What should we know about competency based residency training?

08-April, 2019
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Introduction

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DISCLOSURE STATEMENT

No conflicts of interest
Why CBME: Patient & System Needs

Frenk J. Health professionals for a new century: transforming education to strengthen health systems in an interdependent world. Lancet. 2010
Fundamental Characteristics of CBME

1. **Goal**: Graduate outcomes in the form of achievement of predefined desired competencies. These are aligned with the roles of the discipline.

2. **Competencies**: Derived from the needs of patients and organized into a coherent guiding framework.

3. **Time**: Is a resource for learning, not the basis of progression of competence.

4. **Teaching and learning**: Sequenced to facilitate an explicitly defined progression of ability in stages.

5. **Progress**: Learning is tailored to the learner's individual progression in some manner.

6. **Feedback**: Repetitive direct observations and focused feedback contribute to effective development of expertise.

7. **Assessment**: Is planned, systematic, systemic, and integrative.
Competency versus competence

**Competence**: a generic term that describes an individual’s overall ability to perform a specific task and refers to the knowledge and skills the individual needs to perform the particular task.

**Competency**: on the other hand refers to specific capabilities, such as leadership, collaboration, communication, and management capabilities demonstrated while performing a task.

Competence is considered a habit of lifelong learning rather than an achievement, reflecting the relationship between a person’s abilities and the task to be performed.
Competency versus competence

**Competence** is considered a habit of lifelong learning rather than an achievement, reflecting the relationship between a person’s abilities and the task to be performed.

**Competency**, involves the *collective application* of a person’s knowledge, skills, and attitudes and is aimed at standardizing how knowledge, skills, and abilities are combined in describing what aspects of performance are (considered) important in particular areas.

A trainee’s clinical reasoning may therefore appear to be competent in areas in which their knowledge base is well organized and accessible but may appear to be much less competent in unfamiliar contexts.
What’s a (training) Program?

- A Program:
  - is a group of related activities managed in a coordinated manner to obtain benefits and control that are **NOT** available from managing them individually.
  - The activities have a common goal or success "vision" under integrated management. These activities consist of people, technology, and processes aimed at implementing significant educational and clinical change.
What is a “System?”

• W.E. Deming:
  – “Two or more parts that work together to accomplish a shared aim.”

• Key concepts:
  – Working together, interactional and interdependent.
  – CBME as a system is not simply the sum or average of the curricular and assessment components, but the product of all the interactions among the components.
Assessment System

- This system has a *structure* to carry out assessment *processes* that produce an *outcome*

  - The assessment system must ultimately produce a valid entrustment judgment
Assessment as a System

• An assessment system is a group of people who work together on a regular basis to perform evaluation and provide feedback to a population of trainees over a defined period of time

• The assessment system must ultimately produce a valid entrustment judgment
Model For Programmatic Assessment
(With permission from CPM van der Vleuten)

- = learning task
○ = learning artifact
△ = single assessment data-point
△ = single certification data point for mastery tasks
– = learner reflection and planning
— = social interaction around reflection (supervision)
= learning task being an assessment task also

Time

Maastricht University
Shared Mental Model Challenge

* From TeamSTEPPS/AHRQ
Competencies

- Serve as framework and “scaffolding” for outcomes-based education

- Examples of existing frameworks
  - CanMEDS roles
  - ACGME/ABMS general competencies
  - UK Good Medical Practice

- Competencies are the “conduits” to competence, but have been hard to operationalize
Milestones

• By definition a milestone is a significant point in development.

• Milestones can describe the developmental trajectory of a competency

• Milestones should enable residents, fellows and the training program to better determine an individual’s trajectory of competency acquisition.
<table>
<thead>
<tr>
<th>Competency</th>
<th>Developmental Progression or Set of Milestones</th>
</tr>
</thead>
<tbody>
<tr>
<td>PC1. History (Appropriate for age and impairment)</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Level 1</th>
<th>Level 2</th>
<th>Level 3</th>
<th>Level 4</th>
<th>Level 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acquires a general medical history</td>
<td>Acquires a basic clinical history including medical, functional, and psychosocial elements</td>
<td>Acquires a comprehensive clinical history integrating medical, functional, and psychosocial elements</td>
<td>Efficiently acquires and presents a relevant history in a prioritized and hypothesis driven fashion across a wide spectrum of ages and impairments</td>
<td>Gathers and synthesizes information in a highly efficient manner</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Elicits subtleties and information that may not be readily volunteered by the patient</td>
<td></td>
</tr>
</tbody>
</table>
### U.S. IM Residency Example

