



## 19 Innovations, Integration and Implementation Issues in Competency-Based Education in Postgraduate Medical Education

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MÉDECINS DE FAMILLE  
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## Executive Summary

A 2009 report from the US, *Emerging Physicians: A Call for Reform of Medical School Residency* and a subsequent report from Canada, the “*Future of Medical Education in Canada – MD Education*” found that key areas for reform include: standardizing outcomes and making training more unique to the individual, integrating learned knowledge and clinical skills in practice based setting, encouraging professional identity growth and fostering innovation.<sup>1-2</sup>

The purpose of this paper is to report on the practice, innovations and integration of competency-based education in the postgraduate medical training context, based on findings from a systematic review of the literature and interviews with key informants. Coordinated by medical and education experts at the Postgraduate Medical Education Office at the University of Toronto, in collaboration with a multidisciplinary team of researchers at the Wilson Centre, this paper summarizes the evidence of competency-based medical education by identifying key issues arising from the literature and a collection of case studies of programs that have developed or implemented competency-based education for the postgraduate medicine context. The literature and case studies point to key lessons that should be considered when moving forward to improve the postgraduate medical education curriculum through the development or enhancement of a competency-based approach to PGME.

The key lessons are:

1. Competency-based postgraduate medical education *is* worth doing because it clarifies *what* is important and makes performance expectations more explicit in PGME. It is unlikely that faster completion of PGME will be gained through the increased use or implementation of competency-based approaches in residency education. It is, however, likely that, with the additional focusing of learning, teaching and assessment through competency-based curriculum, it will be easier to overcome the current challenges to meet the training requirements.
2. Competency-based approaches illustrate the need for enhanced assessment practices and tools (e.g., a baseline entry clinical examination, integrated assessment using entrustable professional acts).<sup>a</sup>
3. PGME would benefit from a matrix educational model that further retains the professional maturation elements of the apprenticeship model while integrating a competency-based model that includes explicit expectations and assessment yet being cautious and avoiding the risk of deconstruction of practice into ever smaller units of competence or of focusing on only those competencies that are easy to describe and assess.

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<sup>a</sup> Entrustable Professional Activities (Ten Cate, 2007) are concrete critical clinical activities which often include multiple competencies. Through several observed activities, when the performance is satisfactory, the trainee is permitted to do the EPA on own or within the established limits or parameters (e.g., for a particular patient population, within a particular setting).

## Background

This paper reports on a multi method approach that scans the current and future issues related to the innovations, integration and implementation of competency-based education in postgraduate medical education in Canada. First, the paper provides a comprehensive literature review on competency-based education including its definition, history and evolution. Next, the paper explores several case studies about the implementation of competency-based postgraduate education in Canada and internationally. Key lessons emerged from the case studies about 'what worked' as well as hurdles and challenges to avoid or manage. Finally, the paper explores the implications of the literature and the case studies for competency-based education for postgraduate medicine in Canada.

## About PGME

Postgraduate medical education in Canada has traditionally been defined and assessed over a time period in which education takes places.<sup>3</sup> It has also been defined as 'time and process-based medical education'. Medical trainees were considered 'trained' following the completion of a defined set of hours that typically took place over a structured number of years. Completing hours and satisfying specific conference and rotation requirements were considered satisfactory to allow medical trainees to practice medicine.<sup>4</sup> Since the early 1990's, however, postgraduate medical education has been evolving from the 'time and process' based paradigm into an education process that results in outcomes that can be demonstrated in practice.

Some of the appeal of competency-based educational approaches is related both to its pedagogical properties and its potential to improve efficiency and reduce costs to health care and educational systems.<sup>2</sup> Some suggest that training programs may even be shortened with competency based approaches.<sup>2, 5, 6</sup>

Those critical of or resistant to the unfettered implementation of competency-based educational approaches point out the need to be careful about discarding time-based approaches which have served many and to be cautious about what we may be giving up.<sup>2, 7, 8</sup> Specific worries include the deconstruction of professional practice, the destabilization of education into customized educational programs, the chaos of individualized training timetables, and the impact on patient care with changes to resident's service delivery. Of particular concern is that an over emphasis on 'production' of residents and attention to 'outcomes' may result in the disappearance of residency education as a transformative journey between medical education and professional practice.<sup>2, 7</sup>

Competency-based medical education primarily focuses on outcomes. The goal of competency-based medical education in postgraduate education is that medical trainees will attain the needed knowledge, skills and attitudes required to practice as competent physicians.<sup>9</sup> Competency-based medical education does not focus on how the teacher should teach or how the medical trainee should learn; however, it defines how practical skills are acquired and applied throughout education. Competency-based education in postgraduate medical education does infer particular formats of curriculum and learning; however, it focuses on a clear set of desired outcomes. This clarity provides increased flexibility for both the trainee and the teacher and also provides the opportunity for medical trainees to be assessed during their education on ability in addition to knowledge.

## History of competency-based education in PGME

Competency-based education first appears in the medical literature in the early 1970s.<sup>10-12</sup> Educators and researchers at that time also grappled with the complex nature of clinical competence and how to both define and effectively evaluate clinical competence.

In the past two decades, there has been a remarkable shift in the structure and delivery of postgraduate medical education in Canada. The introduction of the Canadian Medical Education Directives (CanMEDS) framework in 1996 by the Royal College of Physicians and Surgeons of Canada (the Royal College) signaled the beginning of a rapid evolution in the language, structure and understanding of medical education in general. In addition, as the main accrediting and certifying body for specialty medical training in Canada, the Royal College was able to mandate the implementation of the framework throughout Canada's postgraduate training programs.<sup>1</sup>

Canada is not alone in the design and implementation of competency-based frameworks for medical education. Similar models are in use in the United States and the United Kingdom; and CanMEDS itself has been modified for use in other countries.<sup>13-15</sup>

### Defining Competency

The urge to shift healthcare education curriculum from its contemporary time-based approach to a competency-based model has been growing in recent years.<sup>16-18</sup> The literature on competency-based education has seen an increase since the beginning of the millennium. Although there is no one standard definition for competency-based education, there are common words that arise across the literature. Associated with the definition of competency-based education are common words such as abilities, outcomes, patient needs, quality and accountability.<sup>19-22, 18</sup> Dacre, 2004 adds that competence can be defined as something a 'doctor should be able to do,' referring to knowledge and skills. The knowledge that is gained as a result of competence should then be demonstrated through clinical practice.<sup>23</sup>

One of the first challenges facing competency-based medical education (CBME) is the language. A competency-based framework routinely includes the use of words like "competence", "competency" and "competent", each of which has a unique definition and specific application in the framework.

With the publication of the proposed definitions of CBME and related terms by the International CBME Collaborators in 2010, there is agreement that "competency" in a given domain is an observable ability that represents a complex integration of knowledge, skills and attitudes. The definitions presented by Frank et al. represent a synthesis of pre-existing definitions and common usages dating back more than 40 years. Specifically, the author's state:

*"Competency is an observable ability of a health professional, integrating multiple components such as knowledge, skills, values and attitudes. Since competencies are observable, they can be measured and assessed to assure their acquisition. Competencies can be assembled like building blocks to facilitate progressive development."*<sup>19</sup>

Competency-based education involves a dual learning process for the learner whereby the framework allows for a self-directed learner; however, it also limits authority of learner. Under the competency-based framework, the learner has more autonomy in how they learn competencies; however, they may have less authority in deciding what they learn.<sup>16</sup> The same questions are posed when defining how competencies should be taught and assessed. Defining 'what' is learned and 'how' it is learned is fundamental to defining competency-based education

and sets the framework for the curriculum design, implementation and delivery in postgraduate medical education.

