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Implementing competency-based medical education: Moving forward

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ABSTRACT

For more than 60 years, competency-based education has been proposed as an approach to education in many disciplines. In medical education, interest in CBME has grown dramatically in the last decade. This editorial introduces a series of papers that resulted from summits held in 2013 and 2016 by the International CBME Collaborators, a scholarly network whose members are interested in developing competency-based approaches to preparing the next generation of health professionals. An overview of the papers is given, as well as a summary of landmarks in the conceptual evolution and implementation of CBME. This series follows on a first collection of papers published by the International CBME Collaborators in *Medical Teacher* in 2010.

Background

Big breakthroughs happen when what is suddenly possible meets what is desperately necessary.
Thomas Friedman (2012)

In a special issue of *Medical Teacher* in 2010, competency-based medical education (CBME) was defined by the International CBME Collaborators as “[a]n outcomes-based approach to the design, implementation, assessment, and evaluation of medical education programs, using an organizing framework of competencies” (Frank et al. 2010b, p. 641) and as “an approach to preparing physicians for practice that is fundamentally oriented to graduate outcome abilities and organized around competencies derived from an analysis of societal and patient needs. It de-emphasizes time-based training and promises greater accountability, flexibility, and learner-centredness” (Frank et al. 2010a, p. 636).

Formed in 2009 and sponsored by several medical education organizations, the International CBME Collaborators are a scholarly network whose members are interested in exploring, developing, and enhancing competency-based approaches to preparing the next generation of health professionals. CBME is recognized as a promising means of addressing certain challenges and shortcomings attributed to contemporary models of medical curriculum design. More specifically, the development of the CBME model is a response to

- calls for greater accountability and a greater focus on outcomes relating to patients, populations, and health professions education programs (Frank et al. 2010);
- the need to reduce unacceptable variability in graduate abilities after medical training (Langdale et al. 2003; Raymond et al. 2011);
- evidence that some graduates are not prepared for safe and effective practice;

- patterns of suboptimal patient outcomes in health care systems (e.g. IOM 2000, 2001; OECD 2000–2015a, 2000–2015b, 2000–2015c);
- calls for a fundamental re-examination of curriculum content to ensure relevance to the twenty-first century practice. This includes an expanded vision of the desired outcomes of training, such that they go beyond expert medical knowledge to include competencies in communication, collaboration, professionalism and professional identity formation, systems thinking, lifelong learning, population health, and continuous improvement;
- concerns that models of education in which time spent in training is a surrogate marker of competence are no longer desirable or defensible.

The evolution of CBME

CBME did not begin in 2009. Its history has been described by ten Cate (2014), and landmark developments are summarized in Table 1. In the United States, the idea of competency-based training first surfaced almost a century ago within industrial and business models that focused on specific outcomes and behaviors. In the 1960s, competency-based education training was introduced in teacher education in response to demands for more relevant and outcomes-focused training (Houston 1973; Burke 1999).

Throughout the twentieth century, health professions educators considered numerous tentative innovations in curriculum development. In 1978, in a visionary report for the World Health Organization, McGaghie et al. called for the worldwide adoption of CBME to ensure that health professions education could truly meet local and regional population health needs. In fact, for more than 60 years competency-based education has been used, or suggested, as an approach to education in multiple jurisdictions

Table 1. Landmarks in the evolution of CBME.

Year	Organization or country	Landmark
1978	World Health Organization	Produces a report in which competency-based models are first promoted for wide use. The authors define CBME as follows: "The intended output of a competency-based program is a health professional who can practise medicine at a defined level of proficiency, in accord with local conditions, to meet local needs" (McGaghie et al. 1978, p. 18)
1990	Ontario's medical schools (five, at that time), the Council of Ontario Faculties of Medicine, Associated Medical Services, and the Ontario Ministry of Health	Prompted by tensions between the medical profession and the Ontario public, the Educating Future Physicians for Ontario project is launched to address issues related to changing expectations and resource constraints. The overall goal of the project is to modify medical education to make it more responsive to evolving health care needs (Neufeld et al. 1993)
1981	Association of American Medical Colleges (AAMC)	The GPEP (General Professional Education of the Physician and College Preparation for Medicine) Panel is created to develop strategies to improve physician education for the twenty-first century. The panel's final report, issued in 1984, recommends that physicians in all specialties share a common foundation of knowledge, skills, attitude, and values (Anderson et al. 1998, p. 2)
1992	AAMC	The "ACME-TRI" report is issued, summarizing the results of a 1990 survey of deans of 84 North American medical schools concerning whether and how changes recommended in three major reports published in the 1980s on medical student education were being implemented. The report concluded that "most medical schools had done little to correct the major shortcomings in the ways they educate their students" and had not solved recurring problems that had been reported since 1932 (Abrahamson et al. 1992, pp. xi, xv)
1996	AAMC	The MSOP (Medical School Objectives Project) task force is established in response to the ACME-TRI report (Anderson et al. 1998, pp. 1–3)
1996	Royal College of Physicians and Surgeons of Canada (RCPSC)	The report of a task force on the future of postgraduate medical education (the "Maudsley report") called for "mastery learning" to be built into medical training design (Maudsley et al. 1996)
1996	RCPSC	The CanMEDS Project releases its first framework for physician competencies (Frank et al. 1996)
1999	Association for Medical Education in Europe (AMEE)	AMEE publishes an influential model for outcomes-based medical education (Harden 1999)
2001	Accreditation Council for Graduate Medical Education (ACGME)	The ACGME Outcomes Project is launched. This initiative is focused on the increased use of educational outcomes for improving residents' education (Batalden et al. 2002; Swing 2007)
2002	United States	Carraccio and colleagues conduct an influential literature review to generate practical insights into how to accomplish full implementation and evaluation of a paradigm shift from structure- and process-based to competency-based education (Carraccio et al. 2002)
2004	Australia, Netherlands, United States	Competency-based residency programs begin to be implemented globally (e.g. Borleffs & ten Cate 2004; Long 2004; Collins et al. 2007)
2005	RCPSC	CanMEDS 2005, an expanded competency framework, is published and becomes widely adopted in various countries (Frank et al. 2005)
2007	ACGME	Initiates the development of milestones for internal medicine residency training in six general dimensions of practice (Green et al. 2009)
2007	Netherlands	The concept of Entrustable Professional Activities (EPAs) within competency-based training is introduced (ten Cate 2005; ten Cate & Scheele 2007)
2009	United Kingdom	The Tomorrow's Doctors initiative of the General Medical Council defines graduate outcomes pertaining to the doctor as scientist and scholar; practitioner; and professional (General Medical Council 2009)
2009–2016	International CBME Collaborators	<ul style="list-style-type: none"> • Hold a summit on CBME in 2009 • Promote CBME through an invitational summit in 2013 • Conduct ongoing monthly one-hour webinars on a number of topics that explore various models and approaches to CBME. These webinars are open to all and offered at no cost (International CBME Collaborators 2016) • <i>Medical Teacher</i> publishes a series of articles by the Collaborators in its August 2010 issue • A 2016 world summit on CBME, held in conjunction with the AMEE conference, attracts over 200 participants from around the world
2009	University of Toronto	The University of Toronto Orthopedic Surgery program modifies its residency training model in keeping with the CanMEDS competency framework. The pilot focuses on competency-based modular training linked to specific learning objectives that form the basis of learning contracts between residents and faculty. Progression is centered on demonstrating competency in the objectives and is not linked to time spent (Ferguson et al. 2013)
2010	Carnegie Foundation for the Advancement of Learning	A report of the Carnegie Foundation calls for "standardizing learning outcomes and individualizing the learning process" (Cooke et al. 2010).
2011	College of Family Physicians of Ontario	The Triple C Competency-based Curriculum is launched: this model, centered in Family Medicine, emphasizes comprehensive care and education, and continuity of education and patient care (Tannenbaum et al. 2011)
2011	AAMC, American Board of Pediatrics, ACGME, and others	Five medical schools test the feasibility of time-variable, competency-based advancement in pediatrics from undergraduate education through to transition to independent practice (Powell et al. 2011)
2012–13	ACGME	<ul style="list-style-type: none"> • Implementation of the Next Accreditation System (NAS) is launched in seven core specialties • The aim of NAS is "to enhance the ability of the peer-review system to prepare physicians for practice in the 21st century, to accelerate the ACGME's movement toward accreditation on the basis of educational outcomes, and to reduce the burden associated with the current structure and process-based approach" (Nasca et al. 2012) • A key element of the NAS is the use of educational milestones in formation, continuous quality improvement, and the measurement and reporting of outcomes
2015	Royal College of Physicians and Surgeons of Canada	A revised and expanded CanMEDS 2015 framework is published (Frank et al. 2015)
2015	Australia, Canada, Netherlands, United States	Implementation continues (e.g. Caccia et al. 2015; Jurd et al. 2015; Stodel et al. 2015; Carraccio et al. 2017)
2016		The CBME Charter outlines principles and sets directions for future work (Carraccio et al. 2016)

and across multiple professions, including social work (Menefee & Thompson 1994), chiropractic medicine (Wangler 2009), and pharmacy (Marshall et al. 1997). In the 1990s, many jurisdictions witnessed the emergence of “outcomes-oriented approaches” that used competency frameworks as a key component of education and training. Today, the three most widely known competency-based frameworks are the Good Medical Practice standard in the United Kingdom (General Medical Council 2013), the Outcomes Project of the Accreditation Council for Graduate Medical Education in the United States (Swing 2007), and the CanMEDS Competency Framework of the Royal College of Physicians and Surgeons of Canada (Frank et al. 2015). In 2010, *Medical Teacher* published a series of widely cited papers from the International CBME Collaborators dedicated to documenting, elaborating, developing and disseminating this emerging competency-based paradigm (Campbell et al. 2010; Dath et al. 2010; Frank et al. 2010a, 2010b; Harris et al. 2010; Holmboe et al. 2010; Iobst et al. 2010; Snell & Frank 2010; Swing et al. 2010; Taber et al. 2010; ten Cate et al. 2010).

Series II

CBME continues to evolve in exciting ways as those involved learn and gain experience in the theories, principles, and practices of this approach. Both CBME and our global network of educators have grown dramatically in the last decade, and in this issue of *Medical Teacher*, we are pleased to offer a second series of papers focused not just on CBME concepts and controversies, but also on the implementation of CBME. The International CBME Collaborators held further summits in 2013 and 2016. Topics and issues of interest to the participants were prioritized using a Delphi process (see Table 2), and the resulting discussions were distilled into this series of articles.

In an introductory paper, Holmboe and colleagues discuss the growth of CBME as a major international movement and address some of the criticisms that have been leveled against the model (Holmboe et al. 2017). Englander and coauthors take a further step, presenting the efforts of the International CBME Collaborators to develop common definitions and to identify the relationships between certain core concepts, as medical educators move toward a shared language necessary for this adaptive change in medical education (Englander et al. 2017).

Because implementation is a current issue for many, overarching challenges to implementing CBME are discussed by Caverzagie et al. (2017). Nousiainen et al. (2017) continue the implementation theme by exploring the structural changes needed to support the transition to CBME. Ferguson et al. (2017) delve deeper to consider changes needed in the professional, institutional, and organizational cultures surrounding the training of medical professionals. They identify key barriers to the acceptance of CBME within the current culture of medical education and propose ways to address them.

Assessment remains a challenge from the perspective of principles and practice. Harris et al. (2017) explore recent developments in CBME assessment, describing key issues regarding assessment as discussed at the 2013 invitational summit on CBME. Core principles of assessment in CBME

Table 2. Summary of top-ranked topics after three rounds of a Delphi process.

CBME across the continuum
Milestones EPAs: shared language and definitions
Designing assessment programs: balancing rigor with utility
Evaluating the impact of CBME: key and unintended outcomes
Faculty development for CBME: preparing teachers and assessors
Practical CBME implementation
Research agenda for CBME
Understanding entrustment decisions

are described by Lockyer et al. (2017b), who also examine ways to ensure the effectiveness of assessment programs.

The Collaborators also looked to the future. Although the principles of CBME have yet to be widely adopted in continuing professional development (CPD), Lockyer et al. (2017a) suggest that they are just as important after residency as they are during postgraduate training, and that significant changes are needed in the approach to CPD to ensure that practicing physicians maintain competence throughout their careers. Their paper explores the rationale for CPD reform; considers the key elements that would facilitate a transition to a CBME–CPD framework and an expanded role for the assessment of competence and performance in the workplace; suggests educational activities to support CPD in a CBME environment; and highlights the implications for different stakeholders. Finally, Gruppen et al. (2017) present a range of questions, both theoretical and practical, that require research in the context of CBME. The authors further explore methodological issues that will need to be addressed in gathering evidence about outcomes and best practices in implementing CBME.

The two most recent summits of the International CBME Collaborators resulted in additional papers that have been published in other journals. A charter for clinician–educators framed by Carraccio et al. (2016) outlines three basic tenets of CBME: medical education must be based on the needs of society; it must focus on outcomes, not structure or process; and it must be seamless across the continuum from early medical student to senior practitioner. The Charter then proposes nine commitments to ensure that implementation is effective. In a paper on entrustment decision-making, ten Cate et al. (2016) describe the process of making entrustment decisions in clinical training, outline varied modes of trust, and discuss the factors that lead to entrustment. This paper lays a foundation for the assessment decisions made in CBME. Van Melle et al. (2016) propose using contribution analysis as a rigorous approach to evaluate CBME programs and understand its impact.

The near future

Competency-based, outcomes-focused education is now implemented in a number of jurisdictions. It has been transformed from a set of aspirations, innovations, concepts, and experiments into the systematic and espoused directions of numerous institutions of health professions education. Although much has happened, much remains to be done. Challenges remain, and resources are not limitless, but we are certain the opportunities for improvement in our medical education and training systems exist, and that the move to a competency-based framework will have a significant positive impact on the health of individual patients and society through the better education of future

physicians. The end of training based only on time is now ... and it is about time.

Disclosure statement

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References

- Abrahamson S, Beaty HN, Bryan GA, Carver S, Friedman CP, Morahan PS, Reich C, Rosse C, Seidel HM. ACME-TRI report. 1992. Educating medical students: assessing change in medical education. The road to implementation. Washington: Association of Medical Colleges; [cited 2017 Feb 3]. Available from: <http://files.eric.ed.gov/fulltext/ED354818.pdf>
- Anderson MB, Cohen JJ, Hallock JE, Kassbaum DG, Turnbull J, Whitcomb ME. 1998. Report I: learning objectives for medical student education. Guidelines for medical schools. Washington: Association of American Medical Colleges; [cited 2017 Feb 5]. Available from: <https://members.aamc.org/eweb/upload/Learning%20Objectives%20for%20Medical%20Student%20Educ%20Report%20I.pdf>
- Batalden P, Leach D, Swing S, Dreyfus H, Dreyfus S. 2002. General competencies and accreditation in graduate medical education. *Health Aff (Millwood)*. 21:103–111.
- Borleffs C, ten Cate TJ. 2004. Competency-based training for internal medicine. *Neth J Med*. 62:344–346.
- Burke JW, editors. 1999. Competency-based education and training. London: Falmer Press.
- Caccia N, Nakajima A, Scheele F, Kent N. 2015. Competency-based medical education: developing a framework for obstetrics and gynaecology. *J Obstet Gynaecol Can*. 37:1104–1112.
- Campbell C, Silver I, Sherbino J, ten Cate O, Holmboe ES. 2010. Competency-based continuing professional development. *Med Teach*. 32:657–662.
- Carraccio C, Englander R, Gilhooly J, Mink R, Hofkosh D, Barone MA, Holmboe ES. 2017. Building a framework of entrustable professional activities, supported by competencies and milestones, to bridge the educational continuum. *Acad Med*. 92:324–330.
- Carraccio C, Englander R, Van Melle E, ten Cate O, Lockyer J, Chan MK, Frank JR, Snell LS. International CBME Collaborators. 2016. Advancing competency-based medical education: a charter for clinician-educators. *Acad Med*. 91:645–649.
- Carraccio C, Wolfsthal SD, Englander R, Ferentz K, Martin C. 2002. Shifting paradigms: from Flexner to competencies. *Acad Med*. 77:361–367.
- Caverzagie KJ, Nousiainen MT, Ferguson PC, ten Cate O, Ross S, Harris KA, Busari J, Bould MD, Bouchard J, Iobst WF, et al; ICBME Collaborators. 2017. Overarching challenges to the implementation of competency-based medical education. *Med Teach*. 39:588–593.
- Collins JP, Gough IR, Civil ID, Stitz RW. 2007. A new surgical education and training programme. *ANZ J Surg*. 77:497–501.
- Cooke M, Irby DM, O'Brien BC. 2010. Educating physicians: a call for reform of medical school and residency. San Francisco: Jossey-Bass.
- Dath D, Iobst W. International CBME Collaborators. 2010. The importance of faculty development in the transition to competency-based medical education. *Med Teach*. 32:683–686.
- Englander R, Frank JR, Carraccio C, Sherbino J, Ross S, Snell L; ICBME Collaborators. 2017. Toward a shared language for competency-based medical education. *Med Teach*. 39:582–587.
- Ferguson PC, Caverzagie KJ, Nousiainen MT, Snell L; ICBME Collaborators. 2017. Changing the culture of medical training: an important step toward the implementation of competency-based medical education. *Med Teach*. 39:599–602.
- Ferguson PC, Kraemer S, Nousiainen M, Safir O, Sonnadora R, Alman B, Reznick R. 2013. Three-year experience with an innovative, modular competency-based curriculum for orthopaedic training. *J Bone Joint Surg Am*. 95:e166.
- Frank JR, editor. 2005. The CanMEDS 2005 physician competency framework. Better standards. Better physicians. Better care. Ottawa: Royal College of Physicians and Surgeons of Canada.
- Frank J, Jabbour M, Tugwell P, Boyd D, Fréchette D, Labrosse J, MacFayden J, Marks M, Neufeld V, Polson A, et al. 1996. Skills for the new millennium: report of the societal needs working group. Ottawa: Royal College of Physicians and Surgeons of Canada.
- Frank JR, Mungroo R, Ahmad Y, Wang M, De Rossi S, Horsley T. 2010a. Toward a definition of competency-based education in medicine: a systematic review of published definitions. *Med Teach*. 32:631–637.
- Frank JR, Snell LS, ten Cate O, Holmboe ES, Carraccio C, Swing SR, Harris P, Glasgow NJ, Campbell C, Dath D, et al. 2010b. Competency-based medical education: theory to practice. *Med Teach*. 32:638–645.
- Frank JR, Snell L, Sherbino J, editors. 2015. CanMEDS 2015 physician competency framework. Ottawa: Royal College of Physicians and Surgeons of Canada.
- Frank J, Chen L, Bhutta ZA, Cohen J, Crisp N, Evans T, Fineberg H, Garcia P, Ke Y, Kelley P, et al. 2010. Health professionals for a new century: transforming education to strengthen health systems in an interdependent world. *Lancet*. 376:1923–1958.
- Friedman TL. 2012. Come the revolution. *New York Times* [Internet]; [cited 2012 May 15]. Available from: www.nytimes.com/2012/05/16/opinion/friedman-come-the-revolution.html
- General Medical Council. 2009. Tomorrow's Doctors: Outcomes and standards for undergraduate medical education. Manchester (UK): General Medical Council; [cited 2017 Feb 6]. Available from: www.gmc-uk.org/Tomorrow_s_Doctors_1214.pdf_48905759.pdf
- General Medical Council. 2013. Good medical practice (2013). Manchester (UK): General Medical Council; [cited 2017 Feb 4]. Available from: www.gmc-uk.org/guidance/good_medical_practice.asp
- Green ML, Aagaard EM, Caverzagie KJ, Chick DA, Holmboe E, Kane G, Smith CD, Iobst W. 2009. Charting the road to competence: developmental milestones for internal medicine residency training. *J Grad Med Educ*. 1:5–20.
- Gruppen LD, Frank JR, Lockyer JM, Ross S, Bould MD, Harris P, Bhanji F, Hodges BD, Snell L, ten Cate O; ICBME Collaborators. 2017. Toward a research agenda for competency-based medical education. *Med Teach*. 39:623–630.
- Harden RM. 1999. AMEE guide no. 14: outcome-based education: Part 1 – an introduction to outcome-based education. *Med Teach*. 21:7–14.
- Harris P, Bhanji F, Topps M, Ross S, Lieberman S, Frank JR, Snell L, Sherbino J; ICBME Collaborators. 2017. Evolving concepts of assessment in a competency-based world. *Med Teach*. 39:603–608.
- Harris P, Snell L, Talbot M, Harden RM. 2010. Competency-based medical education: implications for undergraduate programs. *Med Teach*. 32:646–650.
- Holmboe ES, Sherbino J, Englander R, Snell L, Frank JR; ICBME Collaborators. 2017. A call to action: the controversy of and rationale for competency-based medical education. *Med Teach*. 39:574–581.
- Holmboe ES, Sherbino J, Long DM, Swing SR, Frank JR. International CBME Collaborators. 2010. The role of assessment in competency-based medical education. *Med Teach*. 32:676–682.

- Houston RW. 1973. Designing competency-based instructional systems. *J Teach Educ.* 24:200–204.
- International CBME Collaborators. 2016. ICBME webinar series. Ottawa: Royal College of Physicians and Surgeons of Canada [cited 2017 Feb 15]. Available from: www.royalcollege.ca/rcsite/education-strategy-accreditation/innovations-development/icbme/icbme-webinar-series-e
- Iobst WF, Sherbino J, ten Cate O, Richardson DL, Dath D, Swing SR, Harris P, Mungroo R, Holmboe ES, Frank JR, et al. 2010. Competency-based medical education in postgraduate medical education. *Med Teach.* 32:651–656.
- [IOM] Institute of Medicine, Committee on Quality of Health Care in America. 2000. Kohn LT, Corrigan JM, Donaldson MS, editors. *To err is human: building a safer health care system.* Washington: National Academy Press.
- [IOM] Institute of Medicine, Committee on Quality of Health Care in America. 2001. *Crossing the quality chasms: a new health system for the 21st century.* Washington: National Academy Press.
- Jurd S, de Beer W, Aimer M, Fletcher S, Halley E, Schapper C, Orkin M. 2015. Introducing a competency based fellowship programme for psychiatry in Australia and New Zealand. *Australas Psychiatry.* 23:699–705.
- Langdale LA, Schaad D, Wipf J, Marshall S, Vontver L, Scott CS. 2003. Preparing graduates for the first year of residency: are medical schools meeting the need?. *Acad Med.* 78:39–44.
- Lockyer J, Bursley F, Richardson D, Frank JR, Snell L, Campbell C; ICBME Collaborators. 2017a. Competency-based medical education and continuing professional development: a conceptualization for change. *Med Teach.* 39:617–622.
- Lockyer J, Carraccio C, Chan MJ, Hart D, Smee S, Touchie C, Holmboe ES, Frank JR; ICBME Collaborators. 2017b. Core principles of assessment in competency-based medical education. *Med Teach.* 39:609–616
- Long DM. 2004. Competency based training in neurosurgery: the next revolution in medical education. *Surg Neurol.* 61:5–14.
- Marshall JM, Adams JP, Janich JA. 1997. Practical, ongoing competency-assessment program for hospital pharmacists and technicians. *Am J Health Syst Pharm.* 54:1412–1417.
- Maudsley RF, Augustine JR, Embil JM, Dandavino A, DesGrosseilliers JP, Goldsand G, Mikhael NZ, Taylor BR, Junrull J, VanBoxel J, et al. 1996. Report of the task force to review fundamental issues in specialty education. Final report. Ottawa: Royal College of Physicians and Surgeons of Canada.
- McGaghie WC, Miller GE, Sajid AW, Telder TV, Lipson L. 1978. Competency-based curriculum development in medical education: an introduction. *Public Health Papers No. 68.* Geneva: World Health Organization; [cited 2017 Feb 6]. Available from: http://apps.who.int/iris/bitstream/10665/39703/1/WHO_PHP_68.pdf
- Menefee DT, Thompson JJ. 1994. Identifying and comparing competencies for social work management: a practice driven approach. *Adm Soc Work.* 18:1–25.
- Nasca TJ, Philibert I, Brigham T, Timothy C, Flynn TC. 2012. The next GME accreditation system – rationale and benefits. *N Engl J Med.* 366:1051–1056.
- Neufeld VR, Maudsley RF, Pickering RJ, Walters BC, Turnbull JT, Spasoff RA, Hollomby DJ, Lavigne KJ. 1993. Demand-side medical education: educating future physicians for Ontario. *CMAJ.* 148:1471–1477.
- Nousiainen MT, Caverzagie KJ, Ferguson PC, Frank JR; ICBME Collaborators. 2017. Implementing competency-based medical education: what changes in curricular structure and processes are needed? *Med Teach.* 39:594–598.
- OECD. 2000–2015a. OECD.Stat: Health care utilization [Internet]. Paris: Organisation for Economic Co-operation and Development. Available from: http://stats.oecd.org/Index.aspx?DataSetCode=HEALTH_PROC
- OECD. 2000–2015b. OECD.Stat: Health care quality indicators [Internet]. 2000–2015. Paris: Organisation for Economic Co-operation and Development. Available from: http://stats.oecd.org/Index.aspx?DataSetCode=HEALTH_HCQI
- OECD. 2000–2015c. OECD.Stat: Health status. Paris: Organisation for Economic Co-Operation and Development. Available from: http://stats.oecd.org/Index.aspx?DataSetCode=HEALTH_STAT
- Powell D, Aschenbrenner C, Carraccio C. 2011. Pediatrics redesign project: a pilot implementing competency-based education across the continuum. *Acad Med.* 86:e13
- Raymond MR, Mee J, King A, Haist SA, Winward ML. 2011. What new residents do during their initial months of training. *Acad Med.* 86:S60–S63.
- Snell L, Frank JR. 2010. Competencies, the tea bag model, and the end of time. *Med Teach.* 32:629–630.
- Stodel EJ, Wyand A, Crooks S, Moffet S, Chiu M, Hudson CC. 2015. Designing and implementing a competency-based training program for anesthesiology residents at the University of Ottawa. *Anesthesiol Res Pract.* 2015:713038.
- Swing SR. 2007. The ACGME outcome project: retrospective and prospective. *Med Teach.* 29:648–654.
- Swing SR, International CBME Collaborators. 2010. Perspectives on competency-based medical education from the learning sciences. *Med Teach.* 32:663–668.
- Taber S, Frank JR, Harris KA, Glasgow NJ, Iobst W, Talbot M. International CBME Collaborators. 2010. Identifying the policy implications of competency-based education. *Med Teach.* 32:687–691.
- Tannenbaum D, Kerr J, Konkin J, Organek A, Parsons E, Saucier D, et al. 2011. Triple C competency-based curriculum. Report of the Working Group on Postgraduate Curriculum Review – Part 1. Mississauga (ON): College of Family Physicians of Canada.
- ten Cate O. 2005. Entrustability of professional activities and competency-based training. *Med Educ.* 39:1176–1177.
- ten Cate O. Medical education, competency-based 2014. [Internet]. In: *The Wiley Blackwell Encyclopedia of health, illness, behavior, and society.* Hoboken (NJ): Wiley, p. 1329–1335. [cited 2017 Feb 14]. Available from: <http://onlinelibrary.wiley.com/doi/10.1002/9781118410868.wbehbs331/abstract>
- ten Cate O, Hart D, Ankel F, Busari J, Englander R, Glasgow N, Holmboe E, Iobst W, Lovell E, Snell LS, et al. 2016. Entrustment decision making in clinical training. *Acad Med.* 91:191–198.
- ten Cate O, Scheele F. 2007. Competency-based postgraduate training: can we bridge the gap between theory and clinical practice?. *Acad Med.* 82:542–547.
- ten Cate O, Snell L, Carraccio C. 2010. Medical competence: the interplay between individual ability and the health care environment. *Med Teach.* 32:669–675.
- Van Melle E, Gruppen L, Holmboe ES, Flynn L, Oandasan I, Frank JR. 2016. Using contribution analysis to evaluate competency-based medical education programs: it's all about rigor in thinking. *Acad Med.* Available from: <http://dx.doi.org/10.1097/ACM.0000000000001479>
- Wangler M. 2009. Usefulness of CanMEDS competencies for chiropractic graduate education in Europe. *J Chiropr Educ.* 23:123–133.

Appendix

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Implementing competency-based medical education: What changes in curricular structure and processes are needed?

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Implementing competency-based medical education: What changes in curricular structure and processes are needed?

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ABSTRACT

Medical educators must prepare for a number of challenges when they decide to implement a competency-based curriculum. Many of these challenges will pertain to three key aspects of implementation: organizing the structural changes that will be necessary to deliver new curricula and methods of assessment; modifying the processes of teaching and evaluation; and helping to change the culture of education so that the CBME paradigm gains acceptance. This paper focuses on nine key considerations that will support positive change in first two of these areas. Key considerations include: ensuring that educational continuity exists amongst all levels of medical education, altering how time is used in medical education, involving CBME in human health resources planning, ensuring that competent doctors work in competent health care systems, ensuring that information technology supports CBME, ensuring that faculty development is supported, ensuring that the rights and responsibilities of the learner are appropriately balanced in the workplace, preparing for the costs of change, and having appropriate leadership in order to achieve success in implementation.