**1. Gathers and synthesizes essential and accurate information to define each patient’s clinical problem(s). (PC1)**

<table>
<thead>
<tr>
<th>Critical Deficiencies</th>
<th>Milestone descriptors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Does not collect accurate historical data</td>
<td>Consistently performs an appropriate and thorough physical exam</td>
</tr>
<tr>
<td>Does not use physical exam to confirm history</td>
<td>Uses collected data to define a patient’s central clinical problem(s)</td>
</tr>
<tr>
<td>Relies exclusively on documentation of others to generate own database or differential diagnosis</td>
<td>Effectively uses history and physical examination skills to minimize the need for further diagnostic testing</td>
</tr>
<tr>
<td>Fails to recognize patient’s central clinical problems</td>
<td></td>
</tr>
<tr>
<td>Fails to recognize potentially life threatening problems</td>
<td></td>
</tr>
</tbody>
</table>

**Subcompetency**

- Acquires accurate histories from patients in an efficient, prioritized, and hypothesis-driven fashion
- Performs accurate physical exams that are targeted to the patient’s complaints
- Synthesizes data to generate a prioritized differential diagnosis and problem list
- Identifies subtle or unusual physical examination findings
- Efficiently utilizes all sources of secondary data to inform differential diagnosis
- Role models and teaches the effective use of history and physical examination skills to minimize the need for further diagnostic testing

**Milestone descriptors**

- | Critical Deficiencies | Milestone descriptors |
- | Does not collect accurate historical data | Consistently performs an appropriate and thorough physical exam |
- | Does not use physical exam to confirm history | Uses collected data to define a patient’s central clinical problem(s) |
- | Relies exclusively on documentation of others to generate own database or differential diagnosis | Effectively uses history and physical examination skills to minimize the need for further diagnostic testing |
- | Fails to recognize patient’s central clinical problems | |
- | Fails to recognize potentially life threatening problems | |

**Comments:**
## CanMEDS 2015 Milestones: Example

### MEDICAL EXPERT MILESTONES

1. Practise medicine within their defined scope of practice and expertise

1.1 Demonstrate a commitment to high-quality care of their patients
   - While engaging as a learner in the clinical environment, demonstrate a duty of care toward patients
   - Demonstrate compassion for patients
   - Under supervision, demonstrate commitment and accountability for patients in their care
   - Demonstrate a commitment to high-quality care of their patients
   - Role-model a commitment to high-quality patient care

1.2 Integrate the CanMEDS Intrinsic Roles into their practice of medicine
   - Describe the CanMEDS Roles and explain how they relate to the practice of medicine
   - Explain how the Intrinsic Roles need to be integrated in practice of their discipline to deliver optimal patient care
   - Integrate the CanMEDS Intrinsic Roles into their practice of medicine
   - Teach and assess the application of the CanMEDS Competency Framework to medical practice
Dreyfus & Dreyfus Development Model

MILESTONES and EPAs

Curriculum Assessment
Curriculum Assessment
Curriculum Assessment
Curriculum Assessment
Curriculum Assessment

Novice
Advanced
Beginner
Competent
Proficient
Expert/Master

Development is a non-linear phenomenon

Time, Practice, Experience

Dreyfus SE and Dreyfus HL. 1980
Carraccio CL et al. Acad Med 2008;83:761-7
Milestones as the Roadmap

Observations:

1. Journey not a straight line

2. More than one path (but not infinite)

3. “If you don’t know where you are going, any road will get you there”
Entrustable professional activity (EPA):  

A collection of tasks a trainee needs to be able to deal with in order to perform well in an essential part of his or her professional work domain.
Why do we need EPAs?

- EPAs can be used to make competencies meaningful, trainable and assessable for clinical teachers (Carraccio & Burke 2010).