How a medical trainee should demonstrate competence and how competence should be taught are current questions in postgraduate medical education. Some experts suggest that competence should be taught, and as a result learned, on a continuum whereby the resident acquires competence on a progression.<sup>18</sup> As each competency is acquired, the medical trainee would then move onto the next desired outcome. This would occur on a continuum in accordance with the length of program training. This notion could imply that a time-based model is still required to secure medical competence.

Demonstrating 'competence' in postgraduate medical education is evolving from the time-based structure composed of meeting a list of objectives to a knowledge-based assessment that is defined by abilities in practice, also known as competence. Taking Hodge's, 2010 metaphor of tea steeping, whereby the medical student (i.e., tea bag) is put into medical school (hot water) for a suggested amount of time, it is, and has always been, the belief that the outcome will be a competent practitioner. The whole notion of tea steeping is problematic, at best, for those who favor the new competency-based model; however, as Hodges points out, perhaps taking components of both the time-based and competency-based models is the best way to move forward, and that perhaps there are some competencies that require time to be attained. Further, by promoting components of Frank's, 2010 'progression of competence', we can continue to employ a time-based approach on a continuum.<sup>5</sup> Concerns abound that by removing the time-based requirement completely, we could potentially be letting go of critical factors that contribute to competent physicians and go hand-in-hand with maturation over time.<sup>2, 18</sup>

#### Historical Perspectives on Postgraduate Medical Education

Medical education, especially postgraduate medical education, has a relatively short history of structured training. It evolved through an apprenticeship model of intense one-to-one supervision and mentorship that concluded, at times, with the completion of a national exam or certification (e.g., Royal College, College of Family Physicians of Canada) or could conclude with the individual taking over the practice when deemed to be adequately prepared by the mentor/teacher. This format of training created an environment where one could become trained in a specialty due to convenience of location or familial connections rather than merit. Training could also be nearly endless, with trainees working with a mentor for years while awaiting his retirement (when the trainee would be deemed ready for independent practice). The experience of training was as diverse as the practices, locations and personalities of the physicians and surgeons offering the training.<sup>24-25</sup>

William Halsted developed the first published training program in the 1890s. The requirements were designed to address the weaknesses identified in the existing training model and included: merit-based acceptance, fixed training length, structured educational content and a mandatory year of supervised practice during the last year of training. The Halsted model of training was rapidly adopted by hospitals throughout the United States and Canada and key principles of this model can be seen in the structures of most contemporary postgraduate training programs.<sup>25</sup>

In contrast, undergraduate medical education took place within a university, and its structure and content of the curriculum was amenable to traditional testing methods for knowledge (e.g., multiple choice and short answer questions, bell-ringers) as well as evaluation of performance of discrete skills (e.g., clinical exams, oral examinations). This led to a set of accreditation and review structures within undergraduate medicine more in keeping with general undergraduate programs throughout the university with similar administrative structure and oversight.<sup>24, 26</sup>

Postgraduate medical education remains much more varied than undergraduate training. This likely reflects the fact that postgraduate residency education is complete with almost 70 specialty and subspecialty programs in Canada. The variability in residency education programs and experiences is also related to the diversity of clinical practice and the different skills required for competency in each specialty. The challenge for CanMEDS and other CBME programs is how to create a framework that provides a common language and agreement on core components of competent practice while providing the flexibility to allow for the articulation of specific and measurable behaviours that reflect competencies in a given specialty.

## From Inputs to Outputs

Traditional educational frameworks focused on inputs and were often based on the assumption that, with enough time and the proper exposure, a student would develop competence in a given domain.<sup>27</sup> Outcomes-based education (OBE) focuses mostly on the end product of the training or educational intervention and less on the processes within the educational system.<sup>16</sup> In an outcomes-based framework, we want to know that a grade 12 student is literate, not that they received 2,000 hours of instruction in reading and literacy. This is in keeping with the changing view of education first considered in World War II – where educational institutions were viewed like factories, and governments became interested in how to increase output.<sup>28</sup> The outcomes-based model resonated with the general societal interest in increased accountability and was adopted in elementary through postsecondary education.<sup>27</sup>

Competency-based education, which gained broad acceptance in the 1980s, is an off-shoot of the earlier outcomes-based framework. OBE required a structural shift in conceptualizing evaluation of performance where the indicator of a successful program was the performance of the learners. An outcomes-based program also leads to a learner-centred approach – the institution, administration and instructors are focused on ensuring that a given learner achieves the required performance.<sup>27</sup> In keeping with an outcomes focus, competency-based frameworks define their outcomes as “competencies” – the successful learner will successfully demonstrate a required number and variety of competencies.

A major criticism of OBE (and CBME) has been the focus on measurable outcomes. Without careful consideration, an outcomes-based evaluation framework will collect quantitative measures of performance (e.g. knowledge scores, numbers of procedures) which are more straightforward to collect than the more complex or qualitative measures (e.g. impact of patient education, effective quantitative measures). The evaluation of trainees in competency-based postgraduate education presents a significant challenge given that competencies are, by definition, the integration of knowledge, skills and attitudes. They are complex and not amenable to many of the familiar evaluation tools used in postgraduate education.<sup>26</sup>

## Competency-based Education and Training – Medicine and Beyond

Competency-based education is not a new concept in education. There is a large and well-developed field of study looking at competency-based education and training in vocational curricula and trade schools.<sup>27, 30</sup> The trades have had a longer history of well articulated training objectives, standard examinations and national certification. Many trades involve a well-articulated domain of practice (e.g., plumbing, electrician) that can be mapped onto a competency-based framework of observable behaviours.

The implementation of the first generation of CBME frameworks (CanMEDS, Accreditation Council for Graduate Medical Education-ACGME) in 1996 led to lengthy lists of objectives and competencies to be achieved in training, often without an articulated plan of how this level of competence was to be achieved. The opinions on this curricular innovation have been quite

diverse with some enthusiasts saying competency-based postgraduate training will allow for flexible training length and recognition of complex skills,<sup>14,31</sup> and others pointing to limits and problems with this approach such as difficulty creating meaningful evaluation tools<sup>32, 33</sup>, increased administrative burden and a focus on minimal acceptable standards.<sup>34, 18, 35</sup> The most common topics of consideration (or criticism) are the challenges of defining the competencies and subsequently developing suitable evaluation tools.

It is clear that the implementation of a competency-based model will require a great deal of time and work including, for example, the development of a new assessment framework, the administrative framework required to implement the assessment tools, the learner-centred approach requiring close review and personalized oversight of each trainee. The demand for competency-based education arose from the public's wish for greater accountability, as clearly outlined in the CanMEDS framework, but it also arises from an assumption of increased efficiency in CBME programs and is driven by an overall societal interest in maximizing outputs.

### Implementation of Competency-based Education in PGME

The literature inventories the requisite changes to residency programs that need to be considered when implementing competency-based education including development of an inventory of learning outcomes that capture the breadth, depth of safe effective practice, the application of skills and knowledge in variable practice contexts, and maturation of proficiency.<sup>32</sup> Harden (2007) talks about the variable nature of the implementation of competency-based education as ostriches who are those educators or programs that have their heads in the sand about the need for or requirement to move forward towards implementation; the peacocks who like to impress and show they are moving forward without materially integrating or implementing and the beavers who are industrious builders of solid competency-based curriculum.<sup>33</sup> The nine dimensions that Harden uses to determine the implementation 'score' (and to determine who are ostriches, peacocks and beavers) include: learning outcomes, communication with staff and students, educational strategies, course content, student progression, assessment, educational environment and student selection.<sup>36</sup>

The literature on implementation of competency-based education particularly comments on the features of assessment systems such as continuous, criterion-based, developmental, work based<sup>33-34</sup> There is also an expectation that assessment systems are monitored for quality and that important decisions (e.g. promotion from year to year, readiness for certification examinations) are determined based on input by multiple evaluators using a multiple measures or a variety of tools In response to the perception and struggles that have been articulated with measuring each of the competencies, there is an alternative approach being offered where the assessment would focus on entrustable professional activities (EPAs).<sup>39, 8</sup> EPAs are concrete, critical (i.e., important) clinical activities which often include multiple competencies. The EPA approach describes that with specific observation of the activities, the faculty would sign off when the performance is satisfactory and would indicate when the trainee is permitted to do the EPA alone or within established limits or parameters (e.g., a particular patient population, a certain clinical setting).