Introduction

As Caverzagie et al. (2017) discuss in this issue, educators must prepare for many challenges when they decide to implement a competency-based medical education (CBME) curriculum. Many of these challenges will pertain to three key aspects of implementation: organizing the structural changes that will be necessary to deliver new curricula and methods of assessment; modifying the processes of teaching and evaluation; and helping to change the culture of education so that the CBME paradigm gains acceptance. This paper focuses on nine key considerations that will support positive change in the first two of these areas, namely structural and procedural change. A third paper in this issue (Ferguson et al. 2017) discusses changes that will be needed in the culture of education.

Educational continuity

If it is agreed that the innovations that have been made in CBME at the undergraduate and residency training level are appropriate and reflect what we would like the future of medical education to look like, medical educators should also agree that the principles of CBME need to be applied to *all* levels of medical education. Accordingly, the current structure of medical education, whereby undergraduate, postgraduate, and continuing medical education function in silos without integrated processes, should be revised. CBME should begin at the undergraduate level and extend seamlessly into residency, fellowship, and independent practice. This “educational continuity” would be advantageous not only to trainees but also to their supervisors and

Practice points

- Successful implementation of competency-based curricula will require a careful change in the organizational structure of training programs so that new curricula and methods of assessment can be delivered.
- Successful implementation will also require that the processes of teaching and evaluation be modified to support the underlying principles of CBME.
- Clear communication and strong support among all stakeholders involved in the change process will be necessary to an effectual transition to CBME.

patients (Lieberman et al. 2011; Carraccio & Englander 2013).

If the importance of educational continuity is accepted, education stakeholders and policy-makers will need to collaborate to establish policies that support the principles of CBME at all levels of medical education. The principles of CBME – such as incorporating the direct assessment of trainees in learning activities, developing meaningful measures of performance, assisting trainees to develop reflective practice skills, and empowering trainees to take an active role in their learning – apply to all levels of medical education (Lieberman et al. 2011; Carraccio & Englander 2013). By working together, stakeholders and policy-makers will be able to determine which essential competencies must be attained by trainees at which level of training. This should

lead to efficiencies in medical education: trainees entering a new stage of training (for example, residency) will no longer have to be reeducated in the core competencies that should have been mastered at the previous level (for example, in medical school). To promote this change, current organizational policies that limit the transfer of information about trainee performance from one level of training to the next (for example, from undergraduate training to postgraduate training, or from one clinical rotation to the next) may have to be revised (see also Harris et al. 2017, in this issue). Trainee development is best served by a system that promotes and encourages the “forward feeding” of information about performance so that teaching in any subsequent rotation can be focused on continuous improvement.

The dialog between all stakeholders should be clear and open, no matter what level of training they are engaged in. Lessons learned in one center or program with regard to successes and mistakes should be shared with others so that the learning curve does not have to be repeated.

Altering how time is used in medical education

For CBME to be most effective, the current approach of using blocks of time to organize medical education and stand as a proxy for achievement will need to be modified to a more flexible use of time as a resource for learning; this will better reflect the learning curve of trainees and, ultimately, increase efficiency. Recent publications have suggested that moving away from the time-block approach can improve trainee development (Thistlethwaite et al. 2013; Hirsh et al. 2014; Woloschuk et al. 2014). Longitudinal rotations that permit greater continuity between physicians and patients, faculty and trainees, and trainees and other members of the health care team have been shown to enhance the relationships that are critical to foster effective professional development, improve the quality of patient care, and support coaching and feedback (Hirsh et al. 2014; Woloschuk et al. 2014). With sustained observation on longitudinal rotations, faculty can gain a much better idea of trainee competence across all domains, and thus be better equipped to determine how much entrustment they can give to a trainee to provide health care independently. This does not necessarily mean that more time will be needed for training. Rather, the time available will need to be organized such that these critical “continuity relationships” are enhanced, allowing for entrustment decisions to be made at appropriate times in the trainee’s learning curve (Hirsh et al. 2014; Woloschuk et al. 2014).

How training programs will transform current time-based training paradigms to alternative models remains to be seen. A time-free model, in which the trainee graduates from a curriculum only when competence is obtained in all CanMEDS roles or core competencies, no matter how long this takes, would be ideal from the learner’s point of view. That being said, significant practical issues arising from such a model would have to be resolved. Operational processes in the workplace would have to be reorganized (including the scheduling of trainees, which would involve tremendous administrative resources), along with the allocation of financial and material resources. Time-free models also present potential challenges with respect to the

provision of health care services by trainees. For example, if a trainee moves from a given training module earlier than expected, a gap in patient care provision could result unless another trainee is immediately available to step into his or her place.

A hybrid model, in which trainees learn and work in a time-based system that emphasizes a competency-based approach to teaching and assessment, could avoid the risks of the time-free model. Work schedules could be more reliably organized (presumably with less administrative support) to provide patient care.

No matter what model is chosen, it will be important that trainees are afforded flexibility in their program as they work toward the achievement of competence. Trainees must be able to move through learning modules quickly if they are able to do so. If scheduling and staffing issues (as would be seen in a hybrid model) prevent trainees from moving from one module to the next, faculty should be able to enrich the experiences of those who attain basic competencies or milestones sooner than expected. Time and resources must also be provided to remediate training for those found to be dyscompetent or incompetent in any of the core competencies. The challenge for training programs will be to determine how to enable this important flexibility to exist. In addition, as more and more data on the outcomes of CBME are gathered, a better understanding will be gained of how much time is required for trainees to become competent in any one realm of their professional development.

CBME and human health resources planning

If the stakeholders and policy-makers involved in the various levels of medical education can agree on a curriculum built upon educational continuity, then they can also play an important role in helping their respective health care systems prepare for future human health resource needs. By using projections from governmental and professional organizations of how many specialists will be needed to care for certain patient populations (Fraher et al. 2013), training curricula and numbers of training positions can be adapted to meet anticipated demands.

In leading this change, it may be beneficial to implement “health intelligence units” – organizations with a mandate to review health data from a variety of sources and to identify important health problems and trends that should inform both undergraduate and postgraduate medical curricula (Frank 2005). Such units would be responsive to the current and emerging needs of individual communities – within the larger context of national and international trends – by continually profiling the health status and health care needs of the community (Woloschuk et al. 2014). With such foresight, plans can also be made to design interprofessional learning objectives for all health care providers. The development of such curricula is important, as interprofessional learning has been shown to enhance patient care outcomes (Miller et al. 2010).

Competent doctors, competent systems

While a global plan for CBME becomes further organized, it must be recognized that if competent doctors are to be

produced they must work in competent systems that satisfy the needs of society in a responsible and accountable way (Miller et al. 2010; Carraccio & Englander 2013). Ideally, trainees that aim toward exhibiting best practices in all aspects of being a physician should work in a health care system that employs these best practices. This is currently a challenge: remodeling the health care system with the goal of achieving best practices in all aspects of patient care is a large undertaking that will take time and much effort.

In addition, curricula should be developed to empower all stakeholders in health care to learn how to function effectively in a complex system. By learning how to become autonomous, cope with complexity, and develop effective social networks, trainees will be able to work harmoniously with their colleagues to develop an expert system to the benefit of all (Ankel 2013).

CBME and information technology

The means by which curricula are delivered will require reform to make it easier for trainees and their supervisors to access relevant information and assessment tools. Internet-based technologies should be used in all aspects of teaching and assessment (Ward et al. 2001; Ruiz et al. 2006). It is much easier for supervisors to place core content documents on a web server that can be immediately accessed by trainees at any time and place than to manage hard-copy textbooks or printed chapters and journal articles (Ward et al. 2001; Ruiz et al. 2006). E-learning technologies allow learning to be adaptive (that is, to be individualized to learners and their contexts) and collaborative (enhancing learners' interactions with others), and transform the role of the teacher in a way that complements a blended-learning strategy (Ruiz et al. 2006).

In addition, Internet-based technologies should make assessment much more efficient (Ward et al. 2001). Empowering trainees to use web-based assessment forms that can be downloaded from a secure server to a personal smartphone could speed up assessment and feedback. Gone will be the days when staff forget a form in their office and leave an important assessment to a later time. To make this work, medical educators must work with experts in information technology to develop user-friendly applications on secure servers.

In addition, using web-based servers to collate assessments would have the benefit of enabling trainees and their supervisors to access current and previous trainee performance measures at any time, enabling ongoing refinements in the education plan of a trainee to be made. This should help empower residents to play a more active role in their education and to be responsive to the formative and summative feedback provided during their training period.

Faculty development

One of the important concerns that many attending physicians have concerning the implementation of CBME is that they are ill prepared to give the kind of feedback that is expected of them. In addition, they are concerned about the time it will take out of their busy schedules to teach and assess their trainees more effectively. Training centers

at the local level and accreditation bodies at the national level will need to assist attending physicians in developing skills in this regard. As the provision of appropriate summative and formative feedback is an essential tenet of CBME, those who are expected to provide this must be trained appropriately (Bok et al. 2013). If the teachers involved in this process do not accept and support it, CBME will not survive (Dath & Iobst 2010). Even with appropriate support, serious thought should be given to how physicians might be compensated for the extra time and effort that they will take out of their lives and practices to become competent providers of feedback, skills, and knowledge. Although the time spent on such skill development can be used as credits toward the accumulation of continuing professional development hours, financial compensation may also be considered, especially at the outset when novel approaches to teaching and assessment are being implemented. It will be important for those with previous experience in implementing CBME to share their experiences with others so that all involved in this transition are working as efficiently as possible.

Balancing the rights and responsibilities of learners in the workplace

Although the emphasis of CBME will be on assisting the learner to progress through the appropriate levels of competence in all domains of physician performance, trainees and their supervisors must still be mindful of the essential role trainees have as service providers (Kesselheim & Cassell 2013). Call schedules will still have to be filled, and all aspects of patient care will still have to be managed (including administrative tasks such as filling out discharge summaries and prescriptions). There should be no inherent conflict between the roles of trainee and care provider. Rather, patient care should be viewed as an important professional activity through which residents learn, and no patient contact should be without some form of learning (Imrie et al. 2014). Nevertheless, it will be up to trainees to continue to show that they can balance their rights and responsibilities in the workplace. They must recognize that responsibility and graded authority are needed for learning and preparation for practice. Ultimately, it will be up to training programs to ensure that this is done in a manner consistent with safe and efficient patient care.

The costs of change

What will be the cost of implementing such changes? There is no doubt that the financial and human resources needed to bring about change will be significant. For the efficient implementation of CBME reforms, two things must occur. First, lessons learned from centers that have already led the way with CBME should be shared universally so that strengths are built upon and mistakes are not made twice. Second, accreditation bodies, specialty boards, and leaders of specific training centers responsible for leading the charge for CBME must assist training programs in their transformation. Training curricula and assessment tools should be designed for universal use so that individual training centers do not have to create their own tools and forms. Financial support for change may be difficult to

Table 1. Key categories of change to the structure and process of medical education delivery to ensure the successful implementation of CBME.

Category	Key considerations
Educational continuity	CBME should begin at the undergraduate level and continue seamlessly into residency, fellowship, and independent practice.
The use of time in medical education	No matter which model of training is ultimately chosen (time-free or hybrid), trainees must be allowed flexibility in their training programs so that they can achieve competence at an optimal pace.
Human health resources planning	By reviewing health data from a variety of sources, health intelligence units may be able to inform the curricular content of both under- and postgraduate medical education as well as to help plan for current and future human health resources needs at national and local levels.
Competent doctors, competent systems	CBME curricula should be developed to empower all stakeholders in the health care system to learn how to function effectively in an increasingly complex health care system.
Information technology	Current and emerging information technologies should be embraced to make teaching and assessment more effective and timely.
Faculty development	Without appropriate faculty development and support (in the form of remuneration or academic credit), CBME will fail.
Rights and responsibilities of learners in the workplace	Trainees and their supervisors must recognize the essential role trainees have as health care service providers; there should be no inherent conflict between the roles of learner and care provider.
Costs	The financial cost and the time needed by faculty to make changes will be significant. Those leading the change to CBME must provide appropriate support to all those involved.
Leadership	The most important factor in achieving curricular change is appropriate leadership. Leaders should not work alone; it will be important to have champions of CBME located at all levels of an organization to help successfully implement change.

obtain, depending on the jurisdiction of a specific training center; nevertheless, leaders at all levels will have to lobby emphatically and strategically to justify an investment in a training process that should lead to better and more efficient health care. Leaders must ensure that appropriate recognition is given to clinical teachers for their efforts in teaching, observing, and giving feedback in this new paradigm (one could argue that their contribution should be seen as equal to the value of doing research). Without this recognition, all efforts toward CBME have a high chance of failing.

What will it take for the leaders of change to be successful?

Research has shown that the most important factor in achieving curricular change is appropriate leadership (Bland et al. 2000). Successful leaders of change must be stable, assertive yet flexible, able to mobilize others to maintain the change momentum, and able to communicate clearly, to network, and to promote a shared vision for curricular change (Bland et al. 2000). In addition, leaders of change must ensure that their efforts occur in the appropriate context. They must ensure that changes are compatible with the mission and goals of the institution and faculty in question and that specific groups within their organization communicate effectively. Leaders must be able to obtain appropriate resources, not only to provide funding for the initiation of change but also to see that funding continues once the initial support runs out. In order to do this, leaders must be able to work effectively within and outside their specific organizations, since the strong relationships with external bodies can help to secure valuable financial support. Leaders should not work alone; it will be important for champions of CBME located at all levels of an organization to share their enthusiasm for change among others who are not familiar with CBME.

Conclusions

There is no doubt that, to meet the requirements of CBME, significant changes will be needed in the delivery of postgraduate medical education. Key changes to the structure

and process of medical education delivery will include promoting a vision of educational continuity at all levels of medical education; altering the way time is used in medical education so that trainees are able to move through learning modules at their own speed; using human health resources planning resources to help ensure that physicians are able to meet societal needs; ensuring that newly trained competent physicians work in competent health care systems; using information technology to enhance the teaching and assessment of trainees; ensuring that physicians currently in practice who will be teaching and assessing trainees in the CBME paradigm are appropriately trained and compensated; ensuring that trainees and their supervisors fully understand the rights and responsibilities of the learner in the workplace; and ensuring that the leaders of the new initiative, both locally and nationally, appropriately support all stakeholders involved the change (see Table 1 for a review). The effort to initiate and sustain this new initiative will be significant. Nevertheless, despite the trials and tribulations that will undoubtedly occur, it must be remembered that CBME should lead to better-trained physicians and to better patient care.

Disclosure statement

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References

- Ankel F. 2013. "Program Milestones: managing autonomy, context and complexity to build an expert program". Presentation at the 2013 International Conference on Residency Education, Calgary, AB. September 26–26. Ottawa: Royal College of Physicians and Surgeons of Canada; [cited 2016 Jan 3]. Available from: www.youtube.com/watch?v=U3yA2e-oJNo.
- Bland CJ, Starnaman S, Wersal L, Moorehead-Rosenberg L, Zonia S, Henry R. 2000. Curricular change in medical schools: how to succeed. *Acad Med.* 75:575–594.
- Bok HG, Teunissen PW, Favier RP, Rietbroek NJ, Theyse LF, Brommer H, Haarhuis JC, van Beukelen P, van der Vleuten CP, Jaarsma DA. 2013. Programmatic assessment of competency-based workplace learning: when theory meets practice. *BMC Med Educ.* 13:123.
- Carraccio CL, Englander R. 2013. From Flexner to competencies: reflections on a decade and the journey ahead. *Acad Med.* 88:1067–1073.
- Caverzagie KJ, Nousiainen MT, Ferguson PC, ten Cate O, Ross S, Harris KA, Busari J, Bould MD, Bouchard J, Iobst WF, et al.; ICBME Collaborators. 2017. Overarching challenges to the implementation of competency-based medical education. *Med Teach.* 39:588–593.
- Dath D, Iobst W; ICBME Collaborators. 2010. The importance of faculty development in the transition to competency-based medical education. *Med Teach.* 32:683–686.
- Ferguson PC, Caverzagie KJ, Nousiainen MT, Snell L; ICBME Collaborators. 2017. Changing the culture of medical training: an important step toward the implementation of competency-based medical education. *Med Teach.* 39:599–602.
- Fraher EP, Knapton A, Sheldon GF, Meyer A, Ricketts TC. 2013. Projecting surgeon supply using a dynamic model. *Ann Surg.* 257:867–872.
- Frank JR, editor. 2005. The CanMEDS 2005 physician competency framework. Better standards. Better physicians. Better care. Ottawa: Royal College of Physicians and Surgeons of Canada.
- Harris P, Bhanji F, Topps M, Ross S, Lieberman S, Frank JR, Snell L, Sherbino J; ICBME Collaborators. 2017. Evolving concepts of assessment in a competency-based world. *Med Teach.* 39:603–608.
- Hirsh DA, Holmboe E, ten Cate O. 2014. Time to trust: longitudinal integrated clerkships and entrustable professional activities. *Acad Med.* 89:201–204.
- Imrie K, Dath D, Bullock G, Smith R, Fisher R, Frechette D, Harris KA, Jamal M, Kennedy M, Maudsley RF, et al. 2014. The resident's dual role as learner and service provider. In: Harris KA, Frank JR, editors. *Competence by design: reshaping Canadian medical education*; pp. 45–54. Ottawa: Royal College of Physicians and Surgeons of Canada; [cited 2016 Jan 3]. Available from: www.royalcollege.ca/portal/page/portal/rc/common/documents/educational_initiatives/rc_competency-by-design_ebook_e.pdf.
- Kesselheim JC, Cassell C. 2013. Service: an essential component of graduate medical education. *N Engl J Med.* 368:500–501.
- Lieberman SA, McCallum RM, Anderson GD. 2011. A golden opportunity: the coevolution of medical and education homes. *Acad Med.* 86:1342.
- Miller BM, Moore DE, Jr, Stead WW, Balser JR. 2010. Beyond Flexner: a new model for continuous learning in the health professions. *Acad Med.* 85:266–272.
- Ruiz JG, Mintzer MJ, Leipzig RM. 2006. The impact of e-learning in medical education. *Acad Med.* 81:207–212.
- Thistlethwaite JE, Bartle E, Chong AA, Dick ML, King D, Mahoney S, Papinczak T, Tucker G. 2013. A review of longitudinal community and hospital placements in medical education: BEME Guide No. 26. *Med Teach.* 35:1340–1364.
- Ward JPT, Gordon J, Field MJ, Lehmann HP. 2001. Communication and information technology in medical education. *Lancet.* 357:792–296.
- Woloschuk W, Myhre D, Jackson W, McLaughlin K, Wright B. 2014. Comparing the performance in family medicine residencies of graduates from longitudinal integrated clerkships and rotation-based clerkships. *Acad Med.* 89:296–300.



Evolving concepts of assessment in a competency-based world

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Evolving concepts of assessment in a competency-based world

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ABSTRACT

Competency-based medical education (CBME) is an approach to the design of educational systems or curricula that focuses on graduate abilities or competencies. It has been adopted in many jurisdictions, and in recent years an explosion of publications has examined its implementation and provided a critique of the approach. Assessment in a CBME context is often based on observations or judgments about an individual's level of expertise; it emphasizes frequent, direct observation of performance along with constructive and timely feedback to ensure that learners, including clinicians, have the expertise they need to perform entrusted tasks. This paper explores recent developments since the publication in 2010 of Holmboe and colleagues' description of CBME assessment. Seven themes regarding assessment that arose at the second invitational summit on CBME, held in 2013, are described: competency frameworks, the reconceptualization of validity, qualitative methods, milestones, feedback, assessment processes, and assessment across the medical education continuum. Medical educators interested in CBME, or assessment more generally, should consider the implications for their practice of the review of these emerging concepts.

Introduction

Competency-based medical education (CBME) is an approach to curriculum design and trainee assessment whose fundamental aim is to improve the training of health care professionals so that they deliver consistent, high-quality patient care (Carraccio et al. 2002; Frank et al. 2010). CBME strives to systematically enhance abilities in trainees and practitioners, not only ensuring that competence is achieved and maintained, but also encouraging excellence. Assessment plays a critical role in this process (Holmboe et al. 2010). Competency-based assessment is designed to improve the quantity and quality of feedback to learners, including clinicians, while supporting the practice of reflection and the development of skills for lifelong learning; to utilize assessment data as part of a continuous quality improvement process; and, perhaps most importantly, to ensure that patient care is delivered by providers with demonstrated competence in the relevant domains. Substantial progress has been made over the past five years with the development and dissemination of milestones based on competency frameworks (Carraccio & Englander 2014; Frank et al. 2014; Holmboe et al. 2015), along with the exploration of related concepts such as entrustable professional activities (EPAs) (ten Cate et al. 2016). In this issue, Englander et al. (2017) describe the interrelationships of EPAs, milestones, and competencies. This paper reviews evolving concepts in CBME assessment, including competency frameworks, validity, qualitative methods, milestones, feedback, assessment processes, and the learning continuum.

Practice points

- Competency-based medical education requires frameworks that provide an organized structure for learning, reflect the authentic work of practitioners, and provide opportunities for assessment at the "performance" level.
- Qualitative assessment by collectives of supervisors can provide a rich source of data to inform judgment points and summative decisions about progress.
- Validity relates to the degree to which the "evidence" supports the appropriateness of the interpretations and actions made on the basis of the assessment program. It is not a "number."
- Assessment programs set achievement milestones and then determine which unachieved milestones represent barriers to progression for the individual learner.
- Assessment in continuing professional development recognizes that many competencies are truly achieved only through independent practice.

Competency frameworks and CBME assessment

A competency framework is an organized schema composed of statements of the abilities required for effective professional practice. It is designed to reflect the real work of practitioners, encompassing acceptable local practice and aspirations for future practice. It provides a structure

within which learning activities should relate to one or more of the competencies defined by that framework. Medical education premised on competency frameworks not only engages learners in authentic tasks but also emphasizes the “doing” assessment situated at the pinnacle of Miller’s classic description (1990) of clinical competence.

Achieving the goals of CBME requires a robust, programmatic approach to assessment that focuses on workplace-based formative assessment (Holmboe et al. 2010). The approach emphasizes *assessment for learning* (Schuwirth & van der Vleuten 2011) rather than isolated, high stakes, point-in-time, summative examinations of learning. This approach fits well with the Govaerts (2008) description of integrated, context-dependent, demonstrable choices linked to professional domains, and emphasizes the interdependency of tasks and the multiplicity of assessments required for competency. The format of these “assessments” might not reflect traditional examination methods, relying more on tools aligned with clinical practice, and it is essential that learners and clinicians “buy in” to assessment methods that utilize the direct observation and constructive feedback of experts and peers.

In contrast to traditional practice, assessment in CBME presents the challenge of requiring multiple observers of multiple encounters at multiple times with diverse patients (for further details, see Lockyer et al. 2017a in this issue). Summative judgments of competence should not be made in isolation (Holmboe et al. 2010); rather, multiple observations and ratings need to be combined in a manner that conveys a real picture of the trainee to be judged collectively. “Decision moments” need to be disconnected from “assessment moments” (Schuwirth & van der Vleuten 2011), and data collection should continue until it is rich enough to support a summative decision. These data should retain their detail up to the decision point and not be reduced to a series of pass/fail decisions, or even to a series of rankings (Schuwirth & Ash 2013).

Assessment in CBME should focus on improving competence, not simply on identifying incompetence (Schuwirth & Ash 2013). This can be achieved through the practice of *assessment for learning*, in which frequent affirmations of progress are kept separate from higher-stakes summative decision points. There are arguments in favor of continuing the practice of controlled, standardized testing in the “knows,” “knows how,” and “shows how” domains (Miller 1990), since we can use traditional assessments to support the development of underlying knowledge and skills while still acknowledging that “competence is specific, not generic” (van der Vleuten et al. 2010). To examine Miller’s “does” domain, however, assessment has to move to the workplace and incorporate authentic interactions in clinical environments.

Conceptualizing validity in CBME assessment

The validity of an assessment, particularly a summative assessment, is of paramount concern. During the mid-20th century, the adoption of psychometrics in medical education offered a systematic approach to the rigorous interrogation of assessment data in order to determine the accuracy of a judgment. However, it is now understood that traditional representations of validity (i.e. content,

criterion, and construct validity) can result in a limited and superficial understanding of the accuracy of a judgment. Specifically, a traditional psychometric approach allows only quantitative data to inform a judgment of competence (Hodges 2013), often focusing on knowledge or skills that are easy to measure, and leading to overly reductionist surrogates of competence (Govaerts et al. 2007). Many educators, because of issues of feasibility, have studied validity only in relation to a single instrument rather than a program of assessment; this can result in a limited conceptualization of validity (Cook et al. 2014).

More than 25 years ago, Messick (1989, p. 5) proposed a definition of validity that moved past the statistical accuracy of quantitative scores: “Validity is an integrated evaluative judgement of the degree to which empirical evidence and theoretical rationales support the adequacy and appropriateness of inferences and actions based on test scores or other modes of assessment.” Building on this conceptualization, Kane (1992) construed validity as a web of inferences about the “truth” of a summative judgment. By this conception, validity is not a “number” but, rather, an argument that supports the final judgment about “true” physician competence.

Essentially, four key inferences are made in building a validity argument: moving from observation to score; moving from a single to a global score; extrapolating to a summative judgment; and linking these data to the constructs that inform the assessment program (Schuwirth & van der Vleuten 2012; Cook et al. 2015). Ultimately, the truth of the attestation that a physician is competent requires more than a statistic demonstrating the correlation between one number and another; it also requires the examination of each of these four key inferences. We need demonstration of a trainee’s development in a robust assessment program, based on sufficient data to make a valid summative judgment with an acceptably low measurement error.

Assessment in CBME requires the deliberate design of a program of assessment by a group of educators and the use of assessment tools by teaching faculty in a manner that both supports learning and documents performance. Individual assessors may be required to add to the narrative of a trainee’s performance rather than simply recording a mark. These multiple assessment-based judgments will indicate the readiness of the learner to progress in the training program.

Qualitative assessment

By broadening assessment from its traditional focus on the learner’s knowledge to his or her performance in more complex professional activities, CBME requires approaches that integrate the assessment of knowledge, skills, behaviors, and attitudes across multiple domains. Many sources of potentially rich qualitative assessment information are available, such as multi-source feedback, workplace-based assessment, reflection, and portfolio assessment, and are likely to become increasingly prominent as competency-based assessment systems evolve (van der Vleuten et al. 2010). Qualitative approaches are especially useful in assessing what van der Vleuten et al. (2010, p. 709) refer to as “domain-independent competencies” such as

professionalism and in providing actionable feedback to guide learners in their development.

To date, the implementation of qualitative assessment has been hampered not only by the time and effort it demands of faculty and often learners – for example, in the compilation and assessment of portfolios (Donato & George 2012) – but also by an emphasis on the traditional psychometric constructs of reliability and validity, under which qualitative data may fare poorly in comparison with scores obtained through standardized testing. The so-called “psychometric discourse” (Hodges 2006) has inhibited the use and refinement of methods of qualitative assessment in medical education, but as the use of these methods has increased the traditional emphases on reliability and validity has been augmented by new constructs such as trustworthiness and authenticity (Govaerts et al. 2007). For example, van der Vleuten et al. (2010) described three strategies to establish trustworthiness in qualitative assessment by linking each to the qualitative research strategies that support them and potential assessment strategies in medical education. Similarly, Driessen et al. (2005) described five qualitative research strategies used to achieve credibility and dependability in portfolio assessment.

The need for multiple types and points of assessment across a broad range of domains is broadly accepted (van der Vleuten & Schuwirth 2005). Integrating these multiple points of assessment – many of which are qualitative in nature – is itself an exercise in qualitative assessment. We can increase the rigor of this exercise by applying methods of structural coherence and peer examination that have already been established in the practice of qualitative research (van der Vleuten et al. 2010).

Milestones and assessment

CBME promotes the development of milestones that can reflect both progression and exit levels of performance. A milestone is a “defined, observable marker of an individual’s ability along a developmental continuum” (Englander et al. 2017, in this issue). They are criterion-based and, when taken together, chart the developmental journey of a learner through a particular competency or performance. Milestones that incorporate progressive steps align well with an emphasis on deliberate practice and feedback. They provide a clearly articulated basis for expected, sequential behaviors and encourage a shared mental model for learners and assessors that can guide learning. Promotion to the next level of training or responsibility may depend on the achievement of a well-defined exit milestone, and may be accomplished at different rates by different trainees.

Programmatic approaches to assessment rely on milestones set by the training organization to map progress. They are informative for both programs and trainees, and collectively describe an individual’s status at a point in time. They also offer the opportunity for a program to reach its educational goal of “optimising the learning effect for all students” (Schuwirth & van der Vleuten 2014, p. 125), by focusing on individual progress and observing how an individual trainee performs (and, one hopes, improves) on a given task or domain over time. Such repeated personalized data allow a trainee’s educational trajectory to be

tracked and enable the early detection of substandard performance or the option of acceleration where achievement in an area is demonstrated early. Programs need to decide which unachieved milestones should be barriers to a trainee’s promotion and which may be attained later with increased clinical experience.