- Competencies alone are abstract and need to be embedded in a relevant clinical context in order to train and assess them (Dath & Iobst 2010).
Understanding CBME & EPAs

<table>
<thead>
<tr>
<th>Competencies</th>
<th>EPAs</th>
</tr>
</thead>
<tbody>
<tr>
<td>person-descriptors</td>
<td>work-descriptors</td>
</tr>
<tr>
<td>knowledge, skills, attitudes, values</td>
<td>essential parts of professional practice</td>
</tr>
<tr>
<td>• content expertise</td>
<td>• discharge patients</td>
</tr>
<tr>
<td>• collaboration ability</td>
<td>• counsel patients</td>
</tr>
<tr>
<td>• communication ability</td>
<td>• design treatment plans</td>
</tr>
<tr>
<td>• management ability</td>
<td>• lead family meetings</td>
</tr>
<tr>
<td>• professional attitude</td>
<td>• perform paracenteses</td>
</tr>
<tr>
<td>• scholarly habits</td>
<td>• resuscitate if needed</td>
</tr>
</tbody>
</table>

With permission O. Ten Cate
Understanding CMBE & EPAs

A synthetic framework approach

Medical expert
Collaborator
Communicator
Manager
Health advocate
Scholar
Professional

Pangaro & ten Cate 2013

With permission O. Ten Cate
Understanding CMBE & EPAs

Combining the competency framework with EPAs

<table>
<thead>
<tr>
<th>Competency</th>
<th>EPA1</th>
<th>EPA2</th>
<th>EPA3</th>
<th>EPA4</th>
<th>EPA5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medical expert</td>
<td>++</td>
<td>++</td>
<td>+</td>
<td>++</td>
<td>++</td>
</tr>
<tr>
<td>Collaborator</td>
<td>+</td>
<td>++</td>
<td>+</td>
<td>++</td>
<td>+</td>
</tr>
<tr>
<td>Communicator</td>
<td>+</td>
<td>++</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Manager</td>
<td>+</td>
<td>+</td>
<td>++</td>
<td>++</td>
<td>+</td>
</tr>
<tr>
<td>Health advocate</td>
<td>+</td>
<td>+</td>
<td>++</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Scholar</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>++</td>
<td>+</td>
</tr>
<tr>
<td>Professional</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
</tbody>
</table>

Assessment based on EPAs

With permission O. Ten Cate
Terminologies

• Nested EPA’s
• Overarching EPA’s
Nested EPA’s

• These are several small sub-EPAs within a bigger overarching EPA.

• Usually tasks considered to be of high importance for daily practice (core business),

• high-risk or error-prone task (e.g. surgical procedure)

• Specific competencies (Scheele et al. 2008).
Overarching EPA’s

• The overarching EPA defines the total number of assessable activities

• Favors the holistic view.

• Synonymous with Milestones

• For entrustment in the overarching EPA, the resident has to show he is competent in the nested EPAs
EPAs and Entrustment

Overarching EPAs [rectangles]

Nested EPAs [Dots]
EPAs and Entrustment

 Entrustment over time
 [Milestones]
Inter-relationship Perspectives:

Competencies, Milestones and EPAs
### Better Education for Obstetrics & Gynaecology (BOEG)
Dutch National Competency Based Curriculum for Obstetrics & Gynaecology – Courtesy Fedde Scheele (NL)

<table>
<thead>
<tr>
<th>Benchmarks for attaining levels of competency (levels 1-5) throughout training</th>
<th>Benchmark I Year 2</th>
<th>Benchmark II Year 4</th>
<th>Benchmark III Year 6 (sub-specialization)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Uncomplicated Antenatal care</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Complicated Antenatal Care</td>
<td>3</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Intrapartum care</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Complicated Childbirth</td>
<td>3</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Basic High Risk Childbirth</td>
<td>3</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Uncomplicated Postpartum &amp; Newborn Care</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Complicated Postpartum &amp; Newborn Care</td>
<td>3</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Basic Reproductive Medicine</td>
<td>2</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Benign Outpatient Gynecology</td>
<td>3</td>
<td>4</td>
<td></td>
</tr>
</tbody>
</table>

Benchmarks as used here are synonymous with Milestones
## EPA/Theme: Uncomplicated Antenatal Care