Scheele (2008), in describing the process of introducing CanMEDs competency-based medical education to the Netherlands, outlines a three-step curriculum design of first structuring the content, second, choosing the information-rich activities which would function as EPAs and finally using a range of assessment tools to match EPAs to CanMEDS roles.<sup>40</sup>



## Methodology

This comprehensive review on the innovations, integration and implementation issues in competency-based training in postgraduate medical education is one of 24 papers commissioned by the environmental scan for the Future of Medical Education in Canada Postgraduate (FMEC PG) Project to inform deliberations on the current practice and future plans for postgraduate medical education in Canada. The team of researchers for this paper was composed of medical physicians as well as an education consultant with expertise in medical education curriculum design, implementation and delivery. This paper used multiple methods including a comprehensive literature review, focused interviews of individuals knowledgeable about cases and experiments in competency-based medical or postgraduate medical education, thematic and discourse analysis of the interviews; and, finally, a synthesis of analysis through consensus and consultation with key informants.

The research questions utilized in various methods to focus postgraduate medical education were as follows:

- What is competency-based education?
- What is the history and rationale driving the interest or movement in competency-based education?
- Does the theory work? Are there working examples of competency-based education in postgraduate medical? What can we learn from these examples? What problems does competency-based education fix?
- Is a competency-based education paradigm ‘the’ way to move forward in postgraduate medical education in Canada, or is a combined approach that integrates both time and competencies on a continuum basis the method that will foster the best results?

## Literature Review

A comprehensive literature search for articles was performed on PubMed and Scholars Portal dating from 2000 to the present using preset filters that identify papers classified as reviews. In order to identify systematic reviews in the various databases, two strategies were employed:

- The use of a quality filter and/or the use of the *publication type* limit. In the case where a database included a limit for either systematic review, both the limit and the filter were used, and
- Once the terms specific to the search were entered into the database a quality filter was run to search for all articles in the database that were classified as a systematic review.

In brief, the keywords used to identify articles that examined the innovations and implementation of competency-based education were: ‘competency-based’, or ‘outcomes-based’, with ‘education’, and ‘postgraduate trainees’, or ‘graduate medical trainees’, and ‘innovation’, ‘implementation’.

In addition, citations from the literature searches were reviewed and categorized into the pre-defined subsections. Finally, the reference lists of relevant articles were scanned to identify any additional relevant eligible articles.

All French- and English-language articles were considered eligible if they met the following criteria:

- *Type of study design*: systematic reviews,
- *Type of subjects*: postgraduate trainees, graduate medical trainers or medical residents,
- *Type of outcome*: design, implementation or innovations related to competency-based, and
- *Topic of study*: education in a postgraduate (graduate) education setting.

Further, for publications examining competency-based education design and implementation, we consulted grey literature from national and international medical organizations and higher education institutions.

### Focused interviews

In addition to the literature review, six semi-structured interviews were performed. While all informants were asked a set of standard questions (Appendix 3), the interview structure was flexible, allowing new questions to be asked by the interviewer as a result of the interviewee's responses.

Key informants were chosen through a non-probability sampling (convenience sample) method. Informants comprised physicians and education experts from various constituencies who had experience in designing, implementing and/or managing a competency-based medical education program, project and/or curriculum in undergraduate or postgraduate medical education. All informants provided the research team with pre-approved signed ethics-approved consent to be digitally-recorded during the interview process. Audio files were transcribed to word documents, which were sent to individual informants for editing. Following approval from the interviewee of the transcript document, all information pertaining to names and educational institutions were removed.

### Linguistic discourse analysis of interviews

To assist with the analysis of the qualitative interviews, a linguistic discourse analysis methodology was implemented to categorize common patterns. Hodges et al., 2008 defines discourse analysis as the study and analysis of the uses of language. Given that one term can be used in many different ways, Hodges et al, 2008 have simplified the approach by determining the orientation to discourse, sources of data and analysis (Appendix 4). Regardless of approach, a vast array of data sources is available to the discourse analyst, including transcripts from interviews, focus groups, samples of conversations, published literature, media, and web-based materials.<sup>41</sup>

Given the semi-structured nature of the questions, determining thematic outcomes of each interview was done according to the date in which the informant was interviewed (earliest to latest) and the order on which the theme appeared. The coding process involved grouping themes by color and providing a score according to the frequency of topics that emerged from the standard questions as well as from general discussion between the interviewer and interviewee.

A discourse analysis was subsequently implemented to analyze patterns of speech around particular themes that emerged from the thematic analysis. Speech, tone and emphases of the identified themes were analyzed by listening to audio recordings. This step of the analysis process was both intuitive and reflective, and counting the frequency of common words and instances where influence in the conversation was evident provided further insight for the synthesis of the findings.

## Synthesis of literature, thematic analysis and discourse analysis

Given the vast number of peer-reviewed articles retrieved and the depth of thematic discourse that emerged from the interviews, synthesizing information involved dividing the subject of competency-based education into subsections. Tables were developed to present the common themes determined from interviews and following literature was assessed to provide further evidence of our findings.

## Consultation with interviewees and other key informants

Consultation with interviewees and other key informants was employed following the development of the first draft of the paper. Sharing the draft paper with the six interviewees provided an opportunity for additional feedback on how the described cases related to the literature and how experts could further inform the findings. Analysis of cases of competency-based postgraduate medical education

This section explores the 6 interviews conducted for this paper, each representing five competency-based curriculums in postgraduate medical education. They are described in ways including: summary overview, linguistically, thematically and narratively.

Of the five curricula described by key informants, three are fully implemented. The other two curriculums are designed and the implementation will follow over the next couple of years. Table 1 provides an overview of the programs while providing details about the implementation process of competency-based curriculum. Table 1 further illustrates that all programs have implemented extensive curricular reforms to curriculum design, teaching, assessment and promotion. The programs represented by these case studies have moved substantially beyond the 'peacock' level of implementation where there is much talk about implementation to the 'beaver' level of implementation where all, or almost all aspects of the program are actually developed and implemented (i.e., competency-based teaching, assessments, progress and promotions).<sup>36</sup>