In addition to program decisions about the achievement of milestones and preparedness to move to the next level of training, trainees require assessment systems to provide them with the tools to develop skill in self-assessment. Current systems of training and assessment have struggled with the challenge of teaching trainees how to assess themselves accurately (Davis et al. 2006) and to carry out reflection-on-practice or reflection-in-practice (Eva & Regehr 2005). CBME approaches, with their focus on evidence of progress, have the potential to develop frameworks and processes for guided self-assessment (Duffy & Holmboe 2006; Galbraith et al. 2008). CBME requires regular communication between teacher and learner to facilitate guided self-assessment; the ultimate goal is to develop enhanced self-reflection skills that will support lifelong learning during independent practice.

Feedback and student outcomes

In comparison with the traditional approach, CBME provides greater understanding and transparency of achievement milestones, and thus improved accountability for both trainees and training organizations. The clearer and more practice-focused competency frameworks used in CBME can also foster improved attention to trainees, given the more frequent use of feedback and assessments. Assessments should identify and encourage desired practice, informing the ongoing development of an educational plan with the goal of reducing the differences between observed and desired practice. Strategies such as the regular review of an individualized learning plan focused on achievements can support this development.

CBME’s substantial focus on the use of formative feedback promotes *assessment for learning* (Black & William 1998; Brown 2004). Formative feedback shared with trainees can help them correct behavior that is ineffective or unsafe, and reinforces behaviors that are effective (Bazrafkan et al. 2013). Regular, high-quality formative feedback that is informative, behavior- and task-specific, based on direct observation, and timely provides trainees with essential information by which they direct their behavior (Ramani & Krakov 2012). The sharing of formative feedback creates a safe environment where learners can gain awareness of their strengths and weaknesses (Bazrafkan et al. 2013). An interesting comparison with respect to giving and receiving feedback can be found in the learning culture of music: medical learners regard self-assessment as a skill to develop, while music students recognize the continuing need for external feedback (Watling et al. 2013).

In the CBME approach, faculty roles in assessment emphasize workplace observations, judgments about the progression of expertise, and a renewed emphasis on deliberate feedback. Assessment needs to link to (and be embedded in) clinical workflow, resonating with practising clinicians so that their participation is maximized and sustained. The increased emphasis on workplace assessment in

CBME should create the opportunity for an open and rich dialogue between learners and their assessors to promote development. Faculty must be skilled in conveying this feedback and in creating a positive and safe environment, and learners will need to be willing to accept critical feedback. In most current training programs, the majority of learners progress successfully. The enhanced clarity offered by milestones allows this progress to be recognized but also encourages learners in difficulty to be part of their own “solution.” A collaborative approach fosters repeated assessment once an area of dyscompetence (Frank et al. 2010) has been identified and remediated. This allows “borderline” residents not to be pushed through as an effect of dichotomous pass/fail judgments, but to truly achieve each significant milestone. Remediation and enrichment are the two sides of the CBME coin (Schuwirth & van der Vleuten 2011).

Many assessment systems currently focus substantial effort and energy on the borderline or failing trainee with a culture that is not adequately prepared to overcome the “failure to fail” (Dudek et al. 2005). CBME challenges educators to assist (or exclude) those progressing more slowly, while shifting more attention to accelerating and challenging learners who are satisfying the standards. In view of the risk that learners may infer that their learning in a particular area is complete on achieving “competence” and fail to appreciate the need for continual learning throughout their career, assessment in CBME needs to develop a language around excellence and not just around the achievement, or failure to achieve, competence.

Assessment in the authentic environment

Holmboe et al. (2010) describe the clinical microsystems in which learning and assessment occur. Work-based assessment related to the deliberate practice of both individual and sets of competencies requires support by frequent formative assessment and multiple observations. Judgments based on multiple observations by multiple assessors have strong face validity. Recent authors, including Moonen-van Loon et al. (2013), describe compilations that reach adequate levels of defensibility.

Recent work exploring the gap between assessors’ observation of performance and interpretation of a rating scale (Crossley & Jolly 2012) noted enhanced agreement when clear clinical anchors were used in an assessment tool. One of the difficulties of assessor training noted by Holmboe et al. (2010) may be reduced by the greater use of recognizable clinical ratings (that is, use the language of clinical assessors) in assessment tools. For the assessors, these multiple observations ought to be shared among the members of a properly constituted competency committee that can function in a “safe place” legally (along the lines of peer-review or morbidity meetings) to allow free discussion about the needs of individual trainees. A flow of information between trainees and a committee of assessors will provide valuable feedback to both and optimize the environment of *assessment for learning*.

There is emerging evidence that the “wisdom of crowds” or a group process in making judgments of competence is important. Since no single method or combination of methods can assess all of the competencies required of a

physician, group judgment can produce the best possible decisions about competence. Additionally, the group process may be better able to identify issues concerning professionalism than cumulative single-assessor tools (Hemmer et al. 2000). Such an approach is already familiar to many medical educators through the use of grading committees for the summative assessment of student or resident clinical performance at binary decision points, such as progression or readiness for independent practice. Faculty support to ensure that adequate time is dedicated for completing work-based assessments and participating in groups that “judge” the overall progression of the candidate is critical.

The fragmented learning environment created by a change of rotations every one or two months results in a lack of continuity in assessment. The perpetual cycle of each assessor (or assessor team) starting from scratch with each learner should not be acceptable. In the clinical context, we do not hand over a patient without sharing clinical details essential for care, and we should expect a similar forwarding of information in the handover of learners. An incomplete handover can create unnecessary risk. Although ownership of the developmental trajectory rests with the learner, it also needs to be shared with faculty to determine whether the appropriate milestones or EPAs are being achieved. In feeding performance results forward, we must balance any risk of biasing subsequent assessors against the value of such information to their entrustment decisions.

The learning and assessment continuum

The untapped promise of CBME is its application beyond undergraduate and postgraduate training and into clinical practice. Medical knowledge is expanding faster than ever with the publication of over 75 new randomized controlled trials and 11 systematic reviews every day (Bastian et al. 2010). It should not surprise us if established physicians are not integrating new medical knowledge as consistently as their junior colleagues (Lipner et al. 2011). Additionally, the decay in knowledge and skills that occurs naturally with infrequent use and the effects of age can be mitigated or at least recognized with a CBME approach to continuing learning and appropriate ongoing assessment (Baxter et al. 2014). As Lockyer et al. (2017b) discuss in this issue, assessment needs to extend beyond the completion of residency training to become routine within clinicians’ continuing professional development (CPD).

Continuing professional development has long recognized that many competencies are realized only with independent practice, and that graduation is simply a waypoint on the journey. Assessment structured around real tasks can motivate continuing learning and provide useful guidance about expected standards of practice. Self-assessment alone is inadequate for identifying learning and performance needs (Eva & Regehr 2005).

CBME can provide a logical structure for information on learning development to flow forward to the next training stage and into CPD. An informative appraisal of achievements can help structure the CPD profile or possibly influence areas of subspecialization or practice focus. These data would, at least, identify milestones that were lagging at graduation and that could benefit from enrichment

during the clinical years immediately after graduation. As this process is a continuum, some modules developed for trainees may be usefully employed in such structured CPD and vice versa.

Conclusions

The rationale for moving to CBME includes a clearer understanding of levels of achievement and improved accountability of both trainees and training organizations. One implication of these clearer and more practice-focused competency frameworks is greater attention to all trainees. Assessment within CBME should be based on competency frameworks and develop an educational plan based on the differences between desired and observed performance. Milestones provide a clear articulation of expected, sequentially acquired behaviors and encourage the formation of a shared mental model to guide learners and assessors. The focus for assessment in CBME is on individual development based on clear, regular, and expected feedback. Assessment in CBME is not simply about meeting bare competence, but is also intended to inspire learners and programs to strive for excellence.

Validity in the context of CBME requires a shift away from the statistical analysis of single tools toward the evaluation of inferences and actions that derive from a *program* of assessment. Authentic workplace-based assessment targeted at the “does” level of Miller’s classic description is critical to this notion of validity. Judgments of progression or competence need to involve the “wisdom of crowds” and to be conducted away from the teacher–learner encounter and away from individual assessment tasks. Qualitative (or narrative) data may be critically important to these discussions. Interaction and supportive feedback promotes *assessment for learning* and creates a culture where they are not only accepted but also desired. Finally, the CBME approach to assessment has considerable potential in CPD, where despite its current underutilization it has the potential to make the largest impact on physician development and patient care.

Many assessment issues related to CBME remain unresolved, and more data on the effective application of this approach are needed. Holmboe et al.’s (2010) description of assessment in CBME has been followed by substantial contributions to the theory and practice of CBME-related assessment. New publications evaluating the impact of competency-based programs have been reported (see Ferguson et al. 2017, in this issue) and we anticipate that further contributions in the near future will help guide subsequent implementation.

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References

- Bastian H, Glasziou P, Chalmers I. 2010. Seventy-five trials and eleven systematic reviews a day: How will we ever keep up? *PLoS Med.* 7:e1000326.
- Baxter AD, Boet S, Reid D, Skidmore G. 2014. The aging anesthesiologist: a narrative review and suggested strategies. *Can J Anaesth.* 61:865–875.
- Bazrafkan L, Ghassemi GH, Nabeiei P. 2013. Feedback is good or bad? Medical residents’ point of view on feedback in clinical education. *J Adv Med Educ Prof.* 1:51–54.
- Black P, William D. 1998. Assessment and classroom learning. *Assess Educ Princ Policy Pract.* 5:7–74.
- Brown S. 2004. Assessment for learning. *Learn Teach Higher Educ.* 1:81–89.
- Carraccio C, Englander RA. 2014. A milestone for the pediatrics milestones. *Acad Pediatr.* 14:S1–S3.
- Carraccio C, Wolfsthal SD, Englander R, Ferentz K, Martin C. 2002. Shifting paradigms: from Flexner to competencies. *Acad Med.* 77:361–367.
- Cook DA, Brydges R, Ginsburg S, Hatala R. 2015. A contemporary approach to validity arguments: a practical guide to Kane’s framework. *Med Educ.* 49:560–575.
- Cook DA, Zendejas B, Hamstra SJ, Hatala R, Brydges R. 2014. What counts as validity evidence? Examples and prevalence in a systematic review of simulation-based assessment. *Adv in Health Sci Educ.* 19:233–250.
- Crossley J, Jolly B. 2012. Making sense of work-based assessment: ask the right questions, in the right way, about the right things, of the right people. *Med Educ.* 46:28–37.
- Davis DA, Mazmanian PE, Fordis M, Van Harrison R, Thorpe KE, Perrier L. 2006. Accuracy of physician self-assessment compared with observed measures of competence: a systematic review. *JAMA.* 296:1094–1102.
- Donato AA, George DL. 2012. A blueprint for implementation of a structured portfolio in an internal medicine residency. *Acad Med.* 87:185–191.
- Triessen E, van der Vleuten CPM, Schuwirth LWT, van Tartwijk J, Vermunt J. 2005. The use of qualitative research criteria for portfolio assessment as an alternative to reliability evaluation: a case study. *Med Educ.* 39:214–220.

- Dudek NL, Marks MB, Regehr G. 2005. Failure to fail: the perspectives of clinical supervisors. *Acad Med.* 80:584–587.
- Duffy FD, Holmboe ES. 2006. Self-assessment in lifelong learning and improving performance in practice: physician know thyself. *JAMA.* 296:1137–1139.
- Englander R, Frank JR, Carraccio C, Sherbino J, Ross S, Snell L; ICBME Collaborators. 2017. Toward a shared language for competency-based medical education. *Med Teach.* 39:582–587.
- Eva KW, Regehr G. 2005. Self-assessment in the health professions: A reformulation and research agenda. *Acad Med.* 80:546–554.
- Ferguson PC, Caverzagie KJ, Nousiainen MT, Snell L; ICBME Collaborators. 2017. Changing the culture of medical training: an important step toward the implementation of competency-based medical education. *Med Teach.* 39:599–602.
- Frank JR, Snell LS, ten Cate O, Holmboe ES, Carraccio C, Swing SR, Harris P, Glasgow NJ, Campbell C, Dath D, et al. 2010. Competency-based medical education: theory to practice. *Med Teach.* 32:638–645.
- Frank JR, Snell LS, Sherbino J, editors. 2014. *Draft CanMEDS 2015 Milestones Guide – September 2014.* Ottawa: Royal College of Physicians and Surgeons of Canada.
- Galbraith RM, Hawkins RE, Holmboe ES. 2008. Making self-assessment more effective. *J Contin Educ Health Prof.* 28:20–24.
- Govaerts MJB, van der Vleuten CPM, Schuwirth LWT, Muijtjens AMM. 2007. Broadening perspectives on clinical performance assessment: rethinking the nature of in-training assessment. *Adv Health Sci Educ Theory Pract.* 12:239–260.
- Govaerts MJB. 2008. Educational competencies or education for professional competence? *Med Educ.* 42:234–236.
- Hemmer PA, Hawkins R, Jackson JL, Pangaro LN. 2000. Assessing how well three evaluation methods detect deficiencies in medical students' professionalism in two settings of an internal medicine clerkship. *Acad Med.* 75:167–173.
- Hodges B. 2006. Medical education and the maintenance of incompetence. *Med Teach.* 28:690–696.
- Hodges B. 2013. Assessment in the post-psychometric era: learning to love the subjective and collective. *Med Teach.* 35:564–568.
- Holmboe ES, Sherbino J, Long DM, Swing SR, Frank JR; International CBME Collaborators. 2010. The role of assessment in competency-based medical education. *Med Teach.* 32:676–682.
- Holmboe ES, Yamazaki K, Edgar L, Conforti L, Yaghmour N, Miller RS, Hamstra SJ. 2015. Reflections on the first 2 years of milestone implementation. *J Grad Med Educ.* 7:506–511.
- Kane MT. 1992. An argument-based approach to validation. *Psychol Bull.* 112:527–535.
- Lipner R, Song H, Biester T, Rhodes R. 2011. Factors that influence general internists' and surgeons' performance on maintenance of certification exams. *Acad Med.* 86:53–58.
- Lockyer J, Bursley F, Richardson D, Frank JR, Snell L, Campbell C; ICBME Collaborators. 2017a. Competency-based medical education and continuing professional development: a conceptualization for change. *Med Teach.* 39:617–622.
- Lockyer J, Carraccio C, Chan MK, Hart D, Smee S, Touchie C, Holmboe ES, Frank JR; ICBME Collaborators. 2017b. Core principles of assessment in competency-based medical education. *Med Teach.* 39:609–616.
- Messick S. 1989. Validity. In: RL Linn, editor. *Educational measurement*, 3rd edition. New York: American Council on Education and Macmillan.
- Miller GE. 1990. The assessment of clinical skills/competence/performance. *Acad Med.* 65:563–567.
- Moonen-van Loon JMW, Overeem K, Donkers HHLM, van der Vleuten CPM, Driessen EW. 2013. Composite reliability of a workplace-based assessment toolbox for postgraduate medical education. *Adv in Health Sci Educ.* 18:1087–1102.
- Ramani S, Krakov SK. 2012. Twelve tips for giving feedback effectively in the clinical environment. *Med Teach.* 34:787–791.
- Schuwirth LW, van der Vleuten CPM. 2011. Programmatic assessment: from assessment of learning to assessment for learning. *Med Teach.* 33:478–485.
- Schuwirth LWT, van der Vleuten C. 2012. Programmatic assessment and Kane's validity perspective. *Med Educ.* 46:38–48.
- Schuwirth L, Ash J. 2013. Assessing tomorrow's learners: in competency-based education only a radically different holistic method of assessment will work. Six things we could forget. *Med Teach.* 35:555–559.
- Schuwirth LWT, van der Vleuten C. 2014. Assessing competence: extending the approaches to reliability. In: Hodges B, Lingard L, editors. *The question of competence.* Ithaca (NY): Cornell; p. 125.
- ten Cate O, Hart D, Ankel F, Busari J, Englander R, Glasgow N, Holmboe E, Iobst W, Lovell E, Snell LS, et al. 2016. Entrustment decision making in clinical training. *Acad Med.* 91:191–198.
- van der Vleuten CPM, Schuwirth LWT. 2005. Assessing professional competence: from methods to programmes. *Med Educ.* 39:309–317.
- van der Vleuten CPM, Schuwirth LWT, Scheele F, Driessen EW, Hodges B. 2010. The assessment of professional competence: building blocks for theory development. *Best Pract Res Clin Obstet Gynaecol.* 24:703–719.
- Watling C, Driessen E, van der Vleuten CP, Vanstone M, Lingard L. 2013. Music lessons: revealing medicine's learning culture through a comparison with that of music. *Med Educ.* 47:842–850.



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Core principles of assessment in competency-based medical education

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ABSTRACT

The meaningful assessment of competence is critical for the implementation of effective competency-based medical education (CBME). Timely ongoing assessments are needed along with comprehensive periodic reviews to ensure that trainees continue to progress. New approaches are needed to optimize the use of multiple assessors and assessments; to synthesize the data collected from multiple assessors and multiple types of assessments; to develop faculty competence in assessment; and to ensure that relationships between the givers and receivers of feedback are appropriate. This paper describes the core principles of *assessment for learning* and *assessment of learning*. It addresses several ways to ensure the effectiveness of assessment programs, including using the right combination of assessment methods and conducting careful assessor selection and training. It provides a reconceptualization of the role of psychometrics and articulates the importance of a group process in determining trainees' progress. In addition, it notes that, to reach its potential as a driver in trainee development, quality care, and patient safety, CBME requires effective information management and documentation as well as ongoing consideration of ways to improve the assessment system.

Introduction

A major challenge in implementing competency-based medical education (CBME) is the meaningful assessment of competence. The shift to CBME has raised awareness of the limitations of existing assessment methods (see Harris et al. 2017, in this issue) and the need to develop strategies to assess the competencies expected of today's physicians in an era characterized by increasing interdependence among health care professionals, the recognition that patient safety is everyone's responsibility, and an expectation of transparency and accountability.

In designing assessment programs, it is critical to articulate its purpose. Two fundamental and yet essentially different rationales are *assessment of learning* and *assessment for learning*. Before the introduction of CBME, the former was emphasized; however, as CBME becomes established, the focus is shifting to *assessment for learning*. Van der Vleuten et al. suggest that "whenever assessment becomes a goal in itself, it is trivialized and will ultimately be abandoned. Assessment has utility insofar as it succeeds in driving learning, is integrated in a routine and ultimately comes to be regarded as indispensable to the learning practice." (2010, p. 712). Thus, if the primary purpose in assessment in CBME is to drive learning, and our secondary purpose is to make judgments about readiness to progress, we need to design assessment programs accordingly (van der Vleuten et al. 2012). *Assessment for learning* aligns with other foundational principles of CBME, including active trainee involvement in learning and assessment, the creation of an authentic environment for learning and assessment, the use of direct

Practice Points

- Competency-based medical education (CBME) relies on a program of assessment that includes multiple methods and multiple assessors and is embedded within an effective educational system.
- Assessment for learning plays a prominent role in CBME, since formative feedback is an essential element of developing competence.
- Faculty development to create a shared mental model of required learner behavior and expected levels of performance is foundational to CBME.
- Variance in assessor rating is not all attributable to error; some variance reflects a different lens through which an assessor sees a learner.
- The assessment instrument is primarily the individuals who conduct the assessment, rather than the tools and forms they use. As such, individuals using assessment tools and forms need training.

observation, and an emphasis on formative feedback. *Assessment of learning* aligns with the continuing need to gauge progress against targeted outcomes and criterion-referenced standards (Carraccio et al. 2002).

In a plea for new psychometric models, Schuwirth and van der Vleuten (2006) proposed that, rather than asking only whether a learner has achieved a predetermined outcome, we pose a more critical question: How big is the risk of the student performing below the standard in a future case given his or her history and the current observation?

Table 1. Overview of assessment methods aligned with Miller's pyramid^a.

Stage	Corresponding methods to assess performance
Does	Chart/electronic medical record review (e.g. medical decision-making, cost-effective care, documentation) "Collective perspective"/clinical competency committee/residency education committee decisions Direct observation in clinical environments Efficiency data End-of-rotation evaluations Multi-source feedback/360-degree Patient outcomes data, including patient-reported outcome measures Portfolio ^b Procedure or case log with reflection and/or assessment Product review (e.g. splint, laceration repair) Project review (e.g. evidence-based medicine project, quality improvement project) Video review from clinical environments
Shows how	Objective structured clinical examination/standardized patient encounter Oral case presentation Simulated case Skills station Virtual reality/computerized patient management problem
Knows how	Chart-stimulated recall Development of individualized learning plan Mock oral boards examination/progressive case disclosure Oral questioning targeting patient management Written assignment/essay test
Knows	Multiple-choice questionnaire/short-answer test/audience response system Oral questioning targeting fact recall

^aAdapted from Nyquist (2014); Hawkins & Holmboe (2017).

^bPortfolios may fall under various stages of Miller's pyramid, depending on what is included.

Educational systems need to maximize the probability that a physician graduating from residency training can provide safe, effective, patient-centered care (Holmboe et al. 2004; Norcini et al. 2011; Kogan et al. 2014). To meet this purpose, the elements of an assessment program include actions (collecting, synthesizing, interpreting, and assigning weight to information); support (faculty development and psychometric analysis); documentation (rules, blueprints, and information management); improvement (with regard to research, development, the learning environment, and change management); and accountability (with regard to scientific research, external review, cost effectiveness, and political and legal requirements) (Dijkstra et al. 2010).

Moreover, assessment in CBME should not end with residency training. Eva et al. suggest we "prioritize continuous professional development in a manner that enhances a shared model of responsibility/accountability between practitioners and educational programs/testing organizations" (2013, p. 3). Competence is not something one can attain once and for all: there will always be another context or occasion that necessitates reassessment (Eva et al. 2013).

Our vision for meaningful competency-based assessment should include (1) timely ongoing assessments, with comprehensive periodic reviews to ensure continued progress (Archer 2010); (2) the best use of multiple assessors and assessments to enable the right assessment to be made at the right time for the right purpose, while avoiding assessor fatigue (Norcini et al. 2011; Hodges 2013); (3) a synthesis of data collected through group processes to reach judgments about competence; (4) faculty development for all assessors, who, as observers of trainees in the workplace, are the true measurement instrument; and (5) optimized relationships between the givers and receivers of formative feedback to enhance the incorporation of feedback into practice (Watling et al. 2012).

If these emerging issues are not addressed, we risk creating assessment systems that are burdensome and uninformative. This paper examines current recommendations from the literature relating to assessment and assessors.

First, we describe the core principles of assessment *for and of learning*. Then, we describe how assessment can be optimized through multiple methods and multiple assessments, assessor selection and training, a reconceptualization of the role of psychometrics, and a recognition of the importance of group processes. Finally, we discuss information management and documentation and ways to improve assessment programs.

Core assessment principles of CBME

The first step in planning CBME assessments is to determine what information is necessary to ascertain whether goals are being met. Given that the two goals – *assessment for learning* and *assessment of learning* – are different, so too are the information management strategies for each.

Assessment for learning

Miller (1990) identified four levels of learning, conceptualized as a pyramid. Beginning at the base, the learner "knows," and then proceeds through "knows how" and "shows how" before reaching the apex, "does" (Table 1). The assessment strategies tied to each level inform and contribute to learning as well as assessment, provided that formative feedback is given. At the "does" level, assessment becomes part of the authentic context in which one works and learns; learning provides deeper meaning for the trainee and builds a substrate for the cognitive processes of clinical decision-making (Eva 2005).

The active engagement of learners in their own learning has long been understood as crucial to developing skills in lifelong learning (Dewey 1974; Knowles 1975). Assessment should be performed *by and with* the learner. Two strategies that embody this principle are informed self-assessment, whereby the learner is encouraged to draw on data from credible external as well as internal sources to guide learning (Sargeant et al. 2010), and the use of portfolios, which encourage learners to document and reflect

on their learning (van Tartwijk & Driessen 2009). Both strategies can have a significant impact on a trainee's ability to improve performance.

It is difficult to accurately assess oneself (Eva & Regehr 2007). However, when self-assessment involves reflection, particularly "reflection-in-action," it allows the learner to know when to stop and ask for feedback or help (Eva & Regehr 2005). This behavior is termed "self-directed assessment seeking" (Eva & Regehr 2008). Pelgrim et al. (2013) demonstrated the connection between the specificity of the feedback given by faculty and the subsequent specificity of reflections by learners, and showed that this alignment promotes the formulation of action plans, which the authors used as a proxy for the incorporation of feedback into practice. Sargeant et al. (2011) also found that informed self-assessment, especially when combined with feedback, can be a powerful catalyst for professional growth.

Likewise, the fact that CBME and portfolio assessment share certain principles creates synergies when portfolios are used to assess competencies. Here we use a broad definition of a portfolio as a framework and process for collecting, analyzing, and documenting the successful acquisition of competence and performance (Holmboe et al. 2008). Fundamental to both is the active engagement of the learner in the process, leading to assessment as the "teachable moment." The use of portfolios is best conceived in an active sense: "to portfolio" (Friedman Ben David et al. 2001). Moreover, portfolios, particularly electronic versions, contribute to both the effectiveness and the efficiency of information management by stimulating reflection and informed self-assessment, providing a longitudinal view of learner development and organizing the myriad of assessments from multiple assessors using multiple tools.

Assessment of learning

Training outcomes must now go beyond the traditional domains and encompass a broad range of abilities as captured in competency frameworks such as the CanMEDS Roles (Frank & Danoff 2007), the Accreditation Council for Graduate Medical Education (ACGME) Core Competencies (Swing 2007), or Good Medical Practice (General Medical Council 2013). This presents new challenges for assessment. Further, Kogan and Holmboe (2013) and Hodges (2013) recommend expanding assessment beyond single patient-provider encounters to embrace competencies such as population care and teamwork.

Traditionally, assessment has focused on educational outcomes such as the acquisition of knowledge or the demonstration of certain competencies in controlled settings. With CBME comes a shift to work-based assessment, and our thinking must shift to assessments that take into account the impact of trainees' competence on the quality of care provided to the patient (Kogan & Holmboe 2013). Medical education will need to embrace a continuous quality-improvement process to ensure that innovation in education leads not only to improved learner outcomes but also to better patient care, the latter being the ultimate goal.

Optimizing assessment

Optimizing an assessment program in the era of CBME will require (1) multiple methods; (2) multiple assessors; (3) the

selection and training of assessors; (4) a reconceptualization of the role of psychometrics; and (5) a recognition of the importance of group process in reaching critical decisions about competence.

Multiple methods

Various assessment modalities are possible in CBME. The information sought, the level of performance, the learner's stage within Miller's pyramid (Miller 1990), and the institution's capabilities can all influence the choice of assessment technique.

An assessment program should collect information purposefully, using both structured and unstructured measures; it should value quantitative and qualitative data and ensure that the richness and rigor of the data used align with the stakes of the decision being made (Schuwirth & Ash 2013). A comprehensive program must include non-standardized methods if it hopes to gather information that supports inferences about future real-world practice (van der Vleuten et al. 2012).

Because all assessment methods have their limitations, multiple methods are needed to compensate for the shortcomings of any one technique (van der Vleuten 1996). Similarly, using quantitative and qualitative data in combination can bring greater meaning to learner assessment. Traditionally, the focus has been on quantitative data, which were equated with objectivity and reliability (sometimes at the expense of real-world validity). However, qualitative methods of assessment are rigorous, provided they incorporate strategies to establish the trustworthiness of the data (van der Vleuten et al. 2010); thus, work-based assessments, which rely on qualitative data, can be both defensible and desirable. To realize the promise of CBME, medical educators and training programs will need to embrace the "messiness" of work-based assessment and its reliance on qualitative data.

Multiple assessors

Just as we need multiple methods of assessment to compensate for the shortcomings of any one method, so do we need multiple assessors to compensate for rater shortcomings such as biases, halo effects, and leniency. In the past, such shortcomings have shifted assessment strategies away from expert global judgments and toward more "reliable" checklists, such as those used in observed structured clinical examinations. However, subsequent comparisons of expert judgments with checklists yielded the surprising finding that the former were more reliable (Regehr et al. 1998).

As our understanding of the value of expert opinion has advanced, a growing body of literature is focusing on the unexpected variance in rater judgment, previously attributed to "noise," that occurs when two raters witness the behavior of one individual in the same encounter. Rater training has been shown to be helpful in calibrating raters and in addressing some – but not all – of this variance. Gingerich et al. (2011) postulate that raters spontaneously categorize new individuals on the basis of preformed schemas of interactions with previous individuals, in much the same way as pattern recognition influences clinical

decision-making. These schemas or narratives might not be readily translated into the numerical judgments typically required of most rating scales, thus accounting for some of the unexpected variance. Therefore, a rater-based assessment program that incorporates qualitative assessments may be more effective. Factors such as the time allowed to observe the learner and to complete the rating, as well as the expertise of the rater relative to the content of the assessment, are also important to the outcome (Govaerts et al. 2011; Yeates et al. 2012).

Assessor selection and training

More often than may be acknowledged, assessor selection depends on who is available, who volunteers, who has formal assessment responsibilities, and who can be convinced to perform the assessment for a specific task or event. Those recruited are assumed to have the knowledge of the competencies being assessed by virtue of their medical training and area of practice. Secondary consideration, if any, is given to the assessors' skills as an observer and assessor.

