately available and ALL findings double checked**
Trusted to practice the EPA only under reactive, on-demand supervision, **with supervisor immediately available and KEY findings double checked**
Trusted to practice EPA only under reactive, on-demand supervision, with **supervisor distantly available** (e.g., by phone),**findings reviewed**
Trusted to practice the EPA **unsupervised**
Trusted to **supervise others** in practice of the EPA (where supervision means: ability to assess patient and learner needs and **ensuring safe effective care** and **further trainee development by tailoring supervision level**

Chen HC, van den Broek S, ten Cate O. The case for use of EPAs in UME. Acad Med. 2015;90:431-436

Why is Assessment So Important?

- Work of David Asch
  - Almost 5 million deliveries
  - 4 thousand obstetricians trained at 107 different programs
  - Training programs put into quartiles based on maternal complication rates; controls for confounding variables
  - 15 years later these trainees are now practicing obstetricians demonstrating the same complication rates as those of their training program up to 15 years later

Asch DA, et al. Evaluating medical training programs by the quality of care delivered by their alumni. JAMA. 2007;268:1049-1051.

Accountable Assessment for Care Quality & Supervision (AACQS)

Trainee Performance X Appropriate Supervision = Safe, Effective Pt-centered Care

Kogan J, Conforti, LN, Iobst WF, Holmboe ES. Acad Med 2015; 91-199-203. Reconceptualizing variable rater assessments as both an educational *and* patient care problem. Acad Med. 2014;89:721-727.

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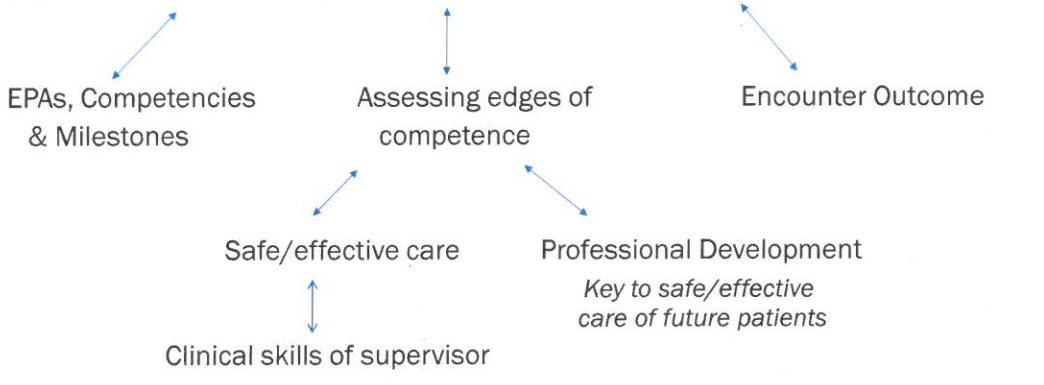
Accountable Assessment for Care Quality & Supervision (AACQS)

Trainee Performance X Appropriate Supervision = Safe, Effective Pt-centered Care[1]



1. Carraccio C, Englander R, Holmboe E, Kogan J. Driving care quality: Aligning trainee assessment & supervision through practical application of EPAs, competencies and milestones. Acad Med 2015; 91-199-203.

2. Kennedy TJT, Lingard L, Baker GR, et al. Clinical oversight: Conceptualizing the relationship between supervision and safety. JGIM. 2007:22:1080-1085.

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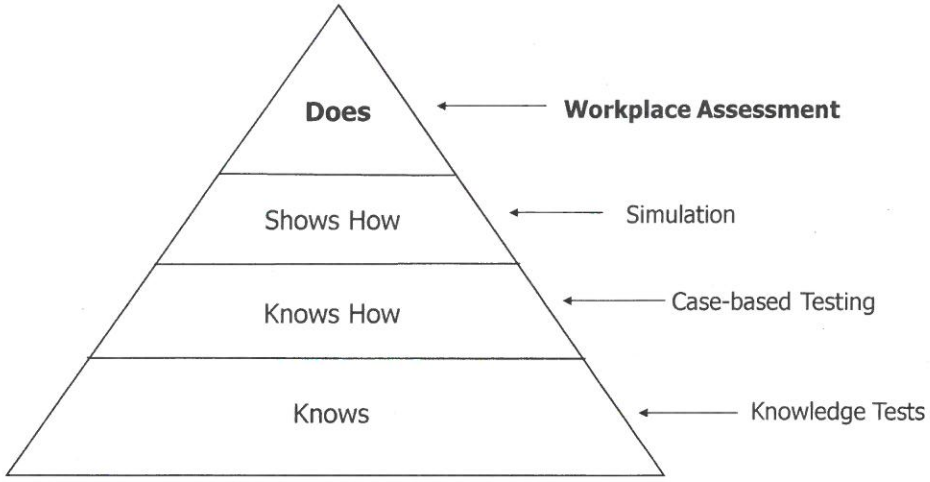
Time to Get to Does: Miller's Pyramid



Miller GE,. The assessment of clinical skills/ competence/ performance. Academic Medicine 1990;65:S63-S67.

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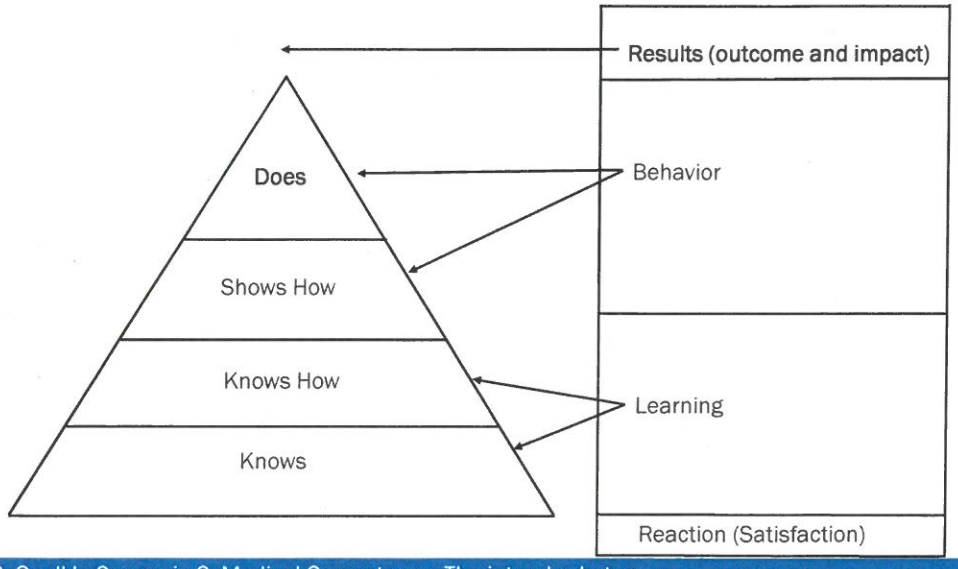
Getting Beyond Does: Kirkpatrick's Hierarchy



Ten Cate O, Snell L, Carraccio C. Medical Competence. The interplay between individual ability & the healthcare environment. Med Teach 2010: 32: 669-675.

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History Repeats Itself

- CBME was introduced late in the70's- early 80's but failed to take hold
- The challenge of assessment was the most likely cause of demise
- Assessment currently remains our greatest challenge (until we get into logistics of time variable training)

McGaghie WC, et al. Competency-based curriculum development in medical education: an introduction. Geneva: World Health Organization, 1978 (http://apps.who.int/iris/bitstream/10665/39703/ 1/WHO_PHP_68 .pdf).