**Table 1: Overview of Interviews – 6 interviews about 5 cases**

<b>Specialty(ies)</b>	<b>Country</b>	<b>Implementation status</b>	<b>Lessons From Development</b>	<b>Top 3 Success or Challenges</b>	<b>Approach to CBPGME<sup>b</sup></b>
1. Psychiatry	Australia	2013 -planned start <ul style="list-style-type: none"> <li>• Communicate with all players</li> </ul>	<ul style="list-style-type: none"> <li>• Assessing knowledge is a foundational competency</li> <li>• Communicate with all parties</li> <li>• Rounded competence comes from time</li> </ul>	<ul style="list-style-type: none"> <li>• Inclusion of more thoughtful assessment practices</li> <li>• Organization change must be thoughtful and reflective</li> </ul>	<ul style="list-style-type: none"> <li>• Using CanMEDS Framework</li> <li>• Use champions in your institution</li> </ul>
2. Multiple specialties (e.g., medical, surgical, pathology, diagnostic radiology, pediatrics)	USA	<ul style="list-style-type: none"> <li>• Implemented 7 years</li> <li>• Use national (US) competency framework and local innovations</li> </ul>	<ul style="list-style-type: none"> <li>• Providing central support</li> <li>• Recognizing GME-Governance</li> </ul>	<ul style="list-style-type: none"> <li>• OSCE for all entering residents as baseline assessment</li> <li>• Expert Leadership</li> <li>• Assessment experience</li> </ul>	<ul style="list-style-type: none"> <li>• Do not reinvent the wheel</li> <li>• Seek out experts in the field external to institution if needed</li> <li>• Collaboration</li> </ul>
3. Family Medicine Program (i.e., with > distributed 10 training sites)	Canada	<ul style="list-style-type: none"> <li>• Implemented 3 years</li> <li>• Locally developed framework and integration of national competency framework</li> </ul>	<ul style="list-style-type: none"> <li>• 3 tiered framework</li> <li>• developed consensus on areas in need of development</li> <li>• Early communication with program committees and residents</li> <li>• Current curriculum must be reviewed to assess upcoming changes needed</li> </ul>	<ul style="list-style-type: none"> <li>• Having the right people in place</li> <li>• Developing objectives on evaluation for CBPGME</li> <li>• Choosing the best model takes time and thought</li> </ul>	<ul style="list-style-type: none"> <li>• Expert working group</li> <li>• Communicate</li> <li>• Chair support of working group very important</li> </ul>
4. Family Medicine Site	Canada	<ul style="list-style-type: none"> <li>• In development</li> </ul>	<ul style="list-style-type: none"> <li>• Faculty Development</li> <li>• Avoid Reductionist approach</li> <li>• Finding CBPGME model that fits current site structure</li> </ul>	<ul style="list-style-type: none"> <li>• Being prepared to handle resistance</li> <li>• Creating electives to meet objectives in curriculum is challenging</li> <li>• Maintaining control of change and resistance</li> </ul>	<ul style="list-style-type: none"> <li>• Need mandated structure for CBPGME to work</li> <li>• College can act as a driver to mandate</li> <li>• Re-thinking how to incrementally change curriculum (i.e., building on what is working)</li> </ul>

<sup>b</sup> CBPGME: Competency-Based Postgraduate Medical Education

<b>Specialty(ies)</b>	<b>Country</b>	<b>Implementation status</b>	<b>Lessons From Development</b>	<b>Top 3 Success or Challenges</b>	<b>Approach to CBPGME</b>
5A. Orthopaedic Surgery <i>(interview 1 for case 5)</i>	Canada	<ul style="list-style-type: none"> <li>• Led day to day for competency-based program</li> <li>• Implemented 2 years</li> <li>• Locally developed framework</li> </ul>	<ul style="list-style-type: none"> <li>• Committed faculty</li> <li>• Administration support</li> <li>• Financial support from external resources</li> <li>• Having surgical skills lab</li> </ul>	<ul style="list-style-type: none"> <li>• Scheduling a module that will take less than a month is challenging in surgery</li> <li>• Planning in advance</li> <li>• ALL residents and faculty have benefitted from explicitness of CBC curriculum and assessments</li> </ul>	<ul style="list-style-type: none"> <li>• Plan well in advance</li> <li>• Communicate + +</li> <li>• Learn from mistakes that others have made – talk to people</li> <li>• Organized training into 21 modules</li> </ul>
5B. Orthopaedic Surgery <i>(interview 2 for case 5)</i>	Canada	<ul style="list-style-type: none"> <li>• Initiated &amp; oversight</li> <li>• Implemented 2 years</li> <li>• Locally developed framework</li> <li>• Concurrently running small number in competency-based and rest in regular program</li> </ul>	<ul style="list-style-type: none"> <li>• Engaging Faculty (preparing materials, assessment tools)</li> <li>• Having solid leaders who are interested in CBPGME</li> <li>• Service requirements, organizational (e.g., scheduling complexities) are hurdles to fully competency-based system that has no timing 'rules' (e.g., rotations at least a month. IF need more on some off service rotations, may not be continuous time period)</li> </ul>	<ul style="list-style-type: none"> <li>• Funding is important to iron out for smooth transition</li> <li>• Engaging regular stream residents to new curriculum</li> <li>• Comprehensive assessment program – formative &amp; summative</li> </ul>	<ul style="list-style-type: none"> <li>• Needs to be derived from a interest standpoint vs. a requirement</li> <li>• Resist going back to time-based mentality</li> <li>• Start small (i.e., resident numbers) and build slowly.</li> <li>• Target is only for up to 1/3 of trainees being in fully competency-based</li> </ul>

The linguistic analysis in Table 2 points to the top five words that preoccupied the interviewees as they answered the same group of questions.

**Table 2- Top 5 Words arising in Case Studies on Implementation of Competency-based Curriculum in PGME**

Word	Associated Words	Total	Mean per Interview	Rationale
1. Time	timing, times	108	21	<b>Time</b> it takes; CBE takes to develop, implement; <b>timing</b> of logistics, infrastructure, resources; number of <b>times</b> communication was sent out; changing <b>times</b> in postgraduate medical education; <b>time</b> for a change in curriculum; <b>time</b> -based instruction; appropriate <b>time</b> for completion
2. Assess	assessing, assessment	85	17	<b>Assessing</b> competencies; Work-based <b>assessment</b> ; knowledge <b>assessment</b> ; how is <b>assessment</b> done?; who does <b>assessment</b> ?; when should we <b>assess</b> ?
3. Support	supporting, supported	35	7	Need <b>support</b> - from faculty, staff; financial <b>support</b> ; <b>supportive</b> committee; <b>supportive</b> administration and leaders; <b>supportive</b> residents; <b>supporting</b> change;
4. Interest	interesting, interested, interests	25	5	Requires <b>interested</b> people; learners express <b>interest</b> ; <b>interesting</b> differences in curriculum
5. Funding	funded, fund, costly	22	4.5	<b>Funds</b> (money) is a crucial requirement; <b>costly</b> to development and implement; programs in existence are <b>funded</b> by regulatory body; <b>funds</b> for infrastructure; <b>funds</b> for expansion of curriculum; <b>funding</b> required over <b>time</b> period

Table 3 below provides an overview of the most common themes that emerged from the interviews about the implementation of the competency-based education.

**Table 3- Analysis of Case Studies about Implementation of Competency-based Curriculum in PGME**

Implementation Lessons	Details
Rewards outweigh the challenges	All informants interviewed collectively felt that the rewards from a competency-based curriculum strongly outweighed the challenges and obstacles they encountered as innovation leads.
Time and effort considerable to develop competency-based curriculum	All informants stressed the notion of time and the length of time that it takes to implement a competency-based curriculum. While length of time was evident as a challenge, it was useful to learn that length of time is common to all implementation projects concerning competency-based education
Supportive leadership, faculty, and residents central to successful implementation	A key success factor mentioned by all informants was the necessity of having support from the implementation team, the faculty who will be learning and developing the tools, and the administration.
Communication is a very important prerequisite for successful implementation	While support is necessary, it is critical to have open and frequent communication to ensure that all players are aware of the latest changes, additions and innovations. Without constant and clear communication, the opportunity for failure in regard to support and implementation heightens significantly.
Program Evaluation – and nimbleness in making ‘on the fly’ improvements	All informants agreed that evaluation is a key component to a competency-based medical education framework. Evaluation of current curriculum is primarily necessary, and evaluation measures must be employed at every stage of design and implementation.

## Issues arising from innovations, integration and implementation of competency-based education

This section explores the issues arising from the literature and five case studies about where and how to implement competency-based education.