One of the primary reasons to train assessors is to ensure that patients cared for by learners receive safe, effective, patient-centered care (Kogan et al. 2014). When we think about assessment as a domain of expertise (Govaerts et al. 2011), we need to think about how someone becomes a competent assessor. The knowledge required is at least twofold: knowledge of the competencies being assessed (Ponnamperuma 2013), and an understanding of the observational and recording tasks intrinsic to the assessor role (Kogan & Holmboe 2013). A supervising clinician who contributes to the summative assessment of senior learners will need considerable skill in the competencies being assessed and, arguably, should already have experience as an assessor. Moving to CBME will challenge institutions to create educational communities in which assessment is integrated into learning and, moreover, the acquisition of assessment skills is integrated into teaching.

Generally speaking, training provides assessors with the opportunity to become familiar with the goals of assessment and with assessment instruments. Although the need for such training seems clear, how to go about it is not always so. Various approaches to assessor training have been developed (e.g. Woehr & Huffcutt 1994), although these have been researched predominantly in the context of personnel appraisal (Woehr & Huffcutt 1994; Smithers 1998) and assessor training research has been conducted only recently in the context of medical education.

The techniques that show some promise in the field of assessor training are behavioral observation training (BOT), performance dimension training (PDT), and frame of reference training (FoRT). BOT familiarizes assessors with observation processes and improves observation skills by means of three strategies: increased frequency of the observation (the "practice makes perfect" principle); proper preparation for observations; and provision of simple tools to record observations (Holmboe et al. 2008). PDT is an interactive group process that assists assessors in learning and applying behavioral criteria and standards for competencies and is an important precursor of FoRT (Holmboe et al. 2004). FoRT is also an interactive process that seeks to align

assessor judgments with a common criterion-based frame of reference to enable assessors to make accurate distinctions between levels of performance (Lievens 2001; Kogan et al. 2014). Both PDT and FoRT rely on the use of case material (video tape review, objective structured teaching examination, etc.) for learning and deliberate practice.

Assessor training must be both feasible and meaningful, and it must be integrated into ongoing faculty development. Training in assessment cannot overcome all the limitations inherent in rater cognition (Gingerich et al. 2011; Yeates et al. 2012; Govaerts & van der Vleuten 2013), and much research into effective rater training is needed. Assessment ability is acquired, not innate; it requires deliberate practice and refinement over time (Berendonk et al. 2013; Govaerts et al. 2013; Kogan & Holmboe 2013). Therefore, one-time training interventions, no matter how appropriate, are insufficient.

Reconceptualizing the role of psychometrics

Two decades ago, the merits of limiting assessment decisions to traditional psychometric approaches came into question. Van der Vleuten (1996) expanded thinking around assessment, defining assessment utility as the product of reliability, validity, cost, practicality, and educational impact. More recently, Norcini et al. (2011) concluded that a "good assessment" should be characterized by validity or coherence; reproducibility or consistency (reliability); equivalence with other assessment approaches; feasibility; acceptability; and a consideration of the educational effect and/or the catalytic effect on learning.

At the same time, traditional thinking about reliability and validity was questioned. Hodges (2013) pointed out that the notion of *subjectivity* had taken on the connotation of *bias*, and that standardization was touted as the ticket to reliability, even though adequate sampling mitigates bias (Eva & Hodges 2012) and is the main determinant of reliability (van der Vleuten & Schuwirth 2005). One can have objective measures (such as standardized checklists) that yield unreliable scores, and subjective measures (such as expert judgments using global rating scales) that provide reliable scores (van der Vleuten 1996). Thinking about validity has also evolved. Validity is no longer seen as an inherent property of a tool. Instead, validity evidence is something that we accumulate, on the basis of the methods and tools that we use, to support the decisions we make. Building evidence of validity is a process that begins with articulating the inference or judgment we want to make. From there, we identify the best evidence needed to support that judgment, collect the evidence using appropriate sampling with multiple methods, and develop faculty members who can effectively use the tools to assess learners and provide them with feedback on their performance (Kane 2013).

Since the introduction of CBME, a common practice has been to reduce competencies to small units of behavior for the purposes of assessment. This "atomization" can lead to trivialization and may actually threaten validity (van der Vleuten & Schuwirth 2005). Hodges (2013) also highlights the threat to validity posed by the "opposite" practice of aggregating sub-scores from instruments with different purposes to "reconstitute competence." The introduction of

entrustable professional activities (EPAs) (ten Cate & Scheele 2007; ten Cate 2013), in which progressive levels of supervision and delegation lead to independent practice, and the Milestone Project (Nasca et al. 2012), which uses narrative descriptions of behaviors for the levels of performance related to competencies, respond to these concerns.

Hodges (2013) sums up much of the new direction in psychometric discourse in the title of his article "Assessment in the post-psychometric era: Learning to love the subjective and collective." He suggests that a "collective perspective" can frame both data-gathering and the aggregation and interpretation of independent judgments. The use of an assessment framework that integrates EPAs and milestones supports this "both/and" approach. Holistic assessment based on EPAs, which are professional activities that require integrated competencies, in combination with milestones, which provide a more granular description of individual competencies and the substrate of formative feedback, will advance competency-based assessment.

Importance of group process

Although assessment processes and research have typically focused on the assessment of one individual by another, or of an individual method such as a knowledge exam, interest is growing in the use of group processes to improve judgments of overall competence. Invoking the "wisdom of crowds," Surowiecki (2005) describes how good group process can be employed in decision-making. Despite the need for multiple assessors, no combination of assessors and assessment methods can measure "all things." A synthesis process is still essential, and group judgment may provide the best means of maximizing the reliability of entrustment decisions. There is some evidence in medicine to support the "wisdom of crowds" principle. Hemmer et al. (2000) found that many deficiencies in professionalism were detected and discussed only in a group evaluation session. Schwind et al. (2004) found that 18% of competency deficiencies in a surgery residency were detected only during discussion at a clinical competency committee. A group process conducted by clinical competency committees is now a required component of the Next Accreditation System in the United States for graduate medical education (Nasca et al. 2012).

Information management and documentation

Shifting to CBME exposes the unmet challenges of learner assessment that had defined the status quo. Attempts to address these challenges have provoked many faculty and program directors to voice concern about the potentially prohibitive assessment burden of CBME. This concern is valid, as faculties will need to assess broad and diverse competencies, to engage in faculty development to produce better assessors, and to widely sample learner progress so that the reliability of expert judgments is enhanced. For CBME to be successful, strategies to mitigate the impact of the change must be employed; the use of technology can be helpful in this regard.

The Internet, handheld devices, innovative software, and other technologies have the potential to facilitate

CBME (Table 2). Connected platforms for the dissemination and collection of assessments, along with a relational database that facilitates the aggregation and analysis of data will be critical. Currently, data synthesis and aggregation are done manually at great expense of time and effort. With these developments, technology can (1) prompt reflection on performance at the individual and program level; (2) inform progression decisions and other important judgments about learners; (3) provide individual learner feedback regarding skill progression along a developmental continuum; (4) create dashboards (graphic representations of an individual's or program's performance against a reference group) to stimulate trainees' reflection on learning needs and performance gaps; and (5) create dashboards for program directors to compare individual and aggregate learner progress with local and national peer groups in other programs as well as to provide comparisons against national or international standards (Schumacher et al. 2014).

Such technologies can facilitate assessment from undergraduate training through to continuing professional development. Technologies could play a role in formative and summative assessments, in both low-stakes and high-stakes contexts, including for certification and revalidation or maintenance of certification. However, maintaining the security of patient and learner data will be critically important.

There are three documentation issues to highlight: assessment program auditing, transparency, and accountability. The audit trail, which is part of the validity evidence for qualitative assessment, is likewise an important component of the validity evidence for any high-stakes decision. Auditing establishes trustworthiness by addressing the dependability or conformability of a judgment (van der Vleuten et al. 2010). Auditing involves documenting the process, supporting the outcome (e.g. if learners question a decision), and providing evidence of quality for external reviewers. The clinical competency committee required by the ACGME for assessing learner milestones sets the stage for auditing documentation going forward (Nasca et al. 2012). Transparency goes hand in hand with creating an audit trail, and documenting the rules, evidence, thought processes, and reasons for decision-making are essential to both. Taking assessment beyond a judgment based on a set of scores to a judgment that includes an interpretation of those scores should be more trustworthy in the end (Govaerts & van der Vleuten 2013). A robust and transparent program of assessment should ideally make the "summative" decisions about learner performance for the benefit of the public more, rather than less, straightforward. Ultimately, there has to be accountability. Those who synthesize and reach decisions are responsible to the trainee and to the larger health care system that trusts their judgments about a physician's ability to progress further.

Improving the assessment system

Dijkstra et al. (2010) and van der Vleuten et al. (2012) make a strong case for creating an assessment program that allows for both ongoing learner assessment and program evaluation. Programs that can forward information from one phase of learning to the next will enable learners to

Table 2. Information management options and uses for assessment^a.

Tools and materials					
Type	Examples	Uses	CanMEDS Role assessed ^b	Benefits	Challenges
Computers and tablets Mobile technology	Audience response systems (clickers) and smartphones Computers on wheels, desktop or laptop computers and tablets	Access to websites, programs, email communications, and documents Interactive feedback Part of toolkit in summative assessment methods, e.g. within OSCEs (S) Point of care and "just in time" information searches, e.g. assessment of scholarly and time-management skills (F) Pre- and post-session quizzes (F/S)	All	Can provide teachers and learners alike with a gauge to learning through pre- and post-session questions Ease of search, mobility Immediacy of feedback User comfort high	Upfront costs of mobile devices Uploading of software onto computer to use mobile technology
Web-based	CanMEDS Interactive http://canmeds.royal-college.ca/ Curriculum management systems Electronic surveys	Accessible via mobile or desktop platforms Direct observation forms, multi-source feedback forms (F) Final in-training assessment forms (S) Houses educational standards, materials, and tools Reflection, self-assessment and documentation re activities within the Intrinsic Roles Role-specific assessment tools (F)	All	Access at point of care or teaching Can be useful for bedside teaching, direct observation, etc. (i.e. work-based assessments) Reduced effort in sending forms, data collation, and report generation; improved convenience for users of forms; improved completion and return	High cost (although some are free of charge)
Digital	Electronic medical record Health electronic record	To support chart audits and related workplace-based assessments (F/S)	Communicator (written) Medical Expert	Potential to track completeness of charting, quality of computerized order entry, documentation, etc., as well as patient outcomes such as length of stay and complication rates. When decision support systems are built in, can prompt use of clinical practice guidelines or standardized protocols or redirect a provider when ordering an inappropriate test. The flagging by such systems can be monitored and used to enhance assessment	Different software do not share data for inter-center collaboration or communication High cost (upfront startup and maintenance costs and human resources)
Audio and video	Electronic portfolio/logbook with audio, video, and/or text entries	Reflection, self-assessment, and documentation of cases, procedures, narratives (F) Sampling of reflection, self-assessment, and documentation of cases, procedures, narratives may be used as part of toolkit (S)	Communicator Professional	On-hand documentation, criteria for assessment on hand, prior learning needs available for review, ongoing updating, reflection	Human resources needed for faculty required to support assessment time, faculty development
Social networks	Group webpages, wikis, blogs, Twitter, etc.	Assessment of professionalism in terms of communication by voice, chat, instant messaging, video conferencing, blogs, and tweets in an interactive learning environment.	Communicator Professional	Ease of sharing information Increased learner-learner interaction and learner motivation as well as learner-teacher interactions Multiple modalities of data available to meet different learner needs	Assessors and organizations need to consider issues of privacy and confidentiality regarding use of data for assessment purposes Determining quality of the data Managing a large volume of data
Virtual classroom	Communication between learners as well as with teachers via webcam, microphone, and real-time chatting Telehealth/web conferencing systems, e.g. Go-To-Meeting or Adobe Connect, to simulate classroom or meetings	To increase opportunities for learners to demonstrate role as Scholar/Teacher (e.g. facilitate teaching sessions) or Manager/Collaborator Role (e.g. attend meetings) (F/S) Polls, quizzes (F/S)	Collaborator Leader Scholar	Can connect teachers and learners across different sites. Increased connectivity for learners with program, especially if programing is shared across multiple sites Synchronous or asynchronous use	High cost; dependence on Internet connection quality
Learner management systems	Blackboard and other web-based learning management systems	Submission and tracking tools for online assessment (synchronous or asynchronous) (F/S) To track attendance, time on task, learner progress patterns	Leader Professional	Secure content management and sharing as well as supporting virtual collaboration Online assessments, learner tracking, and assignment management	Dependence on Internet connection quality High cost (startup, maintenance, and human resources)

(continued)

Table 2. Continued

Tools and materials					
Type	Examples	Uses	CanMEDS Role assessed ^b	Benefits	Challenges
Intelligence tools	Procedural models, games, virtual reality, dexterity analysis devices (through motion tracking), computer modeling, etc.	Part of toolkit within simulation-based summative assessment methods (S) To provide controlled contexts that support provision of feedback (F)	Medical Expert	Electronic reminders for both faculty and learners Synchronous or asynchronous use Can support learning about rare cases and/or learning for high-risk environments. More elaborate assessments including team performance can be assessed in venues such as simulated operating suites or in situ simulation whereby a clinical space is used to stage the simulation	High cost (startup, maintenance, and human resources)

F: formative; S: summative; OSCE: Objective Structured Clinical Examination.

^aAdapted from: Felkey et al. (2005); Courts & Tucker (2012); Hicks et al. (2014); "Educational technology," Wikipedia (http://en.wikipedia.org/wiki/Educational_technology).

^bThis table uses the CanMEDS Framework as an example, but the classifications shown can be applied to other competency-based frameworks.

focus on gaps and build on strengths over time (Eva et al. 2013). Similarly, at the program level, data collected from the assessment of several trainees can be aggregated to assess curriculum effectiveness or to determine whether a cohort was able to reach desired levels of competence within a reasonable period. Data collected for a cohort should be applied in a continuous process of quality improvement and innovation in medical education. Programs should continually ask what works, for whom, in what circumstances, and why (Pawson & Tilley 1997). As Pawson has noted, program interventions are almost always "partial solutions" that must be continually refined and revised (Pawson 2013).

Conclusions

Assessment in a CBME environment requires attention to ensure that it provides feedback *for* and *of* learning. More assessments will be needed by trained assessors on an ongoing basis. This paper highlights the importance of multiple assessments with multiple assessors, assessor training, a reconceptualization of the role of psychometrics, and the need for solid group processes for decision-making. The effective use of technology can help to manage information and track progress toward competence, while facilitating audits and transparency. CBME requires a dynamic environment that is attentive to the demands of the health care system and continually strives to optimize assessments for and of learning.

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References

- Archer JC. 2010. State of the science in health professional education: effective feedback. *Med Educ.* 44:101–108.
- Berendonk C, Stalmeijer RE, Schuwirth LWT. 2013. Expertise in performance assessment: assessors' perspectives. *Adv Health Sci Educ Theory Pract.* 18:559–571.
- Carraccio C, Wolfsthal SD, Englander R, Ferentz K, Martin C. 2002. Shifting paradigms: from Flexner to competencies. *Acad Med.* 77:361–367.
- Courts B, Tucker J. 2012. Using technology to create a dynamic classroom experience. *TLC.* 9:121–128.
- Dewey J. 1974. *John Dewey on education: selected writings.* Chicago: University of Chicago Press.
- Dijkstra J, van der Vleuten CPM, Schuwirth LWT. 2010. A new framework for designing programmes of assessment. *Adv Health Sci Educ Theory Pract.* 15:379–393.
- Eva KW. 2005. What every teacher needs to know about clinical reasoning. *Med Educ.* 39:98–106.
- Eva K, Bordage G, Campbell C, Galbraith R, Ginsberg S, Holmboe E, Regehr G. 2013. Report to the Medical Council of Canada on current issues in health professional and health professional trainee assessment [Internet]. Ottawa: Medical Council of Canada; [cited 2014 Sep 4]. Available from: <http://mcc.ca/wp-content/uploads/Reports-MEAC.pdf>.

- Eva KW, Hodges BD. 2012. Scylla or charbydis? Can we navigate between objectification and judgement in assessment? *Med Educ.* 46:414–419.
- Eva KW, Regehr G. 2005. Self-assessment in the health professions: a reformulation and research agenda. *Acad Med.* 80:546–554.
- Eva KW, Regehr G. 2007. Knowing when to look it up: a new conception of self-assessment ability. *Acad Med.* 82(10 Suppl):S81–S84.
- Eva KW, Regehr G. 2008. "I'll never play professional football"; and other fallacies of self-assessment. *J Contin Educ Health Prof.* 28:14–19.
- Felkey BG, Fox BI, Thrower MR. 2005. Health care informatics: a skills-based resource. Washington: American Pharmacists Association.
- Frank JR, Danoff D. 2007. The CanMEDs initiative: implementing an outcomes-based framework of physician competencies. *Med Teach.* 29:642–647.
- Friedman Ben David M, Davis MH, Harden RM, Howie PW, Ker J, Pippard MJ. 2001. AMEE Medical Education Guide No. 24: Portfolios as a method of student assessment. *Med Teach.* 23:535–551.
- General Medical Council. 2013. Good Medical Practice: Working with doctors, working with patients [Internet]. General Medical Council: Manchester; [cited 2014 Oct 28]. Available from: www.gmc-uk.org/guidance.
- Gingerich A, Regehr G, Eva KW. 2011. Rater-based assessments as social judgments: rethinking the etiology of rater errors. *Acad Med.* 86:S1–S7.
- Govaerts MJB, Schuwirth LWT, van der Vleuten CPM, Muijtjens AMM. 2011. Workplace-based assessment: effects of rater expertise. *Adv Health Sci Educ.* 16:151–165.
- Govaerts M, van der Vleuten CPM. 2013. Validity in work-based assessment: expanding our horizons. *Med Educ.* 47:1164–1174.
- Govaerts MJB, van de Wiel MWJ, Schuwirth LWT, van der Vleuten CPM, Muijtjens AMM. 2013. Workplace-based assessment: raters' performance theories and constructs. *Adv Health Sci Educ.* 18:375–396.
- Harris P, Bhanji F, Topps M, Ross S, Lieberman S, Frank JR, Snell L, Sherbino J; ICBME Collaborators. 2017. Evolving concepts of assessment in a competency-based world. *Med Teach.* 39:603–608.
- Hawkins RE, Durning SJ. 2017. Program evaluation. In: Holmboe ES, Durning SJ, Hawkins RE, editors. *Practical guide to the evaluation of clinical competence*. 2nd ed. Philadelphia: Elsevier; p. 303–331.
- Hemmer PA, Hawkins R, Jackson JL, Pangaro LN. 2000. Assessing how well three evaluation methods detect deficiencies in medical students' professionalism in two settings of an internal medicine clerkship. *Acad Med.* 75:167–173.
- Hicks PJ, Schwartz A, Clyman SG, Nichols DG. 2014. The Pediatrics Milestones: pursuit of a national system of workplace-based assessment through key stakeholder collaboration. *Acad Pediatr.* 14:S10–S12.
- Hodges B. 2013. Assessment in the post-psychometric era: learning to love the subjective and collective. *Med Teach.* 35:564–568.
- Holmboe ES, Davis MH, Carraccio C. 2008. Portfolios. In: Holmboe ES, RE Hawkins RE, editors. *Practical guide to the evaluation of clinical competence*. Philadelphia: Mosby.
- Holmboe ES, Hawkins RE, Huot SJ. 2004. Effects of training in direct observation of medical residents' clinical competence: a randomized trial. *Ann Intern Med.* 140:874–881.
- Kane MT. 2013. Validating the interpretations and uses of test scores. *J Educ Meas.* 50:1–73.
- Knowles M. 1975. *Self-directed learning: a guide for learners and teachers*. New York: Pearson Learning/Cambridge Adult Education.
- Kogan JR, Conforti LN, Iobst WF, Holmboe ES. 2014. Reconceptualizing variable rater assessments as both an educational and clinical care problem. *Acad Med.* 89:721–727.
- Kogan JR, Holmboe E. 2013. Realizing the promise and importance of performance-based assessment. *Teach Learn Med.* 25:S68–S74.
- Lievens F. 2001. Assessor training strategies and their effects on accuracy, interrater reliability, and discriminant validity. *J Appl Psychol.* 86:255–264.
- Miller GM. 1990. The assessment of clinical skills/competence/performance. *Acad Med.* 65:S63–S67.
- Nasca TJ, Philibert I, Brigham T, Flynn TC. 2012. The next GME accreditation system—rationale and benefits. *N Engl J Med.* 366:1051–1056.
- Norcini J, Anderson B, Bollela V, Burch V, Costa MJ, Duvivier R, Galbraith R, Hays R, Kent A, Perrott V, et al. 2011. Criteria for good assessment: consensus statement and recommendations from the Ottawa 2010 Conference. *Med Teach.* 33:206–214.
- Nyquist JG. 2014. *Techniques for assessment of learner performance in teaching and assessing the competencies*, 10th ed. Los Angeles: University of Southern California.
- Pawson R. 2013. *The science of evaluation: a realist manifesto*. London: Sage Publications.
- Pawson R, Tilley N. 1997. *Realistic evaluation*. San Francisco: Sage Publications.
- Pelgrim EAM, Kramer AWM, Mokkink HGA, van der Vleuten CPM. 2013. Reflection as a component of formative assessment appears to be instrumental in promoting the use of feedback: an observational study. *Med Teach.* 35:772–778.
- Ponnampuruma G. 2013. Workplace based assessment. In: Walsh E, editor. *Oxford textbook of medical education*. Oxford: Oxford University Press.
- Regehr G, MacRae H, Reznick RKS, D. 1998. Comparing psychometric properties of checklists and global rating scales for assessing performance on an OSCE-format examination. *Acad Med.* 73:993–997.
- Sargeant J, Armson H, Chesluk B, Dornan T, Eva K, Holmboe E, Lockyer J, Loney E, Mann K, van der Vleuten CP. 2010. The processes and dimensions of informed self-assessment: a conceptual model. *Acad Med.* 85:1212–1220.
- Sargeant J, Eva KW, Armson H, Chesluk B, Dornan T, Holmboe E, Lockyer JM, Loney E, Mann KV, van der Vleuten CP. 2011. Features of assessment learners use to make informed self-assessments of clinical performance. *Med Educ.* 45:636–647.
- Schumacher DJ, Spector ND, Calaman S, West DC, Cruz M, Frohna JG, Gonzalez Del Ray Gustafson KK, Poynter SE, Rosenbluth G, et al. 2014. Putting the pediatrics milestones into practice: a consensus roadmap and resource analysis. *Pediatrics.* 133:898–906.
- Schuwirth LWT, Ash J. 2013. Assessing tomorrow's learners: in competency-based education only a radically different holistic method of assessment will work. Six things we could forget. *Med Teach.* 35:555–559.
- Schuwirth LWT, van der Vleuten CPM. 2006. A plea for new psychometric models in educational assessment. *Med Educ.* 40:296–300.
- Schwind CJ, Williams RG, Boehler ML, Dunnington GL. 2004. Do individual attendings' post-rotation performance ratings detect residents' clinical performance deficiencies? *Acad Med.* 79:453–457.
- Smithers JW. 1998. *Performance appraisal: state of the art in practice*. San Francisco: Jossey-Bass.
- Surowiecki J. 2005. *The wisdom of crowds*. New York: Anchor Books.
- Swing SR. 2007. The ACGME outcome project: retrospective and prospective. *Med Teach.* 29:648–654.
- ten Cate O, Scheele F. 2007. Competency-based postgraduate training: can we bridge the gap between theory and clinical practice? *Acad Med.* 82:542–547.
- ten Cate O. 2013. Nuts and bolts of entrustable professional activities. *J Grad Med Educ.* 5:157–158.
- van der Vleuten CPM. 1996. The assessment of professional competence: developments, research and practical implications. *Adv Health Sci Educ.* 1:41–67.
- van der Vleuten CPM, Schuwirth LWT. 2005. Assessing professional competence: from methods to programmes. *Med Educ.* 39:309–317.
- van der Vleuten CPM, Schuwirth LWT, Driessen EW, Dijkstra J, Tigelaar D, Baartman LKJ, van Tartwijk J. 2012. A model for programmatic assessment fit for purpose. *Med Teach.* 34:205–214.
- van der Vleuten CPM, Schuwirth LWT, Scheele F, Driessen EW, Hodges B. 2010. The assessment of professional competence: building blocks for theory development. *Best Pract Res Clin Obstet Gynaecol.* 24:703–719.
- van Tartwijk J, Driessen EW. 2009. Portfolios for assessment and learning: AMEE Guide no. 45. *Med Teach.* 31:790–801.
- Watling C, Driessen E, van der Vleuten CPM, Vanstone M, Lingard L. 2012. Understanding responses to feedback: the potential and limitations of regulatory focus theory. *Med Educ.* 46:593–603.
- Woehr DJ, Huffcutt AI. 1994. Rater training for performance appraisal: a quantitative review. *J Occup Org Psych.* 67:189–205.
- Yeates P, O'Neill P, Mann K, Eva KW. 2012. Effect of exposure to good vs poor medical trainee performance on attending physician ratings of subsequent performances. *JAMA.* 308:2226–2232.



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Changing the culture of medical training: An important step toward the implementation of competency-based medical education

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ABSTRACT

Objective: The current medical education system is steeped in tradition and has been shaped by many long-held beliefs and convictions about the essential components of training. The objective of this article is to propose initiatives to overcome biases against competency-based medical education (CBME) in the culture of medical education.

Materials and methods: At a retreat of the International Competency Based Medical Education (ICBME) Collaborators group, an intensive brainstorming session was held to determine potential barriers to adoption of CBME in the culture of medical education. This was supplemented with a review of the literature on the topic.

Results: There continues to exist significant key barriers to the widespread adoption of CBME. Change in educational culture must be embraced by all components of the medical education hierarchy. Research is essential to provide convincing evidence of the benefit of CBME.

Conclusions: The widespread adoption of CBME will require a change in the professional, institutional, and organizational culture surrounding the training of medical professionals.

Introduction

In the early twentieth century, the Flexner report (Flexner 1910) on medical education in North America led to the development of the structure- and process-based system under which most of today's medical practitioners were trained. This traditional system has several essential features, including a hierarchical teacher-centered process, a focus on the acquisition of knowledge, sporadic subjective assessments based on comparisons with other learners, progression through training in a fixed amount of time, and a final summative assessment at the end of training (Carraccio et al. 2002). In recent years, this model has been challenged and is undergoing rapid change. In response to increased pressure for greater accountability, rising public expectations for the quality of care, and the need for a medical education system that can readily adapt to changing societal needs, competency-based medical education (CBME) is becoming the new standard.

The acceptance of CBME as a new educational paradigm will not come without a cultural shift across the continuum of medical education. In this discussion, we use the terms "culture" and "cultural" to refer to the behaviors and beliefs characteristic of a particular group in society – in this case, those involved in the education of medical trainees. Today's medical educators share the experience of having been trained in a traditional system of education that has shaped their professional culture and their beliefs about how medical education should best be carried out. A significant challenge in the implementation of CBME will involve persuading traditionalists of the merits of CBME and of the need to adopt new approaches and behaviors.

Practice points

- A change in the culture of medical training is essential to the implementation of competency-based medical education (CBME).
- Both educational leaders and front-line teachers must be supportive of CBME to effect change in educational systems.
- To build confidence in CBME, research is needed to provide evidence of its benefits.
- The concepts of lifelong learning and continuous assessment must be embraced to support the implementation of CBME.

Developing leaders that value and promote innovation in medical education

The culture of medical training programs must foster an environment that promotes novel educational paradigms. Such an environment cannot be established without strong and consistent leaders who can work collaboratively with the various individuals within an organization (Bland et al. 1999). Organizations with educational leaders who understand and can convince others of the need for curricular change, and who can ensure that adequate resources are allocated to its implementation, are more likely to make a successful transition to new educational paradigms than those who lack this kind of leadership (Bland et al. 2000; Fokkema et al. 2012).

Organizations must first develop an educational mission that is consistent with the principles of CBME. Change in leaders should be chosen from among those who are committed to a visionary approach to education, and they must be given protected time to develop their innovations. Leadership is itself a competency (Frank et al. 2015) that has long been ignored in traditional educational systems. The establishment of programs to develop educational leadership should be promoted. Leadership skills must be taught in postgraduate training programs, and faculty development programs focused on leadership should be a part of every medical education organization. When delivered effectively, these programs have been generally well received and have helped to promote a culture of innovation, and several “teaching scholars” programs currently exist that serve this purpose (Steinert et al. 2012). However, it is important to recognize that change at a programmatic level requires the input of more than individual program leaders. It is important to share tasks with front-line teachers, who may themselves be “grassroots” leaders who support change, and incentives should be developed to reward individuals who are committed to curricular development.