<table>
<thead>
<tr>
<th><strong>Diagnosis and advice</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Providing preconception advice.</td>
<td>• Counselling about prenatal diagnostic testing, pregnancy</td>
</tr>
<tr>
<td>• Counselling about prenatal diagnostic testing, pregnancy complications,</td>
<td>complications, intrapartum analgesia, postpartum care and</td>
</tr>
<tr>
<td>intrapartum analgesia, postpartum care and breastfeeding.</td>
<td>breastfeeding.</td>
</tr>
<tr>
<td>• Discuss management of malpresentation, fetal growth restriction, polyhydramnios and</td>
<td>• Assess feasibility of induction of labour.</td>
</tr>
<tr>
<td>oligohydramnios and possible rupture of membranes.</td>
<td>• Able to conduct a basic obstetrical ultrasound (fetal</td>
</tr>
<tr>
<td>• Is familiar with electronic fetal monitoring and indications for its use.</td>
<td>biometry, umbilical cord pulsatility index, fetal screening</td>
</tr>
<tr>
<td>• Assess feasibility of induction of labour.</td>
<td>for most common anomalies with the exception of NT, detailed</td>
</tr>
<tr>
<td></td>
<td>anatomical ultrasound and advanced screening for congenital</td>
</tr>
<tr>
<td></td>
<td>anomalies.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Treatment requiring specific skills</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Able to conduct a basic obstetrical ultrasound (fetal biometry, umbilical cord</td>
<td>• Obstetrical Counselling.</td>
</tr>
<tr>
<td>pulsatility index, fetal screening for most common anomalies with the exception of</td>
<td>• Modifies obstetrical care protocols based on the current</td>
</tr>
<tr>
<td>NT, detailed anatomical ultrasound and advanced screening for congenital anomalies.</td>
<td>literature.</td>
</tr>
<tr>
<td></td>
<td>• Knowledge of teratology.</td>
</tr>
<tr>
<td></td>
<td>• Applies EBM in the practice.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Communicator</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Collaboration with primary care healthcare providers.</td>
<td>• Participates in the obstetrical care system.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Scholar</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Is compliant with WGBO (Dutch Medical Treatment Contracts Act).</td>
<td>• Initiates appropriate maternity care interventions.</td>
</tr>
<tr>
<td>• Prevention by informing.</td>
<td>• Prevention by informing.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Manager</strong></th>
<th></th>
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</thead>
<tbody>
<tr>
<td>• Constructive participation in integrated obstetrical care.</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Health Advocate</strong></th>
<th></th>
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<tbody>
<tr>
<td>• Constructive participation in integrated obstetrical care.</td>
<td>• Constructive participation in integrated obstetrical care.</td>
</tr>
</tbody>
</table>
Competencies, Milestones and EPAs
Another View of Inter-relationship

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Competencies</th>
<th>Milestones</th>
<th>EPAs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Granularity</td>
<td>Low</td>
<td>Moderate to High</td>
<td>Low to Moderate</td>
</tr>
<tr>
<td>Synthetic/Integrated</td>
<td>Moderate</td>
<td>Low to Moderate</td>
<td>High</td>
</tr>
<tr>
<td>Practicality (application)</td>
<td>Low</td>
<td>Moderate</td>
<td>High</td>
</tr>
<tr>
<td>Conceptual</td>
<td>High</td>
<td>Low</td>
<td>Low to Moderate</td>
</tr>
</tbody>
</table>
Challenges

• Finding a balance between holistic activities and the granularity of the training program.

• Narrowing down the activities of a discipline to independent professional activities without losing the holistic view of the profession.

• When is a trainee competent (indicated on an EPA)
The Reality of CBME, Milestones and EPAs

- There are no simple or singular “solutions”
- All interventions represent “partial solutions”
  - This is not a bad thing...
  - but rather the reality of working in highly complex systems such as healthcare and medical education
- The goal is ongoing, iterative improvement
  - Competencies, milestones and EPAs can help

George Box: “All models are wrong, some are useful”
Acknowledgements

• Eric Holmboe, ACGME, USA

• Shelley Ross, University of Alberta, Canada
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