### From chance to purposeful education

*For us, students, and residents for that matter, too, will say they can go through their whole programme and not be observed. They come out [of the clinic room] and they present but they're not observed. There's no other physician in the room. So, partly we were trying to address that need but also at the same time recognise that assessment is more than just me watching you and telling you what I think about it."*

*As the competency-based education program developed, it gave me a chance to focus teaching away from learning by chance and to better define, both for me as a teacher and never mind all the societal things, the societal expectations, what we want at the end of a two-year program for a family doctor. I think it will improve my teaching and I think it will improve everybody's teaching.*

The interviewees commented that a key benefit of the competency-based educational approach is that it enabled programs to be more thoughtful and purposeful with their educational efforts. For example, a given clinic rotation or visit, with clarity about what an individual resident has mastered, could ensure that teaching and assessment time in that clinic is spent on developing skills that resident has not learned or adequately mastered. More importantly, a competency-based approach might help in the timely identification of deficiencies so learners and faculty become aware before the gaps become bigger problems.

### Buy in and support a must for success

*So, I think it's really important to have a solid group of people who can help do the work, so I think that's extremely important. I think it's also important to have people buy into the notion that you have to change a curriculum.*

Common themes and words that emerged in the case studies were support, interest and funding. While competency-based education has received increased interest by postgraduate medical programs in recent years, the curriculum implementation continues to be a struggle with regard to securing support and funding from large governmental bodies. According to the case studies, support was cited numerous times in regard to human resources, infrastructure, faculty and residents, while funding was cited as being a potential obstacle in future years, given the depth of resources required to implement an 'individualized competency-based training program' to a large number of residents.

### Interplay between time, competency-based curriculum, and service

*There is appeal built-in but I think there were a lot of people saying that we are not ready I don't think to go to a true competency model where time doesn't factor in so we're not just signing off on trainees who have achieved all the competencies.*

*There's been a strong argument that time is also an important factor in gaining more general experience and more rounded competence rather than competency so I think time is still built-in so we have to stick to a five-year training program.*

*There's also a pragmatic reason and that is that rotations or runs are generally run on three or six-month rotations. For our services, if someone achieves all their competencies in 2-½ years instead of 5, we wanted to avoid the rush to fill open job postings (i.e., before the rounded competence is gained).*

Although the literature on competency-based medical education summarizes a framework that moves away from the traditional time-based model, it was interesting to note the frequency of the word 'time' through the interviews with the six informants. While 'time' was used in varying contexts, as summarized in Table 2, the very presence of the word 'time' further suggests that time should be considered when designing a competency-based curriculum in postgraduate medical education.

As with all components of change, time is necessary to allow for natural and seamless transitions. These transitions apply to designing and implementing a competency-based curriculum as well as they do to developing a competent physician. The case studies suggest that, even though time is required to develop a competency-based curriculum, the element of time-based approaches is also worth keeping in the model.

Training may not (will likely not) get shorter with competency-based curriculum

*I know what way everybody is thinking or the way they're writing. They can't imagine yet that competency-based learning is ready for a time base, especially in Family Medicine, because our residency is so short. It's only two years and there's so much resistance out there that no matter how you structure any kind of curriculum, the fact that it's only two years, if you ever want to propose something that someone could reach competencies in less than two years, you're considered out of your mind.*

While still theoretically possible, several interviewees, from both Royal College and family medicine programs expressed their view that it was unlikely that CBME would 'shorten' a resident's time in the residency program for many or most trainees.

Avoiding the reductionism 'trap'

*"So, the real question or puzzle that I have is whether some of the ACGME competencies for us, CanMEDS competencies, are overly detailed, given the reality that we have set needs plus different specialties and for us to do assessment at too granular a level becomes crazy, maybe".*

An additional struggle that became evident through the analysis of the case studies was the problems that arise with program directors and curriculum designers trying to measure competencies for the purposes of assessments. As one of the interviewees points out, "they (competencies) are not amenable to measurement at this (ACGME, CanMEDS) level. It's just too broad. So, to get down to a measurable level you have to get quite detailed." The result of this is ending up with similar assessment measurements that sample a variety of different settings, all of which may not be appropriate.

Over and over again, the interviewees noted that, when developing and implementing the curriculum for a competency-based program, it is critical to note that "assessment is core" and is not something that you "add on as a token at the end." The balance to be struck is to have enough detail for reliable assessment without reducing competence into an inventory of longer and longer lists with increasing clarity that deconstruct professional practice to a catalogue of checklist.



## Assessment in service of competency-based curriculum

It was interesting to take note of the word ‘assessment’ and the context in which is used by the six interviewees. Often times when the word ‘assessment’ arises in the competency-based education context, it refers to a method used in testing. As Carraccio & Englander, 2004 noted, it is necessary to have a variety of assessment tools in order to evaluate competence.<sup>42</sup> Although assessment is not considered to be the only tool of evaluation in competency-based postgraduate medical education,<sup>32</sup> it is a critical component of evaluating performance.<sup>21</sup> The frequencies of the word ‘assessment’ in the case studies further informed the analysis of its importance and requirement in competency-based postgraduate medical education. Often associated with the notion of assessment is measurement.

*“We did a little experiment in the undergraduate programme over the past few years to try to think through what a truly competency-based curriculum might look like and what we would have to do to support that. One of the things that came out of it was this recognition that assessment is absolutely core”.*

## Competency-based education worth doing

*That’s the \$64 million question. To be honest with you, worthwhile? It’s going to be worthwhile (i.e., competency-based education) only if it makes a difference in the process of education or the outcome. I don’t think that what we’re producing now are incompetent physicians and all of a sudden this new framework is going to produce radically different doctors. I think it will enable us to be more thoughtful, potentially more efficient in delivering education so that we don’t waste time on skills that people already have.*

When asked if the competency-based curriculum was worthwhile, the collective short answer was yes. While all informants had spoken of both common and varying challenges that accompanied their particular experiences, when asked directly about the value of competency-based curriculum, each of the interviewees offered their unqualified enthusiasm for a competency-based approach. Several interviewees noted that competency-based education was viewed by their community as a positive new direction.

## **Implications and directions for competency-based postgraduate medical education in Canada**

There is much interest in competency-based postgraduate medical education in Canada. The accreditation standards, with their mandatory requirements since 2006 for teaching and assessment of CanMEDS and since 2009 for CanMEDS FM, have created the need for significant changes to implement new approaches to the organization and delivery of residency training.

A 2009 report from the US, *Emerging Physicians: A Call for Reform of Medical School Residency* and a subsequent report from Canada, the “*Future of Medical Education in Canada – MD Education*”<sup>1</sup> found that key areas for reform include: standardizing outcomes and making training more unique to the individual, integrating learned knowledge and clinical skills in practice based setting, encouraging professional identity growth and fostering innovation.<sup>2</sup>

The case studies point to some interesting observations, innovations and lessons for others to consider. Key lessons, implications and directions for competency-based postgraduate medical education in Canada are:

1. Competency-based postgraduate medical education *is* worth doing because it clarifies *what* is important and makes performance expectations more explicit in PGME. It is unlikely that faster completion of PGME will be gained through the increased use or implementation of competency-based approaches in residency education. It is, however, likely that, with the additional focusing of learning, teaching and assessment through competency-based curriculum, it will be easier to overcome the current challenges to meet the training requirements.
2. Competency-based approaches illustrate the need for enhanced assessment practices and tools (e.g., a baseline entry clinical examination, integrated assessment using entrustable professional acts).<sup>c</sup>
3. PGME would benefit from a matrix educational model that further retains the professional maturation elements of the apprenticeship model while integrating a competency-based model that includes explicit expectations and assessment yet being cautious and avoiding the risk of deconstruction of practice into ever smaller units of competence or of focusing on only those competencies that are easy to describe and assess.

## Conclusions

The shift that has resulted from the adoption of CanMEDS Roles framework is having an increasingly significant affect on the current postgraduate medical education curriculum. Physicians, educators, and policy makers are making an increased effort to acknowledge competencies in postgraduate medical education by implementing various competency-based components into their educational programs.