Overcoming negative perceptions by promoting research in CBME

A number of critics take the position that CBME will be detrimental to training and produce inferior doctors. This opinion is often expressed anecdotally without any basis in research. These skeptics remain staunch supporters of the traditional apprenticeship model of training and – again, without evidence – believe that it is superior. Surveys of trainers and trainees about their impressions of recent changes in the postgraduate medical training in the United Kingdom revealed many negative opinions of CBME, which focused largely on concerns about a loss of continuity of care and of clinical exposure opportunities within the newer training systems (Tsouroufli & Payne 2008; Mehmood et al. 2012). However, one of the benefits of CBME is that it requires learners to be more accountable for their educational time. Maximizing the efficiency of training by decreasing nonproductive educational time may in fact increase educational opportunities and, certainly, will maximize the quality of these opportunities. The traditional perception of a trainee as a service provider first and a student second is also being challenged in competency-based approaches. Although these roles need not be mutually exclusive, in CBME a special effort is made to ensure that, in their capacity as service providers, trainees devote their time to activities that have educational objectives and meaningful assessments attached to them.

The key to overcoming negative impressions of CBME is to provide evidence that fears about this new paradigm is unfounded. Studies comparing trainees in traditional and competency-based systems should be undertaken to demonstrate that curricular change is not detrimental and will in fact be beneficial to the trainee’s overall performance as a physician. In some areas, studies on competency-based approaches have already led to curricular reform (Sonnadara et al. 2011). In the meantime, there is existing evidence that training in traditional systems is associated with increased health care costs (Lavernia et al. 2000; Farnworth et al. 2001) and that patient outcomes may be compromised by

traditional approaches, especially when work-hour restrictions are factored in (Browne et al. 2009). However, further research on the outcomes of CBME is needed. Carrying out small-scale pilot projects (Ferguson et al. 2013) may help to change the attitudes of adherents to traditional systems, allowing them to become more engaged in curricular reform, and paving the way to system-wide change.

Promoting acceptance by teachers

Aside from their impressions about detrimental effects on training, some critics of CBME continue to be frustrated by seemingly constant changes in educational paradigms. Comfort with traditional training schemes is often based on an impression of the “stability” of the system (Tsouroufli & Payne 2008). It is therefore important to ensure that skeptics are made aware that the educational reforms currently under way are not being made simply for the sake of change. These reforms will need to be supported by evidence of improved quality of care, efficiency in the health care system, and accountability to stakeholders. Many educators are also apprehensive that their own skill sets do not match the increased demands that they believe the changes in educational expectations will place on them (Tsouroufli & Payne 2008). Furthermore, frontline educators often feel uncomfortable giving feedback on intrinsic physician roles such as communication, professionalism, or advocacy. In reality, these experienced supervisors have been making such judgments about trainees for many years. One benefit of the CBME model is that it offers an explicit and transparent framework upon which these assessments can be made.

It is essential to reshape attitudes toward medical education by clearly demonstrating the benefits of a CBME approach. It is equally important to provide extensive faculty development to prepare educators to confidently meet the requirements of CBME. Further, it will be important to prevent a gradual reversion to traditional systems by ensuring accountability for the outcomes of CBME programs, and accreditation standards will need to be updated to ensure that the basic tenets of CBME are being met by training programs. This is a powerful approach to ensure that programmatic change is implemented and maintained. Effective communication with, and the active engagement of, clinical faculty are key to dispelling skepticism about curricular change and to ensuring that new educational paradigms will indeed result in a new generation of competent trainees.

Change from a culture of achievement to one of lifelong learning

Given the paucity of formal assessment tools, the traditional educational system is ill equipped to identify learners in difficulty. These learners are often identified late in training, when it is difficult to effectively address deficiencies (Zbieranowski et al. 2013). Because of the perceived detrimental implications for students teachers often withhold negative assessments, and a “failure to fail” mentality has become entrenched (Dudek et al. 2005). Without rigorous assessment processes, the identification of learners in difficulty is often intuitive and based on a global

impression of the performance (Audétat et al. 2013). As a result, it becomes problematic to identify specific themes on which to base a remediation process. There is an assumption that, given enough time, the individual will ultimately become competent. This approach is fraught with peril, as it gives the learner little feedback about his or her deficiencies. Learners in difficulty are frequently poor self-assessors and therefore need guidance in identifying problematic areas and behaviors and in learning techniques to overcome them (Eva & Regehr 2005). Teachers need to be provided with the means to identify areas of difficulty. The best mechanism is a multi-faceted assessment program – a key component of CBME.

It is essential that learners be assured that the process of remediation will be a constructive experience. The process needs to be reframed as a personal Quality Improvement initiative. Learners who are not yet competent can be assisted to achieve competence, while those who are already competent can be aided in their progress toward mastery. This reframing needs to include the understanding that learning is a lifelong process and that the real goal of remediation is not to help learners pass a rotation or a residency, but to correct deficiencies that will help them in professional practice (Cleland et al. 2013). A CBME framework should accommodate different learning styles, such that a declaration of “not yet competent” does not necessarily imply a repetition of the same training experience. Once the negative implications are replaced with an understanding that learners undergo remediation to improve performance, taking steps to improve will be applauded rather than stigmatized. Finally, research efforts will be needed to gather evidence on the effects of remediation on outcomes: the CBME approach to remediation will be more readily embraced when there is a strong body of evidence that it produces more competent physicians (see Gruppen et al. 2017, in this issue).

Change from a culture of assessment for regulation to assessment for learning

The use of repeated, rigorous assessment, although fundamental to the success of a competency-based learning program, is a foreign concept to educators trained in more traditional apprenticeship models. There is a lingering impression that assessment is for the purpose of regulation or to enable a transition from one stage of education to another. This impression carries with it a somewhat negative connotation, as failure on an assessment implies an inability to progress. In general, physicians want feedback, but they may be ill-prepared to accept it when it appears negative. This may be compounded by inconsistencies between an individual's impression of his or her own abilities (self-assessment) and objective external measurements (Mann et al. 2011).

It is important to overcome negative perceptions of assessment by stressing the goal of lifelong learning. Learning does not finish at the end of training, however much the absence of formal assessments in practice may give this impression. It is worth stressing that CBME is relevant to all stages of the continuum of training and practice, from undergraduate education to continuing professional development. Therefore, a key to success will be to effect

change throughout the health care system. De-emphasizing the role of education as a regulatory tool will be essential to the implementation of CBME in maintenance-of-competency programs for practicing physicians. We should embrace and welcome the potential to be assessed while in practice, as it will ultimately benefit our patients and society as a whole (Holmboe 2013; Sargeant et al. 2013).

Conclusions

The widespread adaptation of competency-based approaches to medical education will undoubtedly present many challenges in a system whose culture makes it difficult to perceive its own deficiencies. The fear that CBME reforms will lead to an entire generation of poorly prepared, inexperienced physicians is persistent. Much of this fear arises from misinformation about new paradigms or simply from a natural resistance to change. Overcoming misperceptions will entail the revision of entire belief systems about the role of learners and education as a whole. However, we may be confident that under the direction of strong leaders who are committed to systemic change and can respond to the concerns of skeptics by providing evidence for the need for and value of curricular revision, the culture of medical education will successfully make the transition to CBME.

Disclosure statement

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References

- Audétat MC, Laurin S, Dory V. 2013. Remediation for struggling learners: putting an end to 'more of the same' *Med Educ.* 47:230–231.
- Bland CJ, Starnaman S, Hembroff L, Perlstadt H, Henry R, Richards R. 1999. Leadership behaviors for successful university-community collaborations to change curricula. *Acad Med.* 74:1227–1237.
- Bland CJ, Starnaman S, Wersal L, Moorehead-Rosenberg L, Zonia S, Henry R. 2000. Curricular change in medical schools: how to succeed. *Acad Med.* 75:575–594.
- Browne JA, Cook C, Olson SA, Bolognesi MP. 2009. Resident duty-hour reform associated with increased morbidity following hip fracture. *J Bone Joint Surg Am.* 91:2079–2085.

- Carraccio C, Wolfsthal SD, Englander R, Ferentz K, Martin C. 2002. Shifting paradigms: from Flexner to competencies. *Acad Med.* 77:361–367.
- Cleland J, Leggett H, Sandars J, Costa MJ, Patel R, Moffat M. 2013. The remediation challenge: theoretical and methodological insights from a systematic review. *Med Educ.* 47:242–251.
- Dudek NL, Marks MB, Regehr G. 2005. Failure to fail: the perspectives of clinical supervisors. *Acad Med.* 80:584–587.
- Eva KW, Regehr G. 2005. Self-assessment in the health professions: a reformulation and research agenda. *Acad Med.* 80:546–554.
- Farnworth LR, Lemay DE, Wooldridge T, Mabrey JD, Blaschak MJ, DeCoster TA, Wascher DC, Schenck RC. Jr. 2001. A comparison of operative times in arthroscopic ACL reconstruction between orthopaedic faculty and residents: the financial impact of orthopaedic surgical training in the operating room. *Iowa Orthop J.* 21:31–35.
- Ferguson PC, Kraemer W, Nousiainen M, Safir O, Sonnadara R, Alman B, Reznick R. 2013. Three-year experience with an innovative, modular competency-based curriculum for orthopaedic training. *J Bone Joint Surg Am.* 95:e166.
- Frank JR, Snell L, Sherbino J. 2015. *CanMEDS 2015 Physician Competency Framework*. Ottawa: Royal College of Physicians and Surgeons of Canada.
- Flexner A. 1910. *Medical education in the United States and Canada: a report to the Carnegie Foundation for the Advancement of Teaching*. New York: Carnegie Foundation for the Advancement of Teaching.
- Fokkema JP, Westerman M, Teunissen PW, van der Lee N, Scherpbier AJ, van der Vleuten CP, Dörr PJ, Scheele F. 2012. How lead consultants approach educational change in postgraduate medical education. *Med Educ.* 46:390–398.
- Gruppen LD, Frank JR, Lockyer JM, Ross S, Bould MD, Harris P, Bhanji F, Hodges BD, Snell L, Olle ten Cate; ICBME Collaborators. 2017. Toward a research agenda for competency-based medical education. *Med Teach.* 39:623–630.
- Holmboe ES. 2013. Maintenance of certification, revalidation, and professional self-regulation. *J Contin Educ Health Prof.* 33(Suppl 1):S63–S66.
- Lavernia CJ, Sierra RJ, Hernandez RA. 2000. The cost of teaching total knee arthroplasty surgery to orthopaedic surgery residents. *Clin Orthop Relat Res.* 380:99–107.
- Mann K, van der Vleuten C, Eva K, Armson H, Chesluk B, Dornan T, Holmboe E, Lockyer J, Sargeant J. 2011. Tensions in informed self-assessment: how the desire for feedback and reticence to collect and use it can conflict. *Acad Med.* 86:1120–1127.
- Mehmood S, Anwar S, Ahmed J, Tayyab M, O'Regan D. 2012. A survey of UK surgical trainees and trainers; latest reforms well understood but perceived detrimental to surgical training. *Surgeon.* 10:9–15.
- Sargeant J, Bruce D, Campbell CM. 2013. Practicing physicians' needs for assessment and feedback as part of professional development. *J Contin Educ Health Prof.* 33(Suppl 1):S54–S62.
- Sonnadara RR, Van Vliet A, Safir O, Alman B, Ferguson P, Kraemer W, Reznick R. 2011. Orthopedic boot camp: examining the effectiveness of an intensive surgical skills course. *Surgery.* 149:745–749.
- Steinert Y, Naismith L, Mann K. 2012. Faculty development initiatives designed to promote leadership in medical education. A BEME systematic review: BEME Guide No. 19. *Med Teach.* 34:483–503.
- Tsouroufli M, Payne H. 2008. Consultant medical trainers, modernising medical careers (MMC) and the European time directive (EWT): tensions and challenges in a changing medical education context. *BMC Med Educ.* 8:31.
- Zbieranowski I, Takahashi SG, Verma S, Spadafora SM. 2013. Remediation of residents in difficulty: a retrospective 10-year review of the experience of a postgraduate board of examiners. *Acad Med.* 88:111–116.

Competency-based medical education: theory to practice

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Abstract

Although competency-based medical education (CBME) has attracted renewed interest in recent years among educators and policy-makers in the health care professions, there is little agreement on many aspects of this paradigm. We convened a unique partnership – the International CBME Collaborators – to examine conceptual issues and current debates in CBME.

We engaged in a multi-stage group process and held a consensus conference with the aim of reviewing the scholarly literature of competency-based medical education, identifying controversies in need of clarification, proposing definitions and concepts that could be useful to educators across many jurisdictions, and exploring future directions for this approach to preparing health professionals.

In this paper, we describe the evolution of CBME from the outcomes movement in the 20th century to a renewed approach that, focused on accountability and curricular outcomes and organized around competencies, promotes greater learner-centredness and de-emphasizes time-based curricular design. In this paradigm, competence and related terms are redefined to emphasize their multi-dimensional, dynamic, developmental, and contextual nature. CBME therefore has significant implications for the planning of medical curricula and will have an important impact in reshaping the enterprise of medical education.

We elaborate on this emerging CBME approach and its related concepts, and invite medical educators everywhere to enter into further dialogue about the promise and the potential perils of competency-based medical curricula for the 21st century.

Introduction

We believe that in the future, expertise rather than experience will underlie competency-based practice and... certification (Aggarwal & Darzi 2006)

Issues surrounding competency-based medical education (CBME) have generated increasing attention and debate among health professions educators in recent years. This is evidenced by sessions at major international conferences (Frank et al. 2008; Thompson et al. 2009; Frank & Snell 2010), innovative pilot projects (Kraemer 2009), and a growing number of key publications in medical education journals (Harden 1999; Long 2000; Carraccio et al. 2002;

Practice points

- Competency-based education is a resurgent paradigm in professional education.
- CBME is organized around competencies, or predefined abilities, as outcomes of the curriculum.
- The CBME paradigm employs redefined concepts of competence and its development.
- CBME holds great promise along with many challenges for physician training worldwide.
- CBME has the potential to transform contemporary medical education.

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Albanese et al. 2008). CBME has entered the lexicon of the profession and is now debated in the top general medical journals (Leung 2002; Aggarwal & Darzi 2006). “Competencies” have become the unit of medical educational planning in many jurisdictions (Leung 2002; Albanese et al. 2008). Competency frameworks such as CanMEDS (Frank et al. 2005; Frank & Danoff 2007), the Outcome Project of the (US) Accreditation Council for Graduate Medical Education (ACGME 2001), and the Scottish Doctor (Simpson et al. 2002) now arguably form the basis of training for the majority of medical learners in the Western world – at least on paper. However, significant controversies remain. The rationale, definition, components, pros and cons, and implications of CBME are all still hotly debated (Leung 2002). To address these recurring issues, and in an effort to advance the profession through CBME discussions, the Royal College of Physicians and Surgeons of Canada convened an international “theory to practice consensus conference” in 2009 (Royal College 2009b). Participants in this process formed the International CBME Collaborators group to work in partnership on key themes. In this paper, we report the initial consensus findings of the ICBME Collaborators.

Methods: The ICBME Collaborators

Medical educators and institutions around the world are exploring the premises and practicalities of CBME. In 2009, the Council of the Royal College passed a resolution directing the Office of Education to move forward on a CBME agenda for specialty education in Canada:

The Royal College in collaboration with key partners, [will] explore opportunities for incorporating competency-based education in residency training and across the spectrum of medical education. This would ensure that the 21st century PGME [postgraduate medical education] system is focused squarely on meeting societal needs as the primary goal of training. Implementing any such change would conceivably take many years and require a coordinated, resourced, collaborative approach (Royal College 2009a).

Part of the initial work involved a systematic review of the literature (see Frank et al. 2010, pp. 631–637 in this issue), which identified authors from various countries who have published key papers on CBME. Authors of papers that defined and elaborated contemporary concepts of CBME were invited to join in a multi-stage group process to advance work in this area. The goals of the ICBME Collaborators are summarized in Box 1. In addition to conducting the systematic

review, the Collaborators submitted written statements on various aspects of CBME, participated in teleconferences, attended a three-day summit in Ottawa, Canada, and contributed to international thematic writing groups to articulate the consensus findings. The group process identified several important topics for contemporary educators to consider. These included the origins of CBME, the rationale for CBME, key definitions related to CBME, the elements of planning CBME, and practical implications of the CBME approach across the continuum of medical education.

Origins of competency-based education

Calls for competency-based approaches to preparing professionals go back 60 years or more (Grant 1975; Spady 1977; Carraccio et al. 2002) Although an emphasis on program goals and objectives articulated in the work of Tyler (1949) and Mager (1997) was widely adopted in the early 20th century, others rejected the ensuing focus on process at the expense of program end-products. Outcome-based education (OBE) arose in response (Block 1974; Rubin & Spady 1984; Levine 1985; Spady 1994; Harden 1999). OBE emphasized learner and program outcomes, not the pathways and processes to attain them. Whereas traditional criteria organized around knowledge objectives tend to emphasize the instructional process, regardless of the product of the program, OBE takes the opposite position: outcomes guide all curriculum decisions, and curriculum processes are secondary (Harden 1999). In this context, competency-based approaches to curricula can be seen as a type of OBE. Competency-based curricula have been used across multiple professions, including chiropractic (Wangler 2009), social work (Menefee & Thompson 1994) teacher education (Houston 1973), pharmacology (Marshall et al. 1997) and others (Pruitt & Epping-Jordan 2005; du Toit et al. 2010). Within medicine, CBME has been proposed for over 50 years (McGaghie et al. 1978), but has only recently come to the fore (Leung 2002).

The rationale for CBME

If CBME is not new, why is it attracting such interest now? Calls to reform medical education have been a recurring theme in the medical literature and the subject of many proposals since Flexner’s report of 1910 (Neufeld et al. 1993; Christakis 1995; Institute of Medicine 2001). In recent years, however, a number of forces and trends have given rise to a particular interest in CBME. From recent arguments in favour of CBME, four overarching themes have emerged: a focus on outcomes, an emphasis on abilities, a de-emphasis of time-based training, and the promotion of learner-centredness. The following sections reflect on these themes, which are also outlined in Table 1.

1. A focus on curricular outcomes

Advocates of CBME have criticized contemporary health professions curricula on the grounds that they fail to ensure that all medical graduates demonstrate competence in all the

Box 1. Goals of the International CBME Collaborators.

1. Review the international CBME literature.
2. Identify controversies in need of clarification.
3. Explore future directions.
4. Propose consensus definitions that could be useful to educators around the world.

Table 1. The rationale for CBME.

Main principle	Elaboration
<p>Focusing on outcomes In an era of greater public accountability, medical curricula must ensure that all graduates are competent in all essential domains.</p>	<ul style="list-style-type: none"> • Not all current curricula explicitly define desired outcomes. • Not all current curricula address all of the desired outcomes. • Not all current curricula assess or ensure that graduates have acquired all of the necessary abilities. • In the health professions, assessment scores should not be compensatory from one domain to another (i.e., excellent knowledge does not compensate for poor communication skills). • Medical education needs to be transparent for learners, teachers, and the public with respect to its goals and effectiveness. • Standards must be criterion-oriented. • Medical education tends to emphasize process issues (e.g., instructional methods) over outcomes (e.g., graduate performance and satisfaction). • Medical education must prepare trainees for practice. • Content that does not contribute to preparation for practice should be dropped.
<p>Emphasizing abilities Medical curricula must emphasize the abilities to be acquired.</p>	<ul style="list-style-type: none"> • There is too much emphasis on knowledge, and not enough on skills, attitudes and their synthesis into observable competencies. • An emphasis on the abilities of learners should be derived from the needs of those served by graduates (i.e., societal needs). • Educational objectives as an organizing framework should be replaced with a hierarchy of competencies.
<p>De-emphasizing time-based training Medical education can shift from a focus on the time a learner spends on an educational unit to a focus on the learning actually attained.</p>	<ul style="list-style-type: none"> • Time is a resource to be tailored to the needs of teachers and learners. • Current curricula and credentialing tend to emphasize fixed times spent in training. • Learners may progress at different rates, and may achieve threshold competencies faster or slower than the average peer. • Greater emphasis should be placed on the developmental progression of abilities and on measures of performance. • Greater flexibility may make some curricula more efficient and engaging.
<p>Promoting greater learner-centredness Medical education can promote greater learner engagement in training.</p>	<ul style="list-style-type: none"> • A curriculum of competencies provides clear goals for learners. • A roadmap of milestones provides a transparent path to achieve the competencies. • An individual learner can adjust their own learning using the milestones.

domains of their intended practice. They argue that, in an era of greater accountability and scrutiny of the professions, medical educators must ensure that every graduate is prepared for practice. Commentators in many countries have noted that many curricula do not even explicitly define the outcome abilities needed of graduates, let alone ensure they are learned, assessed, and acquired. They advocate an approach to curriculum planning that, explicitly tied to the needs of those served, is inherently utilitarian: each curricular element must contribute to learner outcomes or be cut. In addition, they argue that the phenomenon of allowing ability in one essential domain (e.g., procedural skills) to compensate for lack of ability in another (e.g., communication) does a disservice to both the profession and the public served. CBME is seen as an answer to these challenges in that it is focused on outcomes, is inherently tied to the needs of those served by graduates, and involves explicit definitions of all essential domains of competence to be acquired (Neufeld et al. 1993; Tamblyn 1999; Voorhees 2001b).

2. An emphasis on abilities (competencies as the organizing principle of curricula)

Proponents of CBME favour a curriculum organized around competencies or abilities over long lists of knowledge objectives. It can be argued that the reductionism of

objectives-based approaches has led to an over-emphasis on knowledge at the expense of skills, attitudes, and higher order aspects of practice (Talbot 2004). In addition, independent lists of knowledge objectives can create a program in which learning is not integrated across the curriculum. In the CBME paradigm, curricular elements are tailored to build on one another in a constructivist manner. As we will discuss, by using competencies as an organizing framework, educators have an opportunity to address these issues by designing learning experiences that continuously incorporate prior learning elements and emphasize observable abilities (McGaghie 1978; Voorhees 2001a; Carraccio et al. 2002).

3. A de-emphasis of time-based training

Calls to reform medical curricula through the implementation of CBME have also judged much of contemporary medical education to be oriented toward the amount of time spent in an aspect of training (e.g., a rotation) rather than the abilities actually acquired (Long 2000). Aspects of physician credentialing, such as eligibility for certification exams, also tend to focus on time spent on specific experiences. Contemporary education, they argue, should shift its focus in favour of developing the learner's abilities. Learners may progress faster or slower than their peers in a given curricular component. Theoretically, by accommodating these different rates of

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learning and skills attainment, a curriculum with flexible time periods may be more efficient and engaging than a strictly time-based curriculum (Bell et al. 1997; Long 2000; Carraccio et al. 2002).

4. The promotion of learner-centredness

Closely related to the de-emphasis of time-based training is the concept of enhancing the learner-centredness of training. CBME, some authors have argued, encourages trainees to take responsibility for their progress and development by mapping out a transparent pathway from milestone to milestone on their way toward competence. Again, individual learners may reach these milestones at varying speeds; accordingly, a CBME system could afford them the flexibility they need to adjust the time spent on each learning task (Carraccio et al. 2002).

What is CBME? Defining the key concepts

As the systematic review by Frank and colleagues demonstrates (2010; see pages 631–637 in this issue), the definition of “competency-based medical education” is highly variable in the literature. In our literature review and discussions, it became clear to the ICBME Collaborators that a lack of consensus on definitions and terms limits the advancement of discourse on CBME, and thereby the advancement of health professions education (Divakar 2002; Albanese et al. 2008). We therefore propose the definitions of CBME-related concepts listed in Box 2.

The central tenets of the CBME paradigm require an understanding of physician competence as multi-dimensional, dynamic, contextual, and developmental. The current view of physician competence is that it involves multiple domains of ability, in keeping with the work of Epstein and Hundert

(2002), Gardner’s work on multiple intelligences (2006), and expertise theory (Ericsson 2004; Ericsson et al. 2006). For each domain of competence, there is a corresponding spectrum of ability from novice to master, as described by Dreyfus (2004; see also Carraccio et al. 2008). However, instead of a static concept of competence that postulates a physician who, once certified to practise, is competent forever, we emphasize the concept of competence as an ever-changing, contextual construct (Koens et al. 2005). For example, a surgeon certified as fit for practice in an urban academic teaching hospital soon after graduation from residency may find it difficult to cope in a rural hospital in a developing country. Similarly a physician may find that some aspects of her abilities atrophy during the course of her career, while others develop to the mastery level. In this way, each physician has a unique constellation of abilities at any time in any one context. The idea of “progression of competence” speaks to this conception of competence as dynamic, developing or receding over time, and as grounded in the environment of practice or learning.

Furthermore, we propose that *competencies* be viewed as ingredients of *competence*, which can be assembled from smaller elements of learning. For example, as discussed by Susan Swing in this issue (see pp. 663–668), specific elements of knowledge, skills, and attitudes are the components of a given specific ability, and several of these specific competencies can be combined into a broader overarching competency. Competencies are considered abilities or capabilities and are the organizing units of CBME (Albanese et al. 2008). A competency-based curriculum therefore begins with outcomes in mind, on the basis of which it defines the abilities needed by graduates and then develops milestones, instructional methods, and assessment tools to facilitate their acquisition by learners.

A further conclusion of our group process was that, in this renewed CBME paradigm, the contemporary vocabulary

Box 2. Proposed definitions of CBME and related terms by the International CBME Collaborators.

Competence

The array of abilities across multiple domains or aspects of physician performance in a certain context. Statements about competence require descriptive qualifiers to define the relevant abilities, context, and stage of training. Competence is multi-dimensional and dynamic. It changes with time, experience, and setting.

Competency

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 ensure their acquisition. Competencies can be assembled like building blocks to facilitate progressive development.

Competency-based medical education

An outcomes-based approach to the design, implementation, assessment, and evaluation of medical education programs, using an organizing framework of competencies.

Competent

Possessing the required abilities in all domains in a certain context at a defined stage of medical education or practice.

Dyscompetence

Possessing relatively less ability in one or more domains of physician competence in a certain context and at a defined stage of medical education or practice.

Incompetent

Lacking the required abilities in all domains in a certain context at a defined stage of medical education or practice.

Progression of competence

For each aspect or domain of competence, the spectrum of ability from novice to mastery. The goal of medical education is to facilitate the development of a physician to the level of ability required for optimal practice in each domain. At any given point in time, and in a given context, an individual physician will reflect greater or lesser ability in each domain.

related to a physician being “competent” needs to be updated. Currently, a physician is deemed competent at the point where he or she is considered ready to practise independently. This static view of competence often rests quite arbitrarily on time-based credentialing. We therefore propose that the term “competent” be used with modifiers that specify which domains of ability, which context, and what stage of medical education or practice it refers to. Thus, a second-year medical student could be competent to enter a supervised undergraduate clinical rotation on a teaching hospital ward, a resident trainee could be competent to run an intensive care unit autonomously overnight, and a graduate of a residency program could be competent to perform some, but not all, procedures independently in a rural institution. This notion of the term “competent” as requiring specification is aligned with the work of ten Cate (2005; ten Cate & Scheele 2007) and the concept of entrustable professional activities. Entrustable professional activities are essentially competencies in context; that is, an integration of the competencies that allow one to perform the professional activities expected of a good doctor within a given specialty.

Similarly, we offer definitions for the expressions “incompetent” and “dyscompetence.” Dyscompetence has been used in several ways in the medical education literature already (Pierson 1992; Leape & Fromson 2006). We propose “dyscompetence” as a comparative term to refer to physicians who have a relative deficiency in one or more domains of competence (e.g., communication abilities). To say that a physician is “incompetent” would be a judgment that his or her constellation of abilities does not meet the requirements for a specified stage of training or practice, in a specified setting (e.g., a third-year medical student could be incompetent to function in an ambulatory clinic with intermediate supervision).

Planning CBME

The approach to planning CBME, and how this contrasts with contemporary process-based curricula, has been well described by Carraccio and colleagues (2002). Whereas a traditional program may begin with the question, “What do learners need to know?” or “How shall we teach our learners?”, CBME begins with outcomes. CBME is organized around the question, “What abilities are needed of graduates?” (Harden et al. 1999). The answer to this question can come from educational needs assessments, such as practice profiling, task analysis, defining population health needs, or identifying entrustable professional activities for the specialty or subspecialty (ten Cate 2005; Wang et al. 2005; ten Cate & Scheele 2007). The identified abilities are organized as competencies for a curriculum, and are further delineated in terms of their building blocks. Working backward, educators can then identify milestones that trainees will need to reach as they acquire the required competencies. Instructional methods and assessment tools can then be selected to facilitate the development of learners for these abilities (Bienenfeld et al. 2000; Carraccio et al. 2002). These steps are summarized in Box 3. CBME curricula developed from this process can reflect

a spectrum in terms of structure and time flexibility, as in Figure 1.

Promise and perils: implications of the CBME approach for the health professions

Among the various important implications of considering a competency-based approach to medical education, some hold tantalizing prospects for improving training, while others present challenges to the adoption of CBME.

Among the benefits promised by the adoption of CBME are:

- A new paradigm of competence. The terms identified by the ICBME Collaborators can facilitate a new discourse on what is meant by physician competence and the role of medical education in the acquisition, maintenance, and enhancement of the abilities of each individual professional.
- A renewed commitment to outcomes. CBME curricula, with their emphasis on graduate abilities, can fulfill medicine’s societal contract to prepare clinicians to serve their patients and communities.
- A new focus for assessment on developmental milestones. CBME’s requirement for frequent, utilitarian assessment to guide development emphasizes the role of assessment in the learning process
- A mechanism to promote a true continuum of medical education. By defining competencies and milestones for each stage of medical education and practice, CBME can promote vertical and horizontal integration of training programs, from undergraduate medical education to residency to continuing professional development.
- A method to promote learner-centred curricula. By providing experiences within a more flexible time frame and focusing on the learner’s development, CBME can help

Box 3. Steps in planning CBME curricula.