Does maintaining, in the context education standards, mean changing the current postgraduate medical education curriculum to an exclusively competency-based approach, or does it mean integrating certain components within a competency-based postgraduate education curriculum? While the literature and the cases reported in this research paper cannot confirm that competency-based education is ‘the answer’ to transforming postgraduate medical education, they both suggest that features of a competency-based curriculum are beneficial and are seen as adding value to the training of residents in postgraduate medical education.

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<sup>c</sup> Entrustable Professional Activities (Ten Cate, 2007) are concrete critical clinical activities which often include multiple competencies. Through several observed activities, when the performance is satisfactory, the trainee is permitted to do the EPA on own or within the established limits or parameters (e.g., for a particular patient population, within a particular setting).

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## Appendix 1: About the Authors



**Susan Glover Takahashi, MA (Ed), PhD**

Dr. Glover Takahashi has both a Masters and a Doctorate degree in Education – with a focus on curriculum planning and performance assessment. She is the Director of Education & Research in the Postgraduate Medical Education office at the University of Toronto providing support and oversight to curriculum development and program accreditation for over 70 residency programs. She is an Assistant Professor in the Department of Family and Community Medicine and is also cross-appointed as an Associate Professor in the Dalla Lana School of Public Health, the School of Graduate Studies and the Department of Physical Therapy

Her areas of research and practice include studying the facets of competence in health and medical professionals; designing curriculum programs and systems to support competence; competency assessment; online learning and program evaluation.

In addition to being the lead author for the paper about competency-based education in Postgraduate Medical Education in Canada, Dr. Glover Takahashi served in several project leadership roles including: Chair for the FMEC PG Environmental Scan Scientific Advisory Committee and the Lead Author for the FMEC PG Environmental Scan Synthesis Report.



**Andrea Waddell, M.Ed., M.D., F.R.C.P.C.**

Andrea Waddell is a staff psychiatrist at the University Health Network and a lecturer in the Department of Psychiatry at the University of Toronto, Faculty of Medicine. She is an active educator in undergraduate and postgraduate training and has received local and national recognition for her activity in education. Andrea completed a fellowship in education research at the Wilson Centre and is currently involved in the design and implementation of novel curriculum frameworks and evaluation tools at the undergraduate and postgraduate levels.



**Melissa Kennedy, BA, MA Candidate**

Melissa Kennedy-Hynes, BA, MA Candidate, is the Research Coordinator for the Postgraduate Medical Office, Faculty of Medicine, at the University of Toronto. Melissa's work at PGME involves qualitative and quantitative research, analyzing and interpreting research performance indicators and reporting on outcome measures related to educational research and resident evaluation. Melissa's personal research interests include understanding how residents value their teaching and learning roles in the postgraduate medical education context.



**Brian Hodges, MD, FRCPC, PhD**

Brian Hodges graduated from Queen's University Medical School in 1989, completed psychiatry residency at the University of Toronto in 1994, a Master's of Higher Education in 1995 and a PhD in 2007. Since 2003, he has been Director of the University of Toronto Wilson Centre, one of the largest centres for health professional education research in the world. From 2004-2008 he was Chair of Evaluation for at the Royal College of Physicians and Surgeons, overseeing assessment in the 62 specialty programs in Canada.

Internationally he has worked with medical schools and licensure organizations in New Zealand, Switzerland, Poland, Japan, Jordan, Israel, France, China, Australia and Ethiopia. In 2003 he spent a year at the University of Paris, earning a diploma in Health Economics and Social Sciences and established collaborations with the University of Paris and the Ecole des Hautes Etudes en Santé Publique (EHESP) where he continues to serve as a member of the education board. He was named Full Professor and Richard and Elizabeth Currie Chair in Health Professions Education Research at University of Toronto in 2009. In 2010 he became Vice President Education at the University Health Network (Toronto General, Toronto Western and Princess Margaret Hospitals) Canada's largest teaching hospital group.

## **Appendix 2: Annotated Bibliography**

### **Cate, OL., Snell, L., Carraccio, C. Medical competence: The interplay between individual ability and the health care environment. *Medical Teacher*, 2010; 32 (8)**

In recent years competency-based education has been gaining popularity in medical postgraduate training in Canada, the Netherlands, the United Kingdom, the United States, and many other countries. Despite the increased popularity, Cate et al., suggests that teaching and assessing competencies in the competency-based framework raise questions. Cate et al., make suggestions as to how competency-based education can be implemented in a way that incorporates the uniqueness of the clinical environment in which each competency will be used. Cate et al. further define “entrustable professional activities” (EPAs) and suggest that they can be used as a useful planning and curriculum mapping tool for moving forward.

### **Frank JR, Mungroo R, Ahmad Y, Wang M, De Rossi S, Horsley T. Toward a definition of competency-based education in medicine: a systematic review of published definitions. *Med Teach*. 2010;32(8):631-7.**

Frank et al.’s systematic review of the literature on competency-based education provides a working definition for competency-based education. In a successful effort to determine one definition of competency-based education, Frank et al. further describes a series of themes that should be regarded with high importance when focusing on curricula changes for postgraduate medical education in the future.

### **Harden, RM. Learning outcomes as a tool to assess progression. *Medical Teacher* 2007; 29: Pp 678-682**

This article focuses on outcomes-based education in relation the student exiting from the program. Harden describes a model that is used for monitoring students’ progression to exit outcomes through the phases of undergraduate education. These are described through 4 dimensions which include: increasing breadth, increasing depth, increasing utility and increasing proficiency. Harden further describes his model to be “a blueprint for a more seamless link between undergraduate education, postgraduate training and continuing professional development”. Harden notes that this model recognizes and considers the numerous complexities that exist in medical education at the undergraduate and postgraduate level. Harden’s model further supports the transition to outcomes based education through a student centred focus while using adaptive approaches.

### **Harden, RM. Outcome-based education – the ostrich, the peacock and the beaver. *Medical Teacher*, 2007; 29: 666-671**

Harden described the two requirements of outcome-based education in this article by describing the first as the need to make learning outcomes explicit. The second is described as the outcome being the basis for decisions about the curriculum. Harden continues to describe three patterns of behaviour that are often times apparent in programs when trying to implement an outcomes-based approach. The patterns are defined by “the ‘ostriches’ who ignore the move to OBE believing it to be a passing fad or irrelevance, the ‘peacocks’ who display, sometimes ostentatiously, a specified set of outcomes but stop there and the ‘beavers’ who, having prepared their set of learning outcomes, use this as a basis for curriculum related decisions”. Harden further provides



an inventory for schools and programs are interested in assessing and reviewing their progress in implementing an outcomes based model in postgraduate medicine.

**Hodges, B. D. A tea-steeping or i-doc model for medical education? *Academic Medicine : Journal of the Association of American Medical Colleges*. 2010; 85(9 Suppl), S34-S44.**

Hodges describes the existing models of competency developing in postgraduate medical education. The traditional model is defined as the time-based or the "tea-steeping" model. Hodges describes the tea steeping model via metaphor in which the "student "steeps" in an educational program for a historically determined fixed time period to become a successful practitioner". Hodges then describes the outcomes-based model or "i-Doc" model. "i-Doc originally came from the Apple i-Pod and suggests that schools of medicine, much like products, can be adapted to fit the needs and desires of their user (the resident and the physician). Hodges explores the implications of both models for the future and reform of medical education and provides future direction for integration that involves not only one model, but both.

**Scheele, F., Teunissen, P., Van Luijk, S. Heineman, E., Fluit, L., Mulder, H., et al. Introducing competency-based postgraduate medical education in the Netherlands. *Medical Teacher*. 2008; 30:248-253**

Recent legislation required that all postgraduate medical training programs in the Netherlands be reformed. Scheele's et al.'s article provides a recount of the some of the experiences; stories and lessons learned from the Dutch Advisory Board for Postgraduate Curriculum Development during the design and implementation of a competency-based framework. Their implementation was based on the CanMEDS framework and Scheele and colleagues provide a thorough review of each step taken by this group that can be used by others to ensure smooth transition of the curriculum into their postgraduate programs.

**Whitehead, C. Recipes for medical education reform: will different ingredients create better doctors? A commentary on Sales and Schlaff. *Social Science & Medicine*. 2010; 70: pp. 1672-1676**

This article is a commentary on Sales and Schlaff's article "Reforming Medical Education: A review and synthesis of five critiques of medical practice" (2010). Sales and Schlaff argue that "medicine is practiced in a context of social and organizational structures distinct from its bio-medical substrate" Sales and Schlaff further argue that exposing to residents to more social science teaching and learning they will be more productive in their (physicians) practice. Whitehead uses Sales and Schlaff's article as a foundation to describe the solutions for medical reform. From "greater social responsibility to debates about professionalism to the outcomes-based curricular models that are the current trend in medical education", Whitehead attempts to provide reason for required change in the medical education system, many of which point to outcomes-based education.

### **Appendix 3: Interview Questions**

1. Can you help me understand your experience at the postgrad level with competency-based education?
2. What do you think are the important factors that have influenced the success of competency-based education in to date?
3. What challenges/difficulties/hurdles have you had to overcome during your experience with implementing, teaching and assessing competency-based education in the postgraduate environment.
4. What advice would you give for the future of competency-based education given your involvement and experience with this model/framework.

#### Appendix 4: Three Approaches to Discourse Analysis

Orientation to Discourse	Sources of Data	Analysis
Formal linguistic discourse analysis (such as sociolinguistics)	Samples of writing or oral language and texts	Microanalysis of linguistic, grammatical, and semantic uses of meanings or text
Empirical discourse analysis (such as conversation analysis, genre analysis)	Samples of writing or oral language and texts; <i>and</i> data on the uses of the text in social settings	Microanalysis and microanalysis of the ways in which language and/or texts construct social practices
Critical Discourse Analysis (such as foucauldian analysis)	Samples of writing or oral language and texts; <i>and</i> data on the uses of the text in social settings; and data on institutions and individuals who produce and are produced by the language texts	Macroanalysis of how discourses (any forms) construct what is possible for individuals and institutions to think and to say.

Adapted from: Hodges, BD, Ayelet, D, Reeves, S. Qualitative Research: Discourse Analysis. *British Medical Journal*. 2008 337:a879

## **Appendix 5: Case Studies In Competency-Based Postgraduate Medical Education**

### **CASE 1: International Example – Psychiatry in Australia**

This case study provides key information from a participant interview about the development of and planned implementation for a competency-based residency education for one specialty physician group (i.e., psychiatrists) across Australia. Five years ago the Government of Australia requested that a review be done on the current postgraduate medical education program in psychiatry. The review resulted in a fully funded initiative to develop and implement a competency-based education program for the College of Psychiatrists. The first step in developing the competency-based curriculum was to do complete review of the current curriculum. Concurrent with this step, an extensive literature review was performed to identify current models and frameworks for which the program could develop their own competency-based framework. The CanMEDS framework was the chosen model from which the College of Psychiatrists in Australia developed their competency-based framework.

To understand the competency framework described from the Australian perspective it is necessary to understand their current governance system. Postgraduate trainees (residents) are all employed and specifically linked to specific hospitals/health care facilities. It was noted that there is not a formal role for the education/university system in current postgraduate medical education in Australia. Given the supply and demand issues within the Australian health system, postgraduate trainees are increasingly focused on clinical service rather than education. The specialty organization, the College of Psychiatry in Australia sets the educational accreditation standards.

A developmental approach was employed to determine the competencies in the competency-based curriculum, which provides trainees with increasing difficult and complex learning, cases and patients. Assessment tools and timing were also planned to match the developmental level of the learner.

While the planning for implementation of the competency-based curriculum is underway at the College of Psychiatry the implementation date has been pushed back to 2012. This will afford a higher level of readiness and preparation at the training site level. While there have been set-backs and subsequent delays, the interest and enthusiasm for moving the implementation of the competency-based curriculum forward has not diminished with the 2012 target date in sight.

### **CASE 2: US example of Competency-based Curriculum across ALL Programs**

This section provides information from a participant interview about the implementation of the national competency-based approach to residency education at their university as well as the implementation as an entrance baseline OSCE for all incoming residents. The competency-based curriculum was developed more than 5 years ago concurrently with the implementation of the ACGME competencies<sup>d</sup>. Up until this time, it was

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<sup>d</sup> ACGME competencies: Developed in 1999, the Accreditation Council for Graduate Medical Education (ACGME) endorsed competencies for all residents in the following six (6) areas: Patient Care, Medical Knowledge, Practice-based Learning and Improvement, Interpersonal and Communication Skills, Professionalism, Systems-based Practice. These competencies are used as a standard in determining accreditation in all postgraduate medical education programs in the United States.

reported that very little was being done across the United State to ensure the effective learning, teaching and assessment of the ACGME competencies in postgraduate medical education training.

More locally at the participants university, in addition to program specific strides to implement competency-based education in postgraduate training, the most prominent central innovation was the implementation of an entrance baseline OSCE for all incoming residents. The entrance baseline OSCE is a formative assessment of competencies that is taken having residents in all programs start work with an assessment which typically takes place 1 – 2 days prior to the ‘official start date’ of the first day as a first year resident.

The competencies that are assessed during the entrance baseline OSCE are general in scope. The feedback from program directors has been highly positive, largely because the exercise acts a standard baseline for assessing residents as they enter and advance in their programs. Program directors are able to develop individualize learning plans for residents based on these competency assessments and are also better equipped to recognize deficiencies early in the program. Despite the substantial investment cost of this innovation the view is that this allows the program to be competency-based from the beginning and the assessment outcomes provide a reliable and valid measure of competency that was not being captured in other areas of the residency training program.

Another innovation that was described was the surgery programs’ focus on the assessment of resident’s competence in procedural skills by trying to use simulation to document the attainment of certain levels of performance before those skills can be implemented in the O.R.

Lastly, a third innovation reported was in the internal medicine program which has integrating competency-based education outcomes by assessing how residents interact and participate in patient safety projects. The patient safety project is a requirement of the internal medicine program and in order to meet this requirement each resident must demonstrate they have attained a certain level of performance.

While there are numerous contributing success factors associated with the implementation of competency-based education, it was determined that the pre-existing centralized graduate medical education governance system was viewed as a critical component to their success with implementing the entrance baseline OSCE on such a broad level. It was noted that a key to the success of implementing competency-based education in all programs is based on central support.

### **CASE 3: Family Medicine Program**

This case study is about the development and staged implementation of a centrally developed and administered competency-based approach to a multi site Family Medicine residency program where almost all of the two years of residency education for 324 residents is situated in the 15 training sites (i.e. rather than through the central program). The family medicine program’s interest in a competency-based approach in Family Medicine was driven by the expectation of a competency-based curriculum requirement by College of Family Physicians of Canada. The anticipation was that all Family Medicine programs in the country were going to be charged with developing a

competency-based model<sup>e</sup>, delivering it and then as result having it assessed accordingly during the accreditation visit. Additionally, given that the structure and approach for the curriculum for Family Medicine had few major structural changes to the curriculum in over a decade – other than the significant expansion in numbers of trainees and the development across many more distributed training sites - the need for a fundamental relook was viewed as needed.

In addition to the significant expansion in size, the diversity of residents had grown as had the number of residents in academic difficulty. Competency-based education was viewed by this family medicine program as potentially helpful for many of these challenges.