1. Identify the abilities needed of graduates.
2. Explicitly define the required competencies and their components.
3. Define milestones along a development path for the competencies.
4. Select educational activities, experiences, and instructional methods.
5. Select assessment tools to measure progress along the milestones.
6. Design an outcomes evaluation of the program.

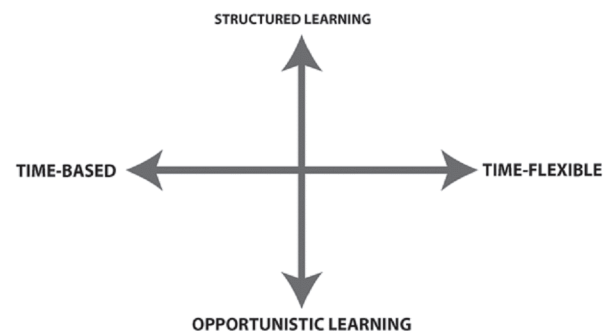


Figure 1. The spectrum of CBME curricula.

physicians-in-training to become truly engaged in a process that progresses at their own rate of acquisition.

- A way to de-emphasize time-based credentialing in medicine. Transitions from undergraduate education to residency education to continuing professional development or maintenance of competence would be based primarily on evidence of skills rather than on predetermined and universally applied time frames. Time then becomes a resource for education, not the marker of learning itself.
- Potential for portability of training. The adoption of a competency-based approach can facilitate the movement of physicians, physician credentials, and credit for training across jurisdictions.

Among the potential perils and challenges of CBME are:

- The threat of reductionism. In an effort to address the challenges of defining and assessing competencies, some have resorted to breaking them down into the smallest observable units of behaviour, creating endless nested lists of abilities that frustrate learners and teachers alike.
- Promoting the lowest common denominator. Critics of CBME have pointed out that, by focusing on an array of competencies so comprehensively, learners may perceive a underlying message that milestones and not excellence are the ultimate pursuit in medicine.
- Logistical chaos. Given that many educational systems around the world are time-based (e.g., requiring a prescribed number of weeks for each rotation), how can a transition to a more competency-based system be accomplished? How can health care manage the scheduling of the thousands of medical trainees progressing at their own pace (in a pure CBME curriculum, for example)?
- Loss of authenticity. If a CBME curriculum is implemented, along with its language of domains for instructional design and its focus on outcomes, what happens to the mentoring and immersion that has served medicine well for 2000 years? Can we use CBME without losing the fidelity and strengths of our current curricula?
- The tyranny of utility. A pure CBME approach is inherently utilitarian, and proposes cutting content and experiences that do not directly contribute to defined program outcomes. This can be unacceptable to some stakeholders in the profession.
- The need for new educational technologies. Adopting CBME on a larger scale would require new teaching techniques, new modules, and new assessment tools to be practical and effective.
- Inertia and lack of resources. For many jurisdictions, adopting a CBME approach would require significant investments in teaching, infrastructure and assessment, and perhaps even an augmented workforce.

An agenda for further development

Finally, in considering the steps needed to move the dialogue on CBME forward, the Collaborators agreed that there is a need for further debate among medical educators, teachers, policy-makers, learners, and other stakeholders as to whether

the future of health professions education should be competency based. We call upon medical education leaders, researchers, journal editors, and conference chairs to engage our communities in this important discussion. To advance the discourse in this area, medical education requires universally accepted definitions for CBME and related terms. We have proposed such a set of terms here, for modification or adoption. Finally, we feel that further scholarship is needed, especially to document the design, feasibility, acceptability, and impact of CBME curricula of all kinds.

Conclusions

Competency-based medical education has emerged as priority topic for medical education planners in the early 21st century. From its origins in the outcomes movement, it has resonated with those who feel that our current curricular paradigm is anachronistic. Our unique partnership, the International CBME Collaborators, recognizes CBME as an educational approach that has the potential to transform how we prepare the physicians of the next decade. We have elaborated on the CBME paradigm and encourage those engaged in medical education around the world to enter into a debate on its utility.

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References

Accreditation Council for Graduate Medical Education [ACGME]. 2001–present. Outcome project. Chicago (IL): ACGME. Available from: www.acgme.org/Outcome (Accessed 7 June 2010).

Aggarwal R, Darzi A. 2006. Technical-skills training in the 21st century. *N Engl J Med* 355(25):2695–2696.

Albanese MA, Mejicano G, Mullan P, Kokotailo P, Gruppen L. 2008. Defining characteristics of educational competencies. *Med Educ* 42(3):248–255.

Bell HS, Kozakowski SM, Winter RO. 1997. Competency-based education in family practice. *Fam Med* 29(10):701–704.

Bienenfeld D, Klyklyo W, Knapp V. 2000. Development of competency-based measures for psychiatry residency. *Acad Psychiatry* 24:68–76.

Block JH. 1974. *Schools, society, and mastery learning*. New York: Holt, Rinehart and Winston.

Carraccio CL, Benson BJ, Nixon LJ, Derstine PL. 2008. From the educational bench to the clinical bedside: Translating the Dreyfus developmental model to the learning of clinical skills. *Acad Med* 83(8):761–767.

Carraccio C, Wolfsthal SD, Englander R, Ferentz K, Martin C. 2002. Shifting paradigms: From Flexner to competencies. *Acad Med* 77(5):361–367.

Christakis NA. 1995. The similarity and frequency of proposals to reform US medical education. *Constant concerns*. *JAMA* 274(9):706–711.

Divakar V. 2002. Commentary: The baby is thrown out with the bathwater. *BMJ* 325(7366):693–696.

Dreyfus SF. 2004. The five-stage model of adult skill acquisition. *Bull Sci Technol Soc* 24(3):177–181.

du Toit R, Cook C, Minnies D, Brian G. 2010. Developing a competency-based curriculum for eye care managers in Sub-Saharan Africa. *Rural Remote Health*. 10(2):1278.

Epstein RM, Hundert EM. 2002. Defining and assessing professional competence. *JAMA* 287(2):226–235.

Ericsson KA. 2004. Deliberate practice and the acquisition and maintenance of expert performance in medicine and related domains. 79 10 Suppl:S70–81.

Ericsson KA, Charness N, Feltovich PF, Hoffman R, editors. 2006. *The Cambridge handbook of expertise and expert performance*. New York: Cambridge University Press.

Frank JR, editor. 2005. *The CanMEDS 2005 physician competency framework: Better standards, better physicians, better care*. Ottawa: The Royal College of Physicians and Surgeons of Canada.

Frank JR, Danoff D. 2007. The CanMEDS initiative: Implementing and outcomes-based framework of physician competencies. *Med Teach* 29(7):642–647.

Frank JR, Holmboe E, Reznick R, Snell LS. The future of competency-based education and the implications for residency. Symposium. The International Conference on Residency Education 2008, Ottawa, Canada. 26 September 2008. Available from: <http://rcpsc.medical.org/meetings/2008>. (Accessed 4 June 2010).

Frank JR, Mungroo R, Ahmad Y, Wang M, De Rossi S, Horsley T. 2010. Toward a definition of competency-based education in medicine: A systematic review of published definitions. *Med Teach* 32(8):631–637.

Frank JR, Snell LS, for the International CBME Collaborators. A new vision of competency-based medical education and definition of competence. The 14th Ottawa Conference on Assessment of Competence in Medicine and the Healthcare Professions. 18 May 2010. Miami, USA.

Gardner H. 2006. *Multiple intelligences: New horizons in theory and practice*. New York: Basic Books.

Grant G, associates. 1979. *On competence: A critical analysis of competence-based reforms in higher education*. San Francisco: Jossey-Bass.

Harden RM. 1999. AMEE Guide no 14: Outcome-based education. Part 1 – An introduction to outcome-based education. *Med Teach* 21(1):7–14.

Harden RM, Crosby JR, Davis MH, Friedman M. 1999. AMEE Guide no. 14: Outcome-based education: Part 5 – from competency to meta-competency: A model for the specification of learning outcomes. *Med Teach* 21(6):546–552.

Houston RW. 1973. Designing competency-based instructional systems. *J Teach Ed* 24:200–204.

Institute of Medicine Committee on Quality of Health Care in America, Institute of Medicine Crossing the Quality Chasm: A new health system for the 21st century. 2001. Washington: National Academies Press.

Koens F, Mann KV, Custers EJ, ten Cate OT. 2005. Analysing the concept of context in medical education. *Med Educ* 39(12):1243–1249.

Kraemer W. Development and implementation of a competency-based curriculum in orthopaedic surgery. 35th Gallie Day symposium, Department of Surgery, University of Toronto, Toronto, Canada. 8 May 2010.

Leape LL, Fromson JA. 2006. Problem doctors: Is there a system-level solution? *Ann Int Med* 144(2):107–115.

Levine D. 1985. *Improving student achievement through mastery learning*. San Francisco (CA): Jossey-Bass.

Leung W. 2002. Competency based medical training: Review. *BMJ* 325(7366):693–696.

- Long DM. 2000. Competency-based residency training: The next advance in graduate medical education. *Acad Med* 75(12):1178–1183.
- Mager RF. 1997. Preparing instructional objectives: A critical tool in the development of effective instruction. 3rd ed. Atlanta (GA): Center for Effective Performance.
- Marshall JM, et al. 1997. Practical, ongoing competency-assessment program for hospital pharmacists and technicians. *Am J Health-Syst Pharm* 54(12):1412–1417.
- McGaghie WC, Miller GE, Sajid AW, Telder TV. 1978. Competency-based curriculum development in medical education. Geneva: World Health Organization. Available from: http://whqlibdoc.who.int/php/WHO_PHP_68.pdf (Accessed 7 June 2010).
- Menefee DT, Thompson JJ. 1994. Identifying and comparing competencies for social work management: A practice driven approach. *Adm Soc Work* 18(3):1–25.
- Neufeld VR, Maudsley RF, Pickering RJ, Walters BC, Turnbull JM, Spasoff RA, Hollomby DJ, LaVigne KJ. 1993. Demand-side medical education: Educating future physicians for Ontario. *CMAJ* 148(9):1471–1477.
- Paulson K. 2001. Using competencies to connect the workplace and postsecondary education. *New Dir Inst Res* 110:41–54.
- Pierson RN. 1992. Remedial medical education: The problem of dyscompetence. In: Rosof AB, Felch WC, editors. *Continuing medical education: A primer*. 2nd ed. New York: Praeger.
- Pruitt SD, Fpping-Jordan JF. 2005. Preparing the 21st century global healthcare workforce. *BMJ* 330 :637–639.
- Royal College of Physicians and Surgeons of Canada 2009b. *Imagine the future: An international summit on competency-based medical education* [consensus conference]. Ottawa, 9–11 July.
- Royal College of Physicians of Canada. 2009a. *Directions for residency education, 2009: A final report of the core competency project*. Ottawa: The Royal College of Physicians of Canada. Available at: <http://royalcollege.ca>
- Rubin SE, Spady WG. 1984. Achieving excellence through outcome-based instructional delivery. *Educ Leadersh* 41(8):37–44.
- Simpson JG, Furnace J, Crosby J, Cumming AD, Evans PA, Friedman Ben David M, Harden RM, Lloyd D, McKenzie H, McLaughlan JC, et al. 2002. The Scottish doctor – learning outcomes for the medical undergraduate in Scotland: A foundation for competent and reflective practitioners. *Med Teach* 24(2):136–143.
- Spady WG. 1977. Competency-based education: A handwagon in search of a definition. *Educ Res* 6(1):9–14.
- Spady WG. 1994. *Outcome-based education: Critical issues and answers*. Arlington (VA): American Association of School Administrators.
- Swing SR. 2010. Perspectives on competency-based medical education from the learning sciences. *Med Teach* 32(8):663–668.
- Talbot M. 2004. Monkey see, monkey do: A critique of the competency model in graduate medical education. *Med Educ* 38(6):587–592.
- Tamblyn R. 1999. Outcomes in medical education: What is the standard and outcome of care delivered by our graduates? *Adv Health Sci Educ* 4(1):9–25.
- ten Cate O, Scheele F. 2007. Competency-based postgraduate training: Can we bridge the gap between theory and clinical practice? *Acad Med* 82(6):542–547.
- ten Cate O. 2005. Entrustability of professional activities and competency-based training. *Med Educ* 39(12):1176–1177.
- Thompson A, Gordon D, Frank JR, ten Cate O. Competency-based postgraduate education. Association for Medical Education in Europe 2009 Conference. September 1, 2009. Malaga, Spain. Available from: <http://www.amee.org/documents/AMEE%202009%20Final%20Programme.pdf> (Accessed 4 June 2010).
- Tyler RW. 1949. *Basic principles of curriculum and instruction*. Chicago: University of Chicago Press.
- Voorhees RA. 2001a. Competency-based learning models: A necessary future. *New Dir Inst Res* 110:5–13.
- Voorhees AB. 2001b. Creating and implementing competency-based learning models. *New Dir Instit Res* 110:83–95.
- Wang N, Schnipke D, Witt EA. 2005. Use of knowledge, skill, and ability statements in developing licensure and certification examinations. *Educ Meas* 24(1):15–22.
- Wangler M. 2009. Usefulness of CanMEDS competencies for chiropractic graduate education in Europe. *J Chiropr Educ* 23(2):123–133.

Toward a definition of competency-based education in medicine: a systematic review of published definitions

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Abstract

Background: Competency-based education (CBE) has emerged in the health professions to address criticisms of contemporary approaches to training. However, the literature has no clear, widely accepted definition of CBE that furthers innovation, debate, and scholarship in this area.

Aim: To systematically review CBE-related literature in order to identify key terms and constructs to inform the development of a useful working definition of CBE for medical education.

Methods: We searched electronic databases and supplemented searches by using authors' files, checking reference lists, contacting relevant organizations and conducting Internet searches. Screening was carried out by duplicate assessment, and disagreements were resolved by consensus. We included any English- or French-language sources that defined competency-based education. Data were analyzed qualitatively and summarized descriptively.

Results: We identified 15,956 records for initial relevancy screening by title and abstract. The full text of 1,826 records was then retrieved and assessed further for relevance. A total of 173 records were analyzed. We identified 4 major themes (*organizing framework, rationale, contrast with time, and implementing CBE*) and 6 sub-themes (*outcomes defined, curriculum of competencies, demonstrable, assessment, learner-centred and societal needs*). From these themes, a new definition of CBE was synthesized.

Conclusion: This is the first comprehensive systematic review of the medical education literature related to CBE definitions. The themes and definition identified should be considered by educators to advance the field.

Introduction

The intended output of a competency-based programme is a health professional who can practice medicine at a defined level of proficiency, in accord with local conditions, to meet local needs... It would be pointless to suggest that there is a single definition. (McGaghie et al. 1978, p. 18)

Competency-based education (CBE) is an emerging discourse in health professions education. This is evidenced by recent papers on the topic (Long 2000; Carraccio et al. 2002; Diwakar 2002; Leung 2002; Talbot 2004; Glasgow et al. 2006; Aggarwal & Darzi 2007; Frank & Danoff 2007; ten Cate and Scheele 2007; Harden 2007; Whitcomb 2007; Albanese et al. 2008a; Albanese et al., 2008b; Carraccio et al. 2008; Brooks 2009). However, the literature also describes an ongoing debate about what exactly is meant by "competency-based education" in the health professions (McGaghie et al. 1978; Leung 2002). CBE has previously been described as an orientation toward curricular outcomes (Harden et al. 1999a; Harden et al. 1999b; Albanese

Practice points

- Competency-based education is an emerging hot topic in the health professions.
- Until now, there has been no widely accepted definition of CBE.
- This systematic review identified 4 themes and 6 sub-themes in the CBE literature.
- A new definition of CBE is proposed to facilitate the development of the field.

et al. 2008b), as a contrast with time-based credentialing (Bell et al. 1997; Long 2000; Carraccio et al. 2002; Collins et al. 2007), or as an organizing paradigm that de-emphasizes process issues in medical training (Bell et al. 1997; Long 2000; Carraccio et al. 2002; Collins et al. 2007; Tsuda et al. 2009). Commentators have asserted that CBE is an example of an outcomes-based approach to curricular design (Harden et al. 1999a; Harden et al. 1999b; Glasgow et al. 2006), a negative

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Table 1. Inclusion and exclusion criteria for obtaining sources for abstract and full paper review.

Inclusion criteria	Exclusion criteria
<ol style="list-style-type: none"> 1. Published and unpublished sources 2. Sources published in print format or on the Internet 3. English and French language sources 4. Sources containing text that define (or attempt to define) "competency-based education" 5. Sources utilizing any type of study design; because research methodology in this area is varied, we included all types of study designs: narrative reviews, systematic reviews, meta-analyses and descriptive studies, randomized, controlled, prospective cohort, retrospective cohort, cross-sectional, survey, controlled before-and-after studies, interrupted time series, paired design studies, and pragmatic trials 6. Because context in medical education is important, we included sources from systems with similar curricular elements. As a frame of reference, we used the 29 international jurisdictions that the Royal College of Physicians and Surgeons of Canada has assessed and deemed as having met Royal College criteria (Royal College 2006). These jurisdictions fall within: Australia, Canada, Hong Kong, Ireland, Singapore, South Africa, Switzerland, the United States of America, and the United Kingdom. 	<ol style="list-style-type: none"> 1. Sources published in languages other than English and French 2. Sources from jurisdictions other than those identified as comparable (Royal College 2006) 3. Sources containing text that define "competency-based education" outside of the medical education context (e.g., veterinary medicine).

oversimplification of physician competence (Talbot 2004), and a method to ensure that health professions training is societally responsive (Neufeld et al. 1993; Frank & Langer 2003). At a glance, the scholarship to date appears remarkably diverse and heavily weighted to models and commentaries. Despite recent proposals to enhance the evidence base of medical education in general, progress is suboptimal (Chen et al. 2004). Without a common language in the medical education enterprise, educators and policy-makers are hampered in their attempts to pursue quality, ensure outcomes, evaluate policies, and further innovation. A serious discourse on CBE would benefit from a shared understanding of terms, concepts, and elements. At this time, there appears to be no widely accepted, applicable definition of CBE that would facilitate a global dialogue to advance the field.

We therefore systematically studied the medical education literature in order to characterize the recurring themes and elements related to CBE and, on that basis, develop a new definition to advance the discourse on competency-based medical education (CBME).

Methods

Using methods similar to those used in other systematic reviews intended to create common definitions (Ainoda et al. 2005; Oh et al. 2005), we conducted a comprehensive inquiry of the scholarly sources related to CBE that provided definitions in English or French.

Inclusion/exclusion criteria

Records were included if they contained a definition or terms for *competency-based education*, *-assessment*, *-models* or *-curriculum*. We excluded records if they (1) did not include a relevant definition; (2) were not published in English or French; (3) were not from a jurisdiction deemed to have an equivalent system of medical education, as defined by the Royal College of Physicians and Surgeons of Canada's

Accreditation Committee (Royal College 2006); (4) cited a primary source publication (e.g., secondary referencing was considered to be a duplicate record and thus excluded); or (5) were outside the context of medical education (e.g., from another profession). A detailed description of inclusion and exclusion criteria is provided in Table 1.

Search strategy

We searched electronic databases using search strings developed by an experienced information specialist in collaboration with the authors. Searches were conducted from inception in MEDLINE (1950 – November, Week 1, 2009, Ovid interface), EMBASE (1980 – Week 46, 2009, Ovid interface) and ERIC (1966 – 17 November 2009) using a combination of search terms: "medical education," "competency," "competency-based education," "clinical competence," "outcome-based education," and "mastery learning."

Recognizing that relevant records were likely to exist within non-indexed sources (e.g., grey literature), searches were supplemented with the use of authors' files and by checking reference lists. To ensure currency, Web searches were conducted using the online search engine Google™ on 6 separate occasions (17 April and 30 July 2008, and 6 February, 22 June, 16 November and 20 November 2009). We are not aware of any validated web-searching method, and therefore adopted a strategy that we found to be both comprehensive and systematic. Using a combination of the terms "medical education," "competency-based education," and "what is?" we ran searches to identify sites containing the term "competency-based education." We examined the first 500 hits of each search, recognizing that the search engine ranks sites by importance and relevance. One reviewer searched all sites using a snowballing technique that allowed for examination of both the site itself and of records embedded within each site (Greenhalgh & Peacock 2005).

Selection methods

Titles and abstracts were examined using conservative criteria developed a priori to ensure accuracy and broad inclusion. Records were considered potentially relevant if they included *competency-based education* or related terms (*outcome-, time- or competence-based education*). All potentially relevant records were retrieved in full text and screened independently by two authors for final inclusion.

Data extraction

Competency-based education definitions were extracted from the original text. In some instances, definitions of CBE were provided in separate sections of the source; extractions were coded as either “VB” (verbatim) or “SS” (separate sections) to ensure transparency. All definitions and terms were extracted by one author and checked for accuracy by another. Disagreements, when they arose, were resolved through discussion. When resolution could not be obtained, a third author was involved as an arbiter. Contextual interpretations of text were not permitted; in sources where ambiguity prevented a clear extraction of text, the source was ultimately excluded by consensus.

Data analysis

A qualitative methodological approach was adopted to code and identify common themes and broad categorizations (Creswell 1998). Analysis of the definitions was performed in a sequential series of cycles. In cycle one (initial review), one member of the research team identified and described themes that emerged from the data set. To limit the effect of our own biases, all texts were examined independently to label and categorize each extraction until theme saturation was achieved. The themes were coded using NVivo qualitative data software version 8 (QSR International Pty Ltd., Doncaster, Australia; 2008) from free text of the definitions within each record (Bazeley 2007). Within the initial review, the research team reviewed the independently created themes and generated one master definition per theme. In cycle two, a second member of the research team independently reviewed and coded all texts for accuracy and consistency. Disagreements were resolved through consensus discussions.

Results

Overview of literature included in the review

Following a process of de-duplication to identify similar records between electronic databases, we identified 15,956 unique records for initial relevancy screening by title and abstract. We removed 14,014 records that did not appear to be applicable on primary screening. The full-text report of 1,826 records were then retrieved and further assessed for relevance. Internet searching identified a total of 2,021 sites and contributed 82 potentially relevant reports for screening. A total of 1,653 sources were excluded because the source contained no relevant definition, it was not within a medical education context or it was published outside of a relevant jurisdiction. In

total, 173 sources satisfied all inclusion criteria and form the basis for our analysis (see Figure 1).

Of the 173 relevant records, 1 was published in French, and the remainder were English-language records. Publications originated from the United States (60.7%), United Kingdom (27.7%), Canada (5.8%), Australia (5.8%), and Switzerland (0.6%). The majority of records were published in journal article format (67.7%), the remainder being reports and guidelines (11.0%), editorials and commentaries (8.7%), electronic resources (4.1%), PowerPoint presentations (3.5%), book chapters (1.7%), newsletters (1.7%), and letters (1.2%). The 173 records are included in the online appendix, List of sources, available at www.medicalteacher.org.

Definitions ranged in length between 13 and 205 words. Year of publication spanned all decades searched, the majority (74.6%) being published between 2000 and 2009, and 44.5% since 2005 (see Figure 2).

Identifying recurring CBE themes

Following a rigorous and thorough qualitative analysis of the 173 included definitions, we identified 4 major themes (*organizing framework, rationale, contrast with time, and implementing CBE*), which included 6 descriptive sub-themes (*outcomes defined, curriculum of competencies, demonstrable, assessment, learner-centred and societal needs*). A summary of themes and broad categorizations, along with frequency counts, are presented in Table 2. Records containing original definitions are presented in Table 3; these identified definitions are coded by theme in Table 4. (Tables 3 and 4 are available online at www.medicalteacher.org.) The majority of definitions (165, 95.4%) addressed the concept of CBE as an educational approach organized around competencies and fundamentally oriented to graduate outcomes. The other major themes were less frequent and included “rationale” (53, 30.6%), “contrast with time” (35, 20.2%), and “implementing CBE” (20, 11.6%).

Discussion

The elements of CBE in medicine

Competency-based education is clearly an emergent topic in medical education, as the exponential growth in citations in the literature within the last decade demonstrates (Albanese 2008b; see Figure 2). There is great heterogeneity in the medical CBE literature, from which we identified 10 recurring themes that form the fundamental concepts of the competency-based approach. Nearly every publication emphasized the cardinal idea that CBE is a distinct approach because of its dedication to predefined graduate abilities as the organizing principle (theme 1 in Table 2) (Harden et al. 1999a). The papers included in the final selection for this review described a variety of methods for identifying and defining these outcomes (Harden et al. 1999b). The authors also collectively promoted the concept of “progression of competence,” meaning that learners advance along a series of defined milestones on their way to the explicit outcome goals of training (theme 1a) (Lane and Ross 1994b; Bandiera &

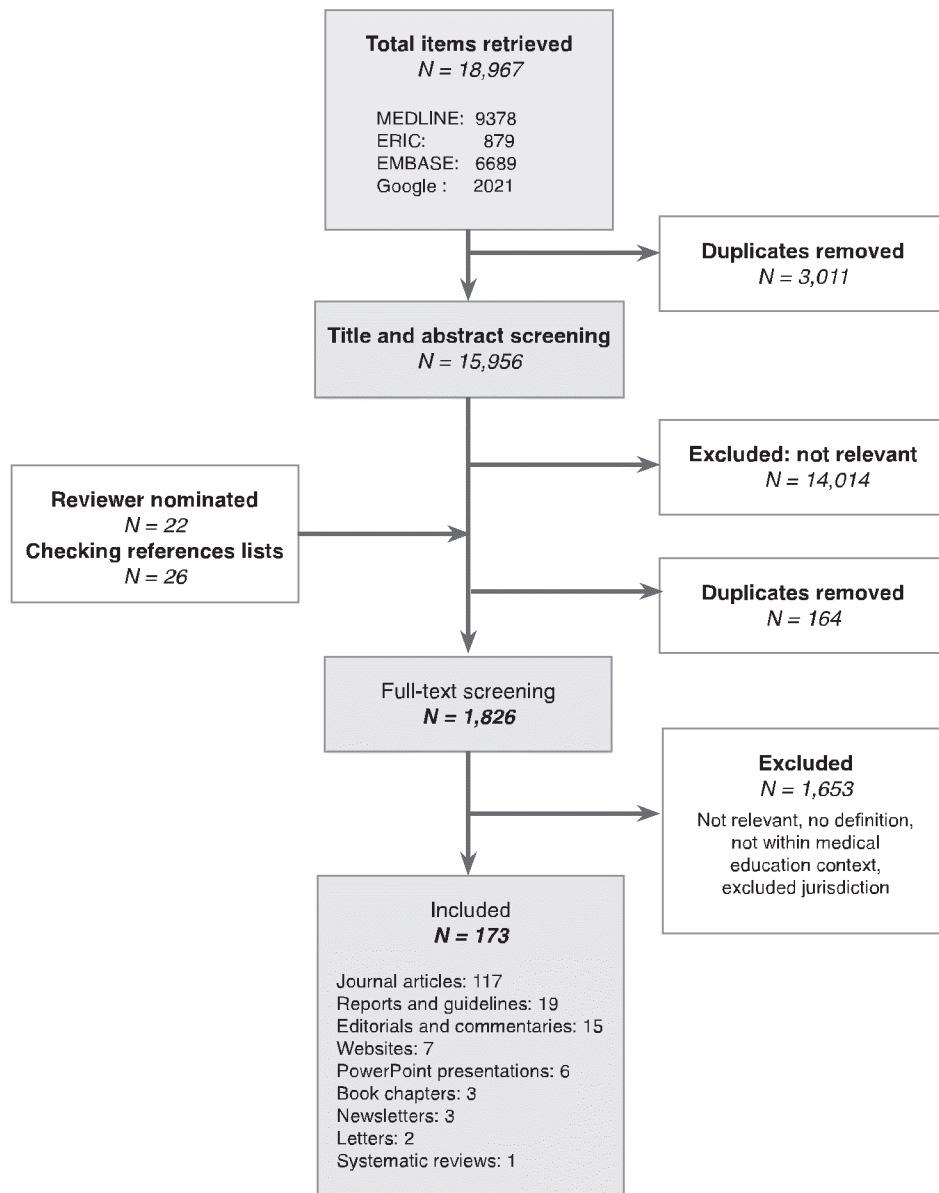


Figure 1. Flow chart of selection of items for systematic review.

Lendrum 2008). This is articulated by Ben-David (1999): “Outcome-based frameworks require a defined scheme of levels of progression towards the outcome.” In CBE, it is suggested that curriculum and assessment are to be organized around the defined standards of the program outcome abilities and their milestones (Craton & Matheson 1993; Lane & Ross 1994; Martin et al. 1998; Harden et al. 1999a). Many of the identified definitions also included arguments as to the rationale for adopting CBE for the health professions (theme 2) (Newble et al. 2005). That all of the efforts to employ CBE would be aligned with societal or patient needs was a major rationale for adoption (Long 2000; Davis & Harden 2003; Lee 2003). Authors argued that a CBE program, when organized around the competencies needed to best serve patients, is the right choice in an era of greater accountability to the public (Glasgow et al. 2006). Furthermore, several authors (e.g., Broski et al. 1977; Demczuk 2009 et al.; Levinson 2009) emphasized the attraction of learner-centredness (theme

2a): greater flexibility in organizing a curriculum, greater transparency of standards, goals and procedures, greater engagement of learners, and the ability of learners to progress at their own pace. Closely related to learner-centredness, the third major theme, the promise of de-emphasizing time- and process-based training, was also prominent in the definitions of CBE (e.g., Brown et al. 1973; Weinstein & Russell 1976; Botticelli & Anderson 1981; Carraccio et al. 2002). Finally, several of the identified descriptions of CBE emphasized elements (theme 4) needed to successfully implement this approach, such as faculty development and engagement, new assessment methods, change management, and resources (Broski et al. 1977; McGaghie et al. 1978).

Toward a definition of CBE in medicine

This systematic review of terms and constructs has provided a thorough and comprehensive view of CBE definitions within

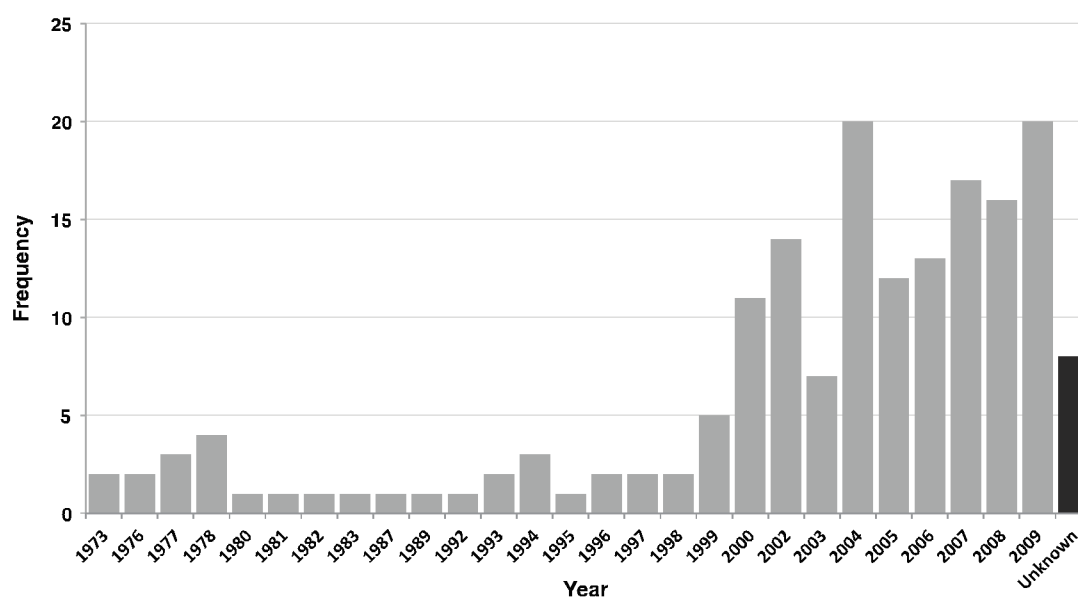


Figure 2. CBE definitions by year of publication.

Table 2. Definitions of themes.

Theme (major)/Sub-themes	Definition	Records, <i>n</i>
1. Organizing framework	All descriptions of competency-based education (CBE) as an approach to education explicitly oriented to graduate outcomes.	165
a. Defined outcomes and milestones	Refers to the identification of specific competencies that are aligned to the outcomes of a training program. These outcomes are derived from the abilities required of physicians for practice or to meet the standards of the profession. Competencies may also be described in terms of milestones or benchmarks that indicate progression of competence in one domain.	144
b. Curriculum of competencies	Includes all references that describe how curricula are organized around the identified competencies. The curriculum node includes references to learning strategies, teaching methods, and instructional design.	50
c. Demonstrable abilities	Includes all references that articulate the need for the components of competency-based education to be observable and comparable to objective criteria for all learners.	20
d. Assessment of competencies	Contains all citations that refer to the assessment of pre-defined standards or milestones that indicate progress toward the defined outcomes of a curriculum. Assessment is criterion-referenced, in that learners are measured against set standards and not other learners. Assessment may also involve threshold standards that must be achieved before further progression of the learner through the curriculum.	73
2. Rationale	Includes all arguments as to the rationale for employing competency-based education as an approach to medical education. This may include how patient needs are a driver to use CBE, how physicians are better prepared for practice or the next stage of training, how it is better for learners, or how it can increase educational efficiency.	53
a. Learner-centred	Includes all discussion of the use of CBE to ensure curricula are aligned with the learning needs of diverse medical learners. It includes all references to organizing teaching and learning around facilitating the progression of trainee competence toward the defined outcome abilities for a program. This involves active engagement of learners in managing their learning, in regular self-assessment, and in ongoing frequent assessment of progress. This thread includes discussion of learner awareness of transparent goals, curriculum design, and assessment methods. It also includes mention of the self-directed continuing professional development of physicians in practice, and flexibility of curriculum processes to meet learners' needs.	29
b. Societal needs	Includes all discussions of the need for CBE to ensure that graduates have the essential abilities to effectively serve patients and populations once in practice. It also encompasses references to CBE as a mechanism to align curriculum goals with patient needs and optimal health care delivery.	26
3. Contrast with time	Includes all discussions that contrast time- or process-based medical education designs with CBE. All references to the pace of learning being tied to the acquisition of competence by a learner are incorporated. In this thread, training time is seen as a resource for instruction and not the organizing framework for medical education and credentialing.	35
4. Implementing CBE	Includes all discussions of CBE implementation designs, components, and ingredients.	20

contemporary medical education literature. From this research we have developed a proposed 21st century definition of CBE for medical education, namely:

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

This definition is intended to assemble the component terms and concepts we identified into a brief, accessible, and useful reference. Such a description should be useful for medical educators, teachers, learners, and policy-makers to judge the nature of a program or policy with respect to CBE.

Study limitations

The strength of our review is embedded within strong systematic review methodologies to minimize bias and a comprehensive search of the literature developed by an experienced information specialist. Our review, however, does have several limitations, which include the fact that the scope of the search was confined to English- and French-language sources, as well as to only the jurisdictions deemed “comparable” to the medical education systems of the Royal College of Physicians and Surgeons of Canada. A number of important papers, such as the work of ten Cate and Scheele (2007) from the Netherlands, could therefore not be included in this protocol. Nevertheless, the comprehensive nature of this study should ameliorate the risk of missing critical citations.

Conclusion

This is the first comprehensive systematic review of the medical education definitions related to CBE. We document the essential recurring concepts in the discourse over several decades. We identified 10 key themes and propose a working definition of CBE that should be considered by educators to advance the discourse on CBE in medicine.

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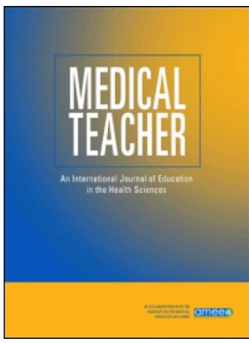
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References

- Aggarwal R, Darzi A. 2007. Competency-based training and practice – what does it really mean? *J Am Coll Surg* 205(1):192–193.
- Ainoda N, Onishi H, Yasuda Y. 2005. Definitions and goals of “self-directed learning” in contemporary educational literature. *Ann Acad Med Singapore* 34(8):515–519.
- Albanese MA, Mejicano G, Anderson WM, Gruppen L. 2008a. Building a competency-based curriculum: the agony and the ecstasy. *Adv Health Sci Educ Theory Pract*. May 15 [Epub ahead of print]. Available from: <http://www.springerlink.com/content/g1w11258v173u6r6/> (Accessed 8 April 2009).
- Albanese MA, Mejicano G, Mullan P, Kokotailo P, Gruppen L. 2008b. Defining characteristics of educational competencies. *Med Educ* 42(3):248–355.
- Bandiera G, Lendrum D. 2008. Daily encounter cards facilitate competency-based feedback while leniency bias persists. *Can J Emerg Med* 10(1):44–50.
- Bazeley P. 2007. *Qualitative data analysis with NVivo*. London: Sage Publications Ltd.
- Bell HS, Kozakowski SM, Winter RO. 1997. Competency-based education in family practice. *Fam Med* 29(10):701–704.
- Ben-David MF. 1999. AMEE Guide No. 14: Outcome-based education: Part 3 – Assessment in outcome-based education. *Med Teach* 21(1):23–25.
- Botticelli MG, Anderson AS. 1981. MD-level competence in internal medicine. Objectives and the flexible clerkship. *Arch Intern Med* 141(2):235–236.
- Brooks MA. 2009. Medical education and the tyranny of competency. *Perspect Biol Med* 52(1): 90–102.
- Broski D, Alexander D, Brunner M, Chidley M, Finney W, Johnson C, Karas B, Rothenberg S. 1977. Competency-based curriculum development: A pragmatic approach. *J Allied Health* 6(1):38–44.
- Brown TC, McCleary IE, Stenchever MA, Poulson AM Jr. 1973. A competency-based educational approach to reproductive biology. *Am J Obstet Gynecol* 116(7):1036–1043.
- Carraccio CL, Benson BJ, Nixon IJ, Derstine PL. 2008. From the educational bench to the clinical bedside: Translating the Dreyfus developmental model to the learning of clinical skills. *Acad Med* 83(8):761–767.
- Carraccio C, Wolfsthal SD, Englander R, Ferencik K, Martin C. 2002. Shifting paradigms: From Flexner to competencies. *Acad Med* 77(5):361–367.
- Chen FM, Bauchner H, Burstin H. 2004. A call for outcomes research in medical education. *Acad Med* 79(10):955–960.
- Collins JP, Gough IR, Civil ID, Stitz RW. 2007. A new surgical education and training programme. *ANZ J Surg* 77(7):497–501.

- Craton N, Matheson GO. 1993. Training and clinical competency in musculoskeletal medicine: Identifying the problem. *Sports Med* 15(5):328–337.
- Creswell JW. 1998. *Qualitative inquiry and research design: Choosing among five traditions*. Thousand Oaks (CA): Sage.
- Davis MH, Harden RM. 2003. Competency-based assessment: Making it a reality. *Med Teach* 25(6):565–568.
- Demczuk L, Gottschalk T, Littleford J. 2009. Introducing information literacy into anesthesia curricula. *Can J Anaesth* 56(4):327–335.
- Diwakar V. 2002. Commentary: The baby is thrown out with the bathwater. *BMJ* 325(7366):693–696.
- Frank JR, Danoff D. 2007. The CanMEDS initiative: Implementing and outcomes-based framework of physician competencies. *Med Teach* 29(7):642–647.
- Frank JR, Langer B. 2003. Collaboration, communication, management, and advocacy: Teaching surgeons new skills through the CanMEDS project. *World J Surg* 27(8):972–978.
- Glasgow N, Wells R, Butler J, Gear A, Lyons S, Rubiano D. 2006. Using competency-based education to equip the primary health care workforce to manage chronic disease. Australian Primary Health Care Research Institute. Available from: http://www.acerh.edu.au/publications/Glasgow_APHCRI-Report_Summary_Sep06.pdf (Accessed 17 April 2008).
- Greenhalgh T, Peacock R. 2005. Effectiveness and efficiency of search methods in systematic reviews of complex evidence: Audit of primary sources. *BMJ* 331(7524):1064–1065.
- Harden RM, Crosby JR, Davis MH. 1999a. AMEE Guide No. 14: Outcome-based education: Part 1 – an introduction to outcome-based education. *Med Teach* 21(1):7–14.
- Harden RM, Crosby JR, Davis MH, Friedman M. 1999b. AMEE Guide No. 14: Outcome-based education: Part 5 – from competency to meta-competency: A model for the specification of learning outcomes. *Med Teach*, 21(6):546–552.
- Harden RM. 2007. Outcome-based education: The future is today. *Med Teach* 29(7):625–629.
- Lane DS, Ross V. 1994. The importance of defining physicians' competencies: Lessons from preventive medicine. *Acad Med* 69(12):972–974.
- Lee AG. 2003. The new competencies and their impact on resident training in ophthalmology. *Surv Ophthalmol* 48(6):651–662.
- Leung W. 2002. Competency based medical training: Review. *BMJ* 325(7366):693–696.
- Levinson W. 2009. Time for innovation: The ABIM view of competency-based education. *Academic Internal Medicine Insight*, 7(3):6–7.
- Long DM. 2000. Competency-based residency training: The next advance in graduate medical education. *Acad Med* 75(12):1178–1183.
- McGaghie WC, Miller GF, Sajid AW, Telder TV. 1978. Competency-based curriculum development in medical education. Geneva: World Health Organization. Available from: http://whqlibdoc.who.int/php/WHO_PHP_68.pdf (Accessed 7 June 2010).
- Martin M, Vashisht B, Frezza E, Ferone T, Lopez B, Pahuja M, Spence RK. 1998. Competency-based instruction in critical invasive skills improves both resident performance and patient safety. *Surgery* 124(2):313–317.
- Neufeld VR, Maudsley RF, Pickering RJ, Walters BC, Turnbull JM, Spasoff RA, Hollomby DJ, LaVigne KJ. 1993. Demand-side medical education: Educating future physicians for Ontario. *CMAJ* 148(9):1471–1477.
- Newble D, Stark P, Bax N, Lawson M. 2005. Developing an outcome-focused core curriculum. *Med Educ* 39(7):680–687.
- Oh H, Rizo C, Enkin M, Jadad A. 2005. What is eHealth: A systematic review of published definitions. *J Med Internet Res* 7(1):e1.
- QSR International Pty Ltd. 2008. NVivo qualitative data analysis software. Version 8. NVivo qualitative data analysis software; QSR International Pty Ltd. [Doncaster, Australia] Version 8, 2008.
- Royal College of Physicians and Surgeons of Canada. 2006. Jurisdiction approved training: International postgraduate medical education. Last updated 13 June 2006. Available from: http://rcpsc.medical.org/residency/certification/img_page2_e.php (Accessed 13 April 2010).
- Talbot M. 2004. Monkey see, monkey do: A critique of the competency model in graduate medical education. *Med Educ* 38(6):587–592.
- ten Cate O, Scheele F. 2007. Competency-based postgraduate training: Can we bridge the gap between theory and clinical practice? *Acad Med* 82(6):542–547.
- Tsuda S, Scott D, Doyle J, Jones DB. 2009. Surgical skills training and simulation. *Curr Probl Surg* 46(4):271–370.
- Weinstein HM, Russell ML. 1976. Competency-based psychiatric education. *Am J Psychiatry* 133(8):935–939.
- Whitcomb ME. 2007. Redirecting the assessment of clinical competence. *Acad Med* 82(6):527–528.



Redesigning competency based medical education in a world of many team players

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Redesigning competency based medical education in a world of many team players

Dear Sir

Competency based medical education has received continued interest following a move away from time based training to one of outcomes and trust. While there will always be arguments for and against any form of educational intervention (and I need not highlight them here), my interest as a shop floor worker lies in the ever-noticeable rise in allied health professionals. Health care provision in the West at least is seeing a move towards additional team players. Case in point the specialist nurse and more recently the physician associate.

While movement for the need of these individuals has occurred based on added pressures within hospital environments with an aim to reduce the burden faced by doctors, there is I feel still reluctance to accept such members as key colleagues. Recent examples where I certainly appreciated their input was during a situation of three peri arrests where they aided me greatly in obtaining IV access, bloods, ECGs and catheter insertions giving me ample time to systematically examine the patients and decide the next most appropriate management plan.

We are witnessing some unease among the profession with allied health care professionals taking up what was deemed traditionally doctor based roles. However I would argue in acute situations and times when doctor presence

is less heavy such professionals greatly help to enhance patient care and safety.

Maybe therefore for the twenty-first century, the knowledge skills and attitudes of the doctor in training can be fine tuned to a doctor keen and willing to work and more importantly learn from others. How this is determined is however tricky. We have knowledge and skill based assessments that are typically doctor centered and work based placed assessments that focus purely on a doctor's knowledge/skill based competence. Maybe our allied health professionals should be assessing our doctors' competence on the ability to troubleshoot and engage with other professionals during clinical events. Exams of the future should involve more interdisciplinary scenarios. Only then can competency based medical education reflect the true reality of work based occurrences.

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مقالات از مجله

Academic Medicine

Advancing Competency-Based Medical Education: A Charter for Clinician-Educators

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Abstract

The International Competency-Based Medical Education (ICBME) Collaborators have been working since 2009 to promote understanding of competency-based medical education (CBME) and accelerate its uptake worldwide. This article presents a charter, supported by a literature-based rationale, which is meant to provide a shared mental model of CBME that will serve as a path forward in its widespread implementation.

At a 2013 summit, the ICBME Collaborators laid the groundwork for this charter. Here, the fundamental principles of CBME and professional responsibilities of medical educators in

its implementation process are described. The authors outline three fundamental principles: (1) Medical education must be based on the health needs of the populations served; (2) the primary focus of education and training should be the desired outcomes for learners rather than the structure and process of the educational system; and (3) the formation of a physician should be seamless across the continuum of education, training, and practice.

Building on these principles, medical educators must demonstrate commitment to teaching, assessing, and role modeling the range of

identified competencies. In the clinical setting, they must provide supervision that balances patient safety with the professional development of learners, being transparent with stakeholders about level of supervision needed. They must use effective and efficient assessment strategies and tools for basing transition decisions on competence rather than time in training, empowering learners to be active participants in their learning and assessment. Finally, advancing CBME requires program evaluation and research, faculty development, and a collaborative approach to realize its full potential.

Editor's Note: A Commentary by M.E. Whitcomb appears on pages 618–620.

The International Competency-Based Medical Education (ICBME) Collaborators have been working since 2009 to promote understanding of competency-based medical education (CBME) and accelerate its uptake worldwide. In 2009, the group assembled at a summit convened by the Royal College of Physicians and Surgeons of Canada, the outcome of which was a collection of scholarly papers published in a special issue of *Medical Teacher*¹ that has generated much dialogue over the ensuing years. An expanded group of ICBME Collaborators convened a second summit in October 2013, concluding with a commitment to make the leap from theory to practice by facilitating

widespread implementation of CBME and contributing another collection of scholarly papers. In this article, we present a charter that builds on the discussions and scholarly works in progress of the second summit, which focused on standardizing language, implementing CBME across the educational continuum, advancing assessment strategies and requisite faculty development, and developing a research agenda. The work of the second summit built upon the 2009 summit. This charter was conceived to help the ICBME Collaborators forge a path toward the goal of widespread implementation of CBME and to invite the worldwide medical education community to travel with us on this journey. This charter for CBME also serves as an effort from the professional community to restore the trust of society in the health professions. Thus, we have based its framework on the medical professionalism charter spearheaded by the American Board of Internal Medicine.²

Background

Internationally, CBME is being adopted under a variety of frameworks, including CanMEDS,³ the Accreditation Council

for Graduate Medical Education competencies,⁴ the Scottish Doctor Outcomes,⁵ and the Australian Curriculum Framework for Junior Doctors.⁶ For the purposes of this charter, we adapt a definition of CBME recently proposed by ten Cate⁷: education for the medical professional that is targeted at a necessary level of ability in one or more medical competencies.

Since the introduction of CBME, many concerns have been raised about implementing a resource-intensive system of education and training that is as yet unproven as a means of producing better doctors.⁸ However, if formal evidence of the effectiveness of CBME is lacking, we do have two bodies of knowledge that support the move to this model. First are sound advances in education theory that serve as the building blocks of CBME: the importance of clearly defined outcomes, learners taking an active role in their education and assessment within an authentic clinical setting, and formative and focused feedback from multiple assessors using multiple methods.^{9,10} Second, we have ample proof that our current system falls short of producing

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the best possible doctors: An Institute of Medicine (IOM) report,¹¹ the Canadian adverse events study,¹² and adverse events and near-miss reporting in the United Kingdom¹³ have documented high rates of preventable medical errors. Although both the system and the individuals that make up that system share responsibility for adverse events, most would agree that, on the individual level, we have a long way to go toward producing physicians who are optimally prepared with the requisite competencies to be able to work as members and leaders of interprofessional teams to safely provide the complex care required in the 21st century.

Faculty, program directors, and learners alike are grappling with the challenges of implementing CBME. Major barriers to CBME implementation to date have included (1) the time- and resource-intensive nature of competence assessment, which requires direct observation by multiple assessors in multiple settings; (2) the need for faculty development in teaching and assessing the competencies; (3) a misalignment between learning environments and learners' chosen practice environments; (4) the logistical challenges of introducing competency-based advancement into a traditionally time-based system (where advancement is primarily based on satisfactory completion of medical school and prescribed number of years of specialty training); and (5) limited investment in health professions education, which accounts for less than 2% of expenditures globally in the health care industry.^{8,14,15}

Our call for the widespread implementation of CBME is matched by an equally fervent call to study both the process and outcomes of implementation. We need to demonstrate to the public and the medical education community that CBME does no harm, is based on sound educational theory, and contributes to the professional formation of physicians who embody the habits of working to improve patient and population care as well as systems of care. Only then will we have answered the call to action laid out by the IOM report over 15 years ago.¹¹ Given our shared goal to implement CBME across countries and continents, and our ability to learn collectively from the universal barriers that we face in doing so, a logical next step is to develop a shared

mental model of what implementation of CBME would look like, chart the course, and begin the journey together.

The CBME Charter

Preamble

Frank et al¹⁶ have proposed the following description of competency-based education for medical education:

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

Moving from description and theory to broad implementation will require the medical education community to adhere to some fundamental principles and to make some stalwart commitments, as outlined below. These principles and commitments build on the foundations of CBME supported by the literature, as well as most current thinking that is emerging from the literature, the work and scholarship resulting from the two ICBME summits, and consensus of the ICBME Collaborative.

Fundamental principles

The following principles must serve as the foundation for the implementation of CBME.

Education must be based on the health needs of the populations served. Until the shift to CBME around the turn of the 21st century, the education and training of physicians in the United States and Canada generally followed the Flexnerian tradition¹⁷ for undergraduate medical education (UME), in which two years of basic science immersion were followed by two years of clinical experience; other countries used similar structures.¹⁸ Experts within specialties likewise formulated blueprints for graduate medical education (GME). The deficiencies that resulted from this education and training experience were explicitly brought to light by reports on quality gaps and medical errors.^{11–13,19} CBME, by contrast, “is a disciplined approach to specify the health problems to be addressed, identify the requisite competencies required of graduates for health-system performance, tailor the

curriculum to achieve competencies, and assess achievements and shortfalls.”¹⁴ CBME requires the ongoing reassessment of competencies to ensure their alignment with local population and system needs, which vary widely within countries and dramatically across the globe.²⁰ The importance of this principle is supported by the “triple aim” of Berwick et al²¹, which espouses better health, better health care, and lower cost.

The primary focus of education and training should be the desired outcomes for learners rather than the structure and process of the educational system.

Before the introduction of CBME, decisions concerning a learner's progress along the continuum of education, training, and practice were based on a set of requirements for exposure to basic science and to clinical experiences and the learner's demonstration of knowledge acquisition at designated points along the way.²² CBME shifts the emphasis to the learner's ability to demonstrate the *application* of that knowledge. Moreover, CBME defines a broad spectrum of basic competencies, along with specific competencies aligned with chosen career trajectories, that learners must *demonstrate* before they advance to the next stage. This principle—“standardization of learning outcomes and individualization of the learning process”—is one of the four goals of the recent Carnegie Foundation report on reforming medical school and residency education.²³ It is important to emphasize, however, that advancement in CBME is not only predicated on clinical competencies but also on other critical components that contribute to the formation of a physician. For example, professional identity formation, a maturational process that occurs over time, is an integral component of the development of professional competence.^{24,25}

The formation of a physician should be seamless across the continuum of education, training, and practice. The vertical adoption of CBME—that is, the integration of a common competency framework across the educational continuum from UME through GME and continuing professional development—will break down the traditional silos of medical education. Likewise, the horizontal adoption and integration across medical schools,

training programs, and regulatory bodies (i.e., those involved in certification) will facilitate the sharing of much-needed resources. Adopting a strategy of “beginning with the end in mind” will allow the entire continuum of education, training, and practice to be informed by a shared vision of what it means to be a good doctor. This reexamination of desired outcomes and curricula leading to these outcomes requires a shift in our thinking away from a focus on merely knowledge toward a focus on critical competencies such as communication and professionalism.²⁶ This shift must begin at the point of admission, requiring us to reexamine what we consider to be the desirable attributes of premedical candidates. In the spirit of the continuum, it also means focusing and integrating core basic science knowledge throughout education and training, and explicitly linking its application to patient care.²³ This becomes particularly important in light of the continuing explosion of new knowledge and highlights the importance of competence in the practice of evidence-based medicine to meet the challenge of managing and analyzing new information throughout one’s career. Continuity of both curriculum and assessment across the continuum will make learning effective, efficient, and meaningful. The additional benefits of continuity for both patients and learners have been well articulated by Hirsh and colleagues.²⁷

Commitments required of medical educators

Implementation of CBME will require a number of steadfast commitments that will chart the course for our collaborative journey.

Commitment to teaching, assessing, and role modeling the broad range of identified competencies. The introduction of CBME heralded not only a new educational framework but also a defined set of competencies that learners must be able to demonstrate. Reaching beyond the traditional goals and objectives related to patient care and medical knowledge, these competencies include communication, professionalism, advocacy, scholarship, leadership, and practice and system improvement.^{3–6,28} For learners to embrace these competencies as part of their professional formation, they must be made explicit in our curricula. For example, for learners

to become competent in practice-based learning and improvement, there needs to be a curriculum that addresses quality improvement (QI) and the opportunity to apply the knowledge by becoming an active participant in QI work with faculty who role model the implementation of QI in everyday practice.

Commitment to supervision that balances patient safety with the professional development of learners.

Although no one would dispute that patient safety is of paramount importance, members of the profession also have a responsibility to the professional formation of learners. There is a basic core of knowledge and skills that faculty must learn to practice effective supervision that aligns competence of the learner with the appropriate degree of supervision. Faculty must provide the structure and support to learners to facilitate their progression toward unsupervised practice. The importance of granting significant responsibility to learners before they complete a postgraduate program is that it allows learners to assume full responsibility for delivery of care while they are still in a protected environment (i.e., where a minimum of supervision at a distance is available), thereby creating a seamless transition into practice.²⁹

Commitment to transparency with all stakeholders. CBME is predicated on desired outcomes for patient populations. The voice of the patient—collectively and individually—must be attended to in defining these outcomes if we hope to achieve patient-centered care. In turn, the numerous stakeholders in health care deserve transparency regarding achievement of the targeted outcomes. During individual patient health care experiences, this translates into transparency about the outcomes that individual physicians have achieved with the patients that they serve. CBME, likewise, requires that learners demonstrate the ability to achieve the desired educational outcomes. Transparency regarding these outcomes and a learner’s progress toward them is critical. To be able to improve their performance, learners need formative, constructive, and specific performance feedback from patients, other health care professionals, peers, and faculty, requiring collaboration with all stakeholders invested in learner development.

Commitment to the empowerment of learners. Unlike traditional pedagogy, which is based on a hierarchical relationship between teacher and learner, CBME calls for the teacher to help the learner take ownership of his or her education and training. The expectation of CBME is that the teacher, the learner, and the learning environment will foster a learner-centered approach that includes individualized learning experiences, feedback, and guided reflection at every step along the career trajectory.³⁰ As all learners differ, so should their educational trajectories. Applying this principle requires that we extend our notion of the learning environment to apply to the workplace, allowing learners to spend more time in the types of settings in which they will ultimately practice. An example of the application of this principle is the increasing use of community health centers for training physicians in primary care disciplines.³¹

Commitment to the effectiveness and efficiency of assessment strategies and tools. One of the major concerns raised about CBME is the resource-intensive requirement for multiple assessors to determine learners’ level of competence through multiple, directly observed assessments. Multiple assessors are critical for two major reasons. First, many stakeholders are involved with patient care, and they each bring an important and different perspective. Second, reliability is dependent on broad sampling.³² Efficiencies should be sought through the use of technology and the careful selection of assessment tools and strategies. For example, electronic communication technologies such as mobile devices can be used to facilitate time-effective point-of-care assessments. Such tools would need to be embedded within platforms that have the capacity to synthesize assessments and deliver feedback to both learners and teachers. As Crossley and Jolly³³ state, “Because high-level assessment is a matter of judgment, it works better if the right questions are asked, in the right way, about the right things, of the right people.” In other words, our assessment strategies must be closely aligned with the constructs (i.e., the behaviors in health care) we are attempting to measure. The essential focus of the assessment must explicitly address what one is attempting to assess. For example, if we want to assess teamwork, we need a tool

that specifically addresses collaborative behaviors in the workplace.³⁴ There is some evidence that this quality of *construct alignment* increases rater agreement around learner performance and the ability to discriminate between low and high performers while reducing the number of observations required for reliable learner assessments.^{35,36} If we hope to measure the integration of competencies needed for care delivery, then workplace assessments based on expert judgment will be critical. The tools that we use should be part of a structured program of assessment³⁷ and be guided by their “utility,” which is defined by van der Vleuten and Schuwirth³² as the “multiplicative product of their reliability, validity, cost-effectiveness, feasibility, and educational impact.” Kogan and colleagues³⁸ have recently recommended that patient outcomes should also inform our assessment of learners.