The development and implementation of the competency-based approach involved looking at previous curriculum, developing inventories of competencies for each major clinical area and building the resident assessment approach and tools. A unique feature of this competency-based approach is the use of ‘progress testing’ as a central part of resident assessment. For 2009 and 2010, residents have had a written test that uses a key features question design to assess knowledge and problem solving related to the identified competency domains. Residents are tested on their progress at the 6, 22 and 30 months of their program.

The development and implementation of the competency-based curriculum process involved a committee, consisting of the program director, site directors, residency representatives and education consultants. One difficulty that was reported in the initial stages was the large number of learning objectives and competencies were more than could be learned, taught or assessed in a two year. The solution was to employ a multilevel approach which discerned prerequisites from essential from enriched and enhanced competencies. The ‘essential competencies’ would be those ones with ALL residents would be able to meet (i.e., learn and perform). The process of having faculty and resident groups develop these detailed multi level inventories was arduous but viewed as important to garner broad-based support and engagement in the implementation of the competency-based framework. Leads and co leads responsible for each area have guided the fine-tuning and completion of the inventories.

#### **CASE 4: Family Medicine site in Canada**

This case study is about the planned implementation of a competency-based curriculum at a Canadian regional family medicine site within a larger family medicine program which has a competency-based curriculum. Each year there are about 20 residents at this site, half are first year Family Medicine, half are second year Family Medicine Residents. The family medicine program’s interest in a competency-based approach in Family Medicine was driven by the expectation of a competency-based curriculum requirement by College of Family Physician’s of Canada’s and also deeply influenced by recent consultations with a team of experts responsible for the implementation a cross-national competency-based medical education program in the Netherlands<sup>f</sup>.

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<sup>e</sup> In 2010, the ‘Triple C’ educational program was published. Key Directions from the Working Group on Curriculum Review Interim Report:

- comprehensive and continuing care as the focus of training.
- competency-based curriculum, and
- centered in family medicine. REF <http://www.cfpc.ca/ProjectAssets/Templates/Column1a.aspx?id=115>

<sup>f</sup> The pressure in the case of the Netherlands was a firm and time-based governmental mandate that all medical education, including postgraduate medical education, be moved to a competency-based curriculum with designated guidelines.

In advance of implementing a competency base approach is a plan to focus on faculty development about competency-based education. The faculty development was viewed as crucial for them to develop an enthusiasm and understanding for how the performance outcomes would be different with a competency-based curriculum as their current/historical time-based curriculum. It was also viewed as important that there be clarity about how day-to-day practice as educators would evolve with the implementation of a competency-based approach.

The implementation of competency-based education at this site will aim to avoid taking a reductionist approach that is one risk of competency-based implementation. Specifically, the pilot project for this site will work to ensure that new objectives are not simply a long list of competencies. A concept that is being considered by this site is the use of the notion of Entrustable Professional Acts (EPA's) as being a tool to assist with the selection, description and assessment of what is important in the curriculum as they develop it.

Another component they are planning for as they move to implementation includes having as a resource a team of experts that have experience in implementation of competency-based medical education - as well as building on the experience of those from the family medicine field (in this particular case-study). Finally, it was viewed as essential that those leading the implementation being cognisant of the current governance policies of the certifying organization which will allow or encourage their planned modification or changes to their curriculum as awareness of such policies can eliminate added delays in the implementation process. These implementation plans – faculty development, avoiding a reductionist approach, consideration of the role of EPAs, building on the experience of others, ensuring awareness of certifying organization policies - will support a successful transition into a competency-based curriculum by the target of July of 2012.

## **CASE 5: Orthopaedic Surgery Program, Canada**

### **INTERVIEW 1: - Day-to-day implementation**

This interview was provided by a leader in the day to day implementation of a fully modularized competency- based curriculum (CBC) for the orthopedic surgery residency program – where the completion of the outlined competencies are the sole criteria for moving on to the next module. This interview explored the early and emerging impressions about the day-to-day implementation of an 'experiment' in a highly structured CBC program in the orthopaedic surgery program in Canada about 18 months after it was implemented.

With a multi-year governmental funding grant and the structure formally approval for trail by the Royal College of Physicians and Surgeons of Canada (RCPSC) it was finalized that this experiment would be a 'competency-based curriculum (CBC) stream' running concurrent to, but separately from the 'regular stream'.

Using the CanMEDS framework of competencies, the current regular stream curriculum for orthopedic surgery is based on competencies sorted into three different sets of modules – basic/early, intermediate and late stage; and within which there are 21 different modules. The same 21 modules became the framework for the modular competency-based curriculum in the orthopaedic surgery program.

The basic/early level modules involve the fundamental skills that any orthopedic surgeons know, such as basic technical skills, basic fracture management, management of emergency orthopedics, and basic medical care of the unwell patient. Following, there are the intermediate competencies, which include fundamental procedures that any orthopedic surgeon should know include basic arthroscopy and common arthroplasty procedures. As well, this group included the series of modules that are a more anatomically based and sub-specialty based – foot and ankle, upper extremity and spine. In addition, there are some non-operative competencies such as rheumatology and some neurology. Finally, the third or later stage involves advanced competencies including demonstrating competence in oncology, advanced fracture management, advanced arthroplasty, and advanced arthroscopy in sports medicine.

It was reported that the first group of residents to participate in the competency-based curriculum are now in their PGY2 year. They are into their second phase of the curriculum, where they just started embarking on their early sub-specialty modules. The experience was noted as being very positive from both a CBC resident and faculty perspective. The viewpoints is that these CBC residents are benefitting from focused, and structured procedural training with extensive use of clinical skills labs as well as regular focused feedback and assessments. It was noted that some regular stream residents have been vocal about not receiving the same advantages as those in the CBC program. It was observed by various faculty that the CBC residents are generally procedurally 'ahead' of the regular stream residents who have had the same amount of time in the program.

#### **CASE 5: Orthopaedic Surgery Program, Canada**

##### **Interivew 2: Program Leadership**

Competency-based education in the Department of Surgery at a large inner-city Canadian hospital was developed as a pilot project in 2007. The idea was generated by the chair of the department to develop a trial curriculum that would be a completely modular competency-based curriculum (CBC) rather than the traditional time-based training.

While the Department of Surgery has always had a strong emphasis on surgical education, the pilot to implement a competency-based model was a partly an attempt to look at the current curriculum and identify potential problems that might arise in the future. The fundamental and principals in this CBC were to use competency as the critical measure for progressing through the department and to use objective, multi-modeled assessment tools to determine competence of residents. The steps to ensure that the foundations of the competency-based curriculum were met included recruiting and training faculty to develop their teaching materials, technical skills modules, evaluation plans and assessment tools.

Technical skills modules in the competency-based program were developed for each 'competency' in the program. The idea is that residents will go through the modules and be assessed 'when' the teacher feels that they have demonstrated their ability in the appropriate module. While a module may have a structure for 3 months of training, it was noted that a resident may be tested at the 2 month period, therefore moving further away from the time-based model.

A unique assessment tool that was employed in their competency-based curriculum is the use of a high fidelity simulator in a surgical skills lab. Being labeled as 'critical component' to the competency-based curriculum for surgery, the surgical skills lab reportedly allows training to happen in a much quicker fashion whereby the resident can



focus their time on skills that they haven't quite mastered; versus spending time on basics that have been mastered for quite some time. The value of having technical skills sessions and objective assessment tools, such as the simulator, has ultimately demonstrated how lacking these tools in the traditional time-based curriculum can negatively impact training. First year residents following the competency-based curriculum have demonstrated ability in some areas of surgery that is comparable to those in the 5<sup>th</sup> year of residency.

While the success of the competency-based pilot in the department of surgery has been the focus of much effort, its sustainability is dependent on faculty educators and the continuation of innovative assessment tools. Having engaged faculty is a critical factor as they spent time working above and beyond, during preparatory phase, developing educational materials and continuously developing assessment tools.