Commitment to basing transition decisions on competence rather than time. Although a full transition to a competency-based system of education and training may seem to present insurmountable logistical challenges, teachers can take the first steps toward this goal by responding to individual variability in skill acquisition and by aggregating and applying their experience with individual learners to educational strategies for the specialty as a whole. Learners who are progressing quickly can be pushed further along the developmental continuum from novice toward expert by the time of their transition from GME to practice.⁴ Thus, instead of graduating at a level of performance that is considered competent, they may graduate at a performance level of proficient or beyond in certain areas. Conversely, learners must not be allowed to progress merely because they have put the requisite time into the process of education and training. Decisions about progression must be based on the demonstration of required competencies. Meanwhile, tracking learners’ performance over time in the required competencies can provide data on how long it takes most learners to attain the expected level of performance in these competencies, thus informing planning with respect to duration of training.

Commitment to advancing CBME through workplace assessment, program evaluation, and research. Assessment of learners at the individual level is critical to their competency-based advancement.

However, because the overarching principle of CBME is to address the health needs of populations¹⁴ and these needs are being addressed by teams of professionals, collective competence is emerging as a critical unit of assessment, and the study of teams is an increasingly important area of continued research.³⁹ Similarly, accumulating evidence on program effectiveness is critical to the advancement of CBME as a whole. Given the important influence of context on the design and implementation of CBME, gathering this evidence will require a robust understanding of how programs actually operate as well as how their processes contribute to both intended and unintended outcomes.⁴⁰ Accordingly, we must expand our view, using a range of lenses—including multisite case studies⁴¹ and developmental⁴² and realist evaluation⁴⁰—to capture the complexity of CBME. Education research must draw from and build on existing theories of education, as well as contribute to the development of new ones, in illuminating what worked, what did not work, and why.⁴³ Accordingly, this research should not focus solely on hypothesis testing but should also elaborate our understanding of how CBME is adopted and adapted as an educational innovation over time.⁴⁴

Commitment to faculty development. Faculty are expected to teach and assess all the competencies now required of learners. Unless faculty are recent graduates themselves, they are being asked to teach about competencies that were not formally taught or assessed during their own training. Compounding the problem is the gap between practices rooted in 20th-century models and the required abilities of 21st-century physicians; for example, team-based care requires new practice models that support interprofessional collaboration, and an emphasis on QI may require infrastructure such as patient registries.⁴⁵ Our commitment must be twofold: (1) to provide faculty development in teaching and assessing the competencies required of learners, and (2) to work with those responsible to transform care systems to models that align with our teaching about best practices.^{15,45}

Commitment to collaboration. Implementation of CBME will require collaboration of all stakeholders to achieve vertical and horizontal integration. This collaboration should encompass all the international communities interested or involved in

implementing CBME. We must also recognize that health care delivery in the 21st century is a team effort that must include our interprofessional colleagues beginning with shared educational experiences in UME, so that each profession appreciates the scope of practice and contribution of the other before they are asked to function together in teams.

Summary

Evidence that our current systems of education and training are not producing the best possible doctors must spur our profession to test and implement more promising strategies. These efforts are crucial if we are to improve patient care and maintain the public trust. CBME has been recognized internationally as a system of education and training that holds the best promise of improving learner and patient outcomes. Although the challenges are great and the resources limited, we are certain that a collaborative effort offers the best prospect for advancing both the implementation and the study of the impact of CBME on learners and their patients. We offer this charter as the first step in our collective journey.

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References

- 1 Harden R, Frank J, Snell L, eds. Special issue: Competency-based medical education. *Med Teach*. 2010;32:629–689.
- 2 ABIM Foundation, American Board of Internal Medicine, ACP-ASIM Foundation, American College of Physicians–American Society of Internal Medicine, European Federation of Internal Medicine. Medical professionalism in the new millennium: A physician charter. *Ann Intern Med*. 2002;136:243–246.
- 3 Frank JR, Danoff D. The CanMEDS initiative: Implementing an outcomes-based framework of physician competencies. *Med Teach*. 2007;29:642–647.
- 4 Batalden P, Leach D, Swing S, Dreyfus H, Dreyfus S. General competencies and accreditation in graduate medical education. *Health Aff (Millwood)*. 2002;21:103–111.
- 5 Simpson JG, Furnace J, Crosby J, et al. The Scottish doctor–learning outcomes for the medical undergraduate in Scotland: A foundation for competent and reflective practitioners. *Med Teach*. 2002;24:136–143.
- 6 Australian Curriculum Revision Working Group. Australian Curriculum framework for junior doctors. <http://curriculum.cpmec.org.au/>. Accessed October 22, 2015.
- 7 ten Cate O. Competency-based medical education. In: Cockerham WC, Dingwall R, Quah SR, eds. *Wiley-Blackwell Encyclopedia of Health, Illness, Behavior, and Society*. Hoboken, NJ: Wiley-Blackwell; 2014:1329–1335.
- 8 Carraccio CL, Englander R. From Flexner to competencies: Reflections on a decade and the journey ahead. *Acad Med*. 2013;88:1067–1073.
- 9 Carraccio C, Wolfsthal SD, Englander R, et al. Shifting paradigms: From Flexner to competencies. *Acad Med*. 2002;77:361–367.
- 10 Swing SR; International CBME Collaborators. Perspectives on competency-based medical education from the learning sciences. *Med Teach*. 2010;32:663–668.
- 11 Kohn LT, Corrigan JM, Donaldson MS, eds. *To Err Is Human: Building a Safer Health Care System*. Washington, DC: National Academies Press; 1999.
- 12 Baker GR, Norton PG, Flintoft V, et al. The Canadian adverse events study: The incidence of adverse events among hospital patients in Canada. *CMAJ*. 2004;170:1678–1686.
- 13 Shaw R, Drever F, Hughes H, Osborn S, Williams S. Adverse events and near miss reporting in the NHS. *Qual Saf Health Care*. 2005;14:279–283.
- 14 Frenk J, Chen L, Bhutta ZA, et al. Health professionals for a new century: Transforming education to strengthen health systems in an interdependent world. *Lancet*. 2010;376:1923–1958.
- 15 Holmboe ES, Ward DS, Resnick RK, et al. Faculty development in assessment: The missing link in competency-based medical education. *Acad Med*. 2011;86:460–467.
- 16 Frank JR, Mungroo R, Ahmad Y, et al. Toward a definition of competency-based education in medicine: A systematic review of published definitions. *Med Teach*. 2010;32:631–637.
- 17 Flexner A. *Medical Education in the United States and Canada: A Report to the Carnegie Foundation for the Advancement of Teaching*. Bulletin 4. New York, NY: Carnegie Foundation; 1910.
- 18 Wijnen-Meijer M, Burdick W, Alofs L, Burgers C, ten Cate O. Stages and transitions in medical education around the world: Clarifying structures and terminology. *Med Teach*. 2013;35:301–307.
- 19 Institute of Medicine. *Crossing the Quality Chasm: A New Health System for the 21st Century*. Washington, DC: National Academies Press; 2001.
- 20 Crisp N, Chen L. Global supply of health professionals. *N Engl J Med*. 2014;370:950–957.
- 21 Berwick DM, Nolan TW, Whittington J. The triple aim: Care, health, and cost. *Health Aff (Millwood)*. 2008;27:759–769.
- 22 Hodges BD. A tea-steeping or i-Doc model for medical education? *Acad Med*. 2010;85(9 suppl):S34–S44.
- 23 Cooke M, Irby DM, O'Brien BC. *Educating Physicians: A Call for Reform of Medical School and Residency*. San Francisco, Calif: Jossey-Bass; 2010.
- 24 Forsythe GB. Identity development in professional education. *Acad Med*. 2005;80(10 suppl):S112–S117.
- 25 Hilton SR, Slotnick HB. Proto-professionalism: How professionalisation occurs across the continuum of medical education. *Med Educ*. 2005;39:58–65.
- 26 Eva KW, Rosenfeld J, Reiter HI, Norman GR. An admissions OSCE: The multiple mini-interview. *Med Educ*. 2004;38:314–326.
- 27 Hirsh DA, Ogur B, Thibault GE, Cox M. “Continuity” as an organizing principle for clinical education reform. *N Engl J Med*. 2007;356:858–866.
- 28 Frank JR, Snell L, eds. *The Draft CanMEDS 2015 Physician Competency Framework: Series I*. Ottawa, Ontario, Canada: Royal College of Physicians and Surgeons of Canada; February 2014. http://www.royalcollege.ca/portal/page/portal/rc/common/documents/canmeds/framework/framework_series_1_e.pdf. Accessed October 22, 2015.
- 29 Ten Cate O, Hart D, Ankel F, et al. Entrustment decision making in clinical training. *Acad Med*. 2016;91:191–198.
- 30 Schumacher DJ, Englander R, Carraccio C. Developing the master learner: Applying learning theory to the learner, the teacher, and the learning environment. *Acad Med*. 2013;88:1635–1645.
- 31 Reynolds PP. The teaching community health center: An idea whose time has come. *Acad Med*. 2012;87:1648–1650.
- 32 van der Vleuten CP, Schuwirth LW. Assessing professional competence: From methods to programmes. *Med Educ*. 2005;39:309–317.
- 33 Crossley J, Jolly B. Making sense of work-based assessment: Ask the right questions, in the right way, about the right things, of the right people. *Med Educ*. 2012;46:28–37.
- 34 Olupeliyawa AM, O’Sullivan AJ, Hughes C, Balasooriya CD. The Teamwork Mini-Clinical Evaluation Exercise (T-MEX): A workplace-based assessment focusing on collaborative competencies in health care. *Acad Med*. 2014;89:359–365.
- 35 Crossley J, Johnson G, Booth J, Wade W. Good questions, good answers: Construct alignment improves the performance of workplace-based assessment scales. *Med Educ*. 2011;45:560–569.
- 36 Weller JM, Misur M, Nicolson S, et al. Can I leave the theatre? A key to more reliable workplace-based assessment. *Br J Anaesth*. 2014;112:1083–1091.
- 37 Driessen EW, van Tartwijk J, Govaerts M, Teunissen P, van der Vleuten CP. The use of programmatic assessment in the clinical workplace: A Maastricht case report. *Med Teach*. 2012;34:226–231.
- 38 Kogan JR, Conforti LN, Iobst WF, et al. Reconceptualizing variable rater assessments as both an educational and clinical care problem. *Acad Med*. 2014;89:721–727.
- 39 Hodges BD, Lingard L, eds. *The Question of Competence—Reconsidering Medical Education in the Twenty-First Century*. Ithaca, NY: Cornell University Press; 2012.
- 40 Pawson R, Tilley N. *Realistic Evaluation*. Thousand Oaks, Calif: Sage Publications; 1997.
- 41 Yin RK. *Case Study Research: Design and Methods*. Thousand Oaks, Calif: Sage Publications; 2014.
- 42 Quinn Patton M. Developmental evaluation. *Eval Pract*. 1994;15:311–319.
- 43 Bordage G. Conceptual frameworks to illuminate and magnify. *Med Educ*. 2009;43:312–319.
- 44 Regehr G. It’s NOT rocket science: Rethinking our metaphors for research in health professions education. *Med Educ*. 2010;44:31–39.
- 45 Eiff MP, Waller E, Fogarty CT, et al. Faculty development needs in residency redesign for practice in patient-centered medical homes: A P4 report. *Fam Med*. 2012;44:387–395.

The CARE Model of Social Accountability: Promoting Cultural Change

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Abstract

On the 10th anniversary of Health Canada and the Association of Faculties of Medicine of Canada's publication in 2001 of *Social Accountability: A Vision for Canadian Medical Schools*, the authors review the progress at one Canadian medical school, the College of Medicine at the University of Saskatchewan, in developing a culture of social accountability. They review the changes that have made the medical school more socially accountable and the steps taken to make those changes possible. In response to calls for socially

accountable medical schools, the College of Medicine created a Social Accountability Committee to oversee the integration of these principles into the college. The committee developed the CARE model (Clinical activity, Advocacy, Research, Education and training) as a guiding tool for social accountability initiatives toward priority health concerns and as a means of evaluation. Diverse faculty and student committees have emerged as a result and have had far-reaching impacts on the college and communities: from changes in curricula

and admissions to community programming and international educational experiences. Although a systematic assessment of the CARE model is needed, early evidence shows that the most significant effects can be found in the cultural shift in the college, most notably among students. The CARE model may serve as an important example for other educational institutions in the development of health practitioners and research that is responsive to the needs of their communities.

Social accountability is a concept that arose as a reaction to gradual changes in medical education that emphasized specialization and technical competency while doing little to improve the overall health of populations.¹ These changes may have improved medical education, but they also contributed to a human resources crisis in the health care sector, as manifested in inequitably distributed health professionals (to the disadvantage of rural and poor areas), a persistent shortage of primary care staff, and an

inability of the health sector, the social sector, and policy makers to jointly address multiple dimensions of health.^{2,3} Priorities, however, have evolved, as demonstrated by the World Health Organization's (WHO's) call for Health for All^{3,4} and an end to growing health disparities. Societies want to ensure that investments in the health care sector improve the community's health,^{3,5} and medical schools are key actors in advancing this change.³

In 1995, the WHO formally defined social accountability as it relates to medical schools, outlining the obligation of educational institutions to serve the health of their surrounding communities and calling on them to collaborate with governments, health care organizations, and the public in identifying, prioritizing, and responding to health issues.³ A sustainable and responsive model for delivering health services, according to the WHO, requires the active participation of five principal partners: policy makers, health managers, health professionals, academic institutions, and communities.⁶

Their 2001 report, *Social Accountability: A Vision for Canadian Medical Schools*, states that the "primary goal of medical education is to prepare graduates to practice effectively in reducing the burden of illness and improving the health of their communities."⁷ The specific recommendations of the report include addressing the needs of diverse individuals and communities in Canada and globally, integrating competencies in prevention and the social determinants of health in medical curricula, and providing students with firsthand experience in community settings and among distinct populations to broaden the learning context.⁶ The principles of social accountability are not limited to Canada's borders; the concepts of partnership, collaboration, and equity direct Canada's role in improving health globally as well. An examination of medical education by the AFMC in 2007 identified key issues that continue to require attention in order to enhance social accountability: the health needs of rural communities, the paucity of Aboriginal students in medicine, and the increasing burden of chronic diseases, among others.⁸

A debate exists among Canadian medical school leaders over the best approach for meeting the goals set forth by the AFMC, with some calling for the creation of dedicated committees, and others

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Social Accountability in Canada

Health Canada and the Association of Faculties of Medicine of Canada (AFMC) have since adopted the principle of social

recommending that an emphasis on social accountability be integrated into the curriculum across all departments. Those who advocate for the integrative approach argue that it would validate social accountability as a necessary aspect of the entire medical profession; relegating the responsibility for ensuring social accountability to a specialized committee could marginalize it as something done “elsewhere, by others.” Those on the other side of the debate, while recognizing that integration into all departments is the optimal goal, believe that change requires “sustained, multifaceted interventions over time”¹ and that dedicated committees are needed to guide the implementation and ensure the sustainability of social accountability.

Social Accountability at the University of Saskatchewan

The College of Medicine at the University of Saskatchewan decided that in its local context a dedicated committee was necessary, and so, in 2004, the dean established the Social Accountability Committee, charging it with incorporating social accountability into all of the educational, research, and service activities of the college. This work was to take the form of engagement, communication, and advocacy related to social accountability, support for specific curricular and extracurricular projects, and the development of community partnerships to identify and address unmet health needs. The volunteer membership of the committee included faculty from various departments, members of the educational administration, students, community representatives, and practicing physicians. The dean was the original chair, followed by a faculty member from the Department of Academic Family Medicine. Membership was loosely defined to encourage maximum participation and thus varied from meeting to meeting, growing as the initiative developed. Interest grew within the College of Medicine, resulting in projects and subcommittees working to address health disparities in the city of Saskatoon, its surrounding communities, and around the world. Emerging areas of interest included Aboriginal health, primary health care in urban and rural underserved areas, gender equity, immigrant health, global health, and eco-

health, with the promotion of greater health equity as an overarching goal.

The quarterly committee meetings evolved over time, reflecting changes in the initiative. In the original phase, meetings focused on establishing the initiative and assessing existing social accountability activities within the College of Medicine. As subcommittees were formed and projects begun, the meetings shifted to focus on reports of the emerging activities. When interest in purely report-based meetings waned, guest speakers were brought in to supplement logistical discussions with background discussions on key topics. The current format combines presentations and reports on existing and new activities, and opportunities for the committee members to network and solve problems.

As interests expanded and activities diversified, the initiative grew beyond the capacity of a volunteer committee. A full-time social accountability coordinator, hired in 2007, reports to the committee chair and supports existing initiatives and development of new activities. That same year, the role of the chair was restructured as a quarter-time faculty position with the primary responsibility of leading the committee. The committee undertook strategic planning to set goals for further developing a culture of social accountability at the College of Medicine. Social accountability was referenced prominently throughout the College of Medicine’s Integrated Plan for 2008 to 2012.⁹ In 2009, the Social Accountability Committee was formalized as a standing committee of the College of Medicine’s faculty council, which meant that the council had to formally approve the committee’s members and chair. In 2010, the council approved the establishment of a Division of Social Accountability, to be hosted by the Department of Community Health and Epidemiology. Changing the initiative from an “at-pleasure” satellite of the current administration to a more permanent institutional component not only increased its capacity in terms of clerical support and office space but further legitimized the effort to give social accountability a central role in the college. A strategic planning workshop in early 2011 has set future directions for the division and the committee, which will remain the body that directs the

college’s social accountability activities. These future directions include enhanced initiatives related to Aboriginal health and a greater emphasis on evaluation and research as a means to better understand the impact of the initiative and advance scholarship in the field of social accountability.

The CARE model

One of the committee’s early steps was meeting with departments throughout the College of Medicine to identify and understand existing activities that could be described as socially accountable. Shortly after the committee chair became a paid position, the new chair met individually with department heads and also presented interactive “grand rounds” sessions to each department to further explore understandings of social accountability and the current activities in the area. From these discussions, the chair and committee identified four key areas of activity within a medical school: *Clinical activity*, *Advocacy*, *Research*, and *Education and training* (giving the acronym CARE). Socially accountable *clinical activity* addresses priority problems and responds to changing community needs, including overcoming barriers to access. Socially accountable *advocacy* includes speaking out on behalf of underserved populations or neglected conditions and working with partners and policy makers to translate a vision of a patient-centered health care system. Socially accountable *research* is curiosity based, is conducted in response to real needs, and leads to evidence-based practice and quality care. Socially accountable *education and training* models and teaches professionalism and community-responsiveness, provides opportunities for service-learning, and incorporates social accountability into practical training and continuing education throughout the life of a physician’s practice.

Beyond clever wordplay, CARE is a useful tool for identifying the priority health concerns of local, regional, national, and international communities, while making health systems more responsive and socially accountable. The Social Accountability Committee works through subcommittees that focus on key issues relevant to the communities served by the College of Medicine (Figure 1). The subcommittees use the CARE model as a guide to assess how their work

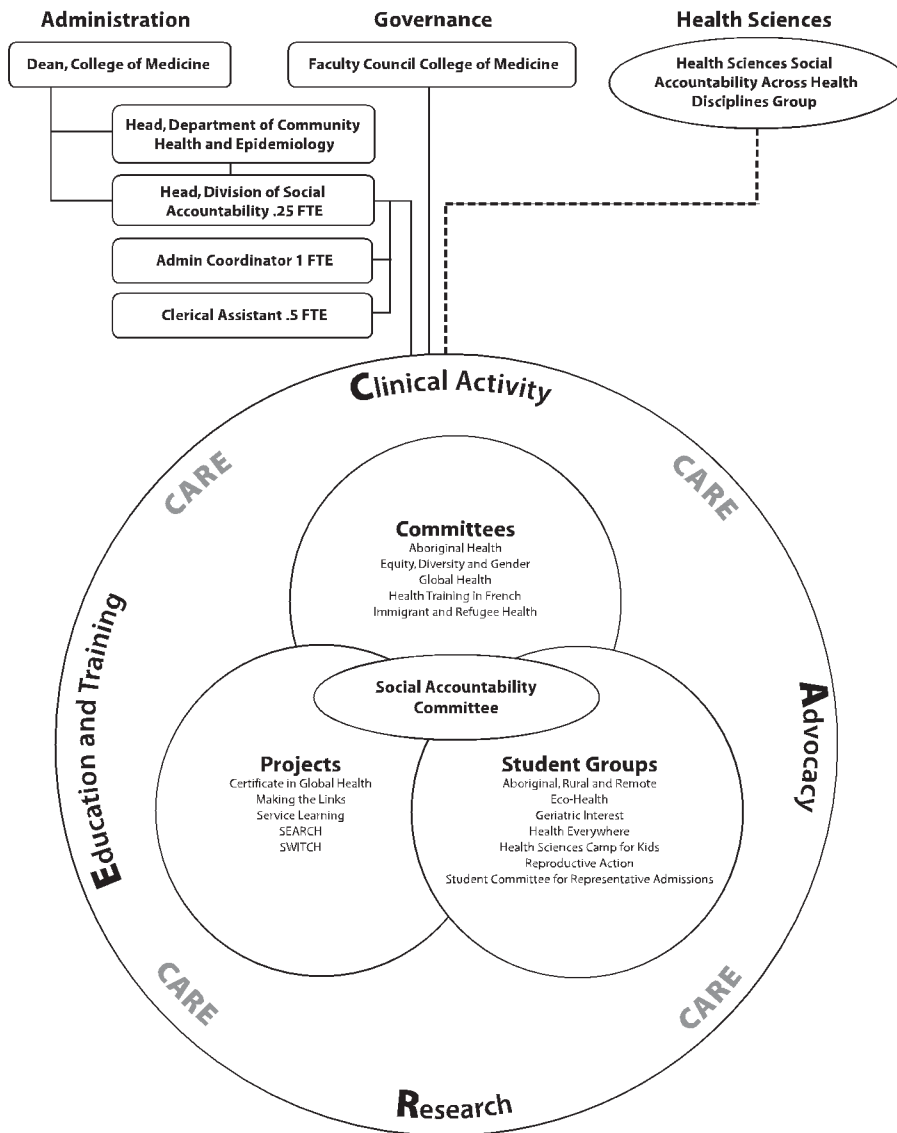


Figure 1 This organogram describes the relationship of the Social Accountability Committee to its partner committees, projects, and student groups at the College of Medicine at the University of Saskatchewan. The Division of Social Accountability offers practical support to each of these activities. The figure also describes the staffing of the division and the reporting relationships of that staff, as well as the reporting relationship of the committee to the faculty council. The dotted line represents a developing structure for interprofessional collaboration in social accountability at the level of the Council of Health Sciences Deans. SEARCH indicates Student Energy in Action for Regina Community Health; SWITCH, Student Wellness Initiative Toward Community Health.

addresses each of the four categories of activity. After a subcommittee has scanned its area of interest for social accountability activities, both curricular and extracurricular, it designs projects to address gaps. These projects might include new course content, an independent speaker series, a service-learning program for students, sending faculty and students to relevant conferences, or initiating collaborative work to introduce a new clinical service. These activities are then reported back to the larger committee, which again

applies the CARE model to evaluate the initiative's success and guide future activities. The four areas of the CARE model serve as a guide for the subcommittees and departments and allow for an assessment, albeit imperfect, of whether social accountability is truly being integrated into all of the college's activities. For example, if the Immigrant and Refugee Health Subcommittee had an education project with elements of advocacy, the Social Accountability Committee might suggest ways of expanding into areas of clinical activity

and research that build on existing connections. Table 1 presents a list of the goals and activities of various subcommittees within the Social Accountability Committee.

Special projects: SWITCH and Making the Links

In addition to the Social Accountability Committee and its subcommittees, social accountability finds expression through unique projects. The Student Wellness Initiative Toward Community Health (SWITCH)¹⁰ and Student Energy in Action for Regina Community Health (SEARCH) are student-run interdisciplinary clinics serving inner-city neighborhoods in Saskatoon and Regina, respectively. These clinical experiences are open to all medical students, who work alongside students from nursing, pharmacy, nutrition, social work, physical therapy, kinesiology, clinical psychology, and other disciplines. The students offer, under appropriate supervision, after-hours clinical services and health programming to underserved communities. In Making the Links,¹¹ a multisite longitudinal service-learning experience, 10 medical students (approximately 10% of the student body) are selected to spend the summer after their first year of study in northern Saskatchewan (in the communities of Ile a-la-Crosse or Pinehouse, or on reserve at Buffalo River Dene Nation). Those students then work at SWITCH during the school year and spend six weeks of the following summer in rural Mozambique. Between these three experiences, the students participate in all aspects of the CARE model: clinical care at SWITCH and the Massinga Rural Hospital (Mozambique), advocacy in community development projects in northern Saskatchewan and Mozambique, participatory research in malaria and HIV in the rural community of Tevele (Mozambique), and community service-learning supplemented by theoretical education in global health. Through these CARE experiences, the students understand the commonalities and differences in three diverse, low-resource settings: remote Aboriginal communities, inner-city neighborhoods, and rural Sub-Saharan Africa. Above all, students gain experiential understanding of the crucial importance of the social determinants of health. These experiences provide a fundamental

Table 1

Goals and Activities of Subcommittees of the Social Accountability Committee at the University of Saskatchewan College of Medicine, 2011

Subcommittee	Goals	Activities
Aboriginal Health Committee	<ul style="list-style-type: none"> To strengthen culturally based linkages between indigenous world views and the medical community To create and develop knowledge and skills specific to the discipline of Aboriginal health and healing 	<ul style="list-style-type: none"> Recruit and retain Aboriginal students and faculty Develop a modular curriculum in Aboriginal health and healing Run the Aboriginal Student Mentorship Program for Aboriginal students interested in medicine Support the student-led Aboriginal, Rural and Remote Health Group
Equity, Diversity, and Gender Group	<ul style="list-style-type: none"> To advocate, support, and promote equity and diversity within the College of Medicine To support and encourage an awareness of equity, diversity, and gender in curriculum, research, and service undertakings To serve as a resource and help answer questions and concerns of faculty, students, and staff at the College of Medicine 	<ul style="list-style-type: none"> Assess current undergraduate and postgraduate curriculum to further enhance diversity in the curriculum Develop initiatives that support international medical graduates Support the student-led Reproductive Action Group Establish a mentoring program for women in academic medicine
Global Health Committee	<ul style="list-style-type: none"> To oversee the College of Medicine's global health initiatives, which are guided by the social transformation model⁹ To advance the college's efforts in global health education, research, and development 	<ul style="list-style-type: none"> Provide travel awards to medical students, faculty, residents, and graduate students for research and/or learning experiences in developing countries Coordinate predeparture orientation and debriefing sessions for students participating in international study/service learning/research experiences Plan the annual Global Health Speaker Series Support the student-led group, Health Everywhere
Health Training in French/Formation Santé en Français	<ul style="list-style-type: none"> To provide students, residents, and current practitioners the skills and connections to provide health services in French, an official Canadian language To improve the quality of health services offered to the Francophone population of Saskatchewan 	<ul style="list-style-type: none"> Offer workshops in medical terminology and networking sessions among students and professionals in medicine and other health sciences Work in collaboration with French-speaking community agencies to better serve immigrant health
Immigrant and Refugee Health Committee	<ul style="list-style-type: none"> To define the College of Medicine's role in immigrant and refugee health within the greater community and to explore and address immigrant health from a socially accountable perspective 	<ul style="list-style-type: none"> Expand immigrant health content in curriculum Run a community service-learning project that matches medical students with immigrant families Support medical student participation in obtaining learning opportunities in immigrant and refugee health

element of social accountability: the "powerful opportunity for mutual change ... in the learner, his or her teachers and the community themselves."¹¹

Deepening interest in fostering a culture of social accountability

The existence of these projects and subcommittees suggests, at the very least, a deepening awareness of and interest in social accountability at the College of Medicine in Saskatchewan. The projects involve numerous faculty, staff, and students (SWITCH, in particular, is attended by over 50% of medical students). Evidence of this cultural change can be found among the students who, over the past 10 years, have not only participated in but have also been frequent innovators of social

accountability activities. SWITCH and Making the Links arose from student initiatives, and students have long clamored for more service-learning experiences and for meaningful interaction and education regarding health issues of the underserved.

In the last two years, interest from students in social accountability has continued to flourish. Existing groups like Health Everywhere, a global health advocacy group, SWITCH, and SEARCH continue to grow in membership and activity. Multiple new groups have arisen: (1) the Reproductive Action Group educates students and communities on sexual health, (2) the Geriatric Interest Group focuses on underaddressed issues in care of the elderly, (3) the Aboriginal, Rural, and Remote Health Group

both hosts speakers and carries out community tours to deepen student understanding of health in Aboriginal and rural communities, (4) the Political Action Committee trains students in lobbying government for health advocacy, (5) Community Health for Community Change focuses on promoting the principles of community health and bridging the University of Saskatchewan and its surrounding community, (6) the Student Committee for Representative Admission seeks to ensure that students from underrepresented groups are welcomed into the College of Medicine through proper preparation and admissions policies, (7) the Global Health Research Interest Group is a cross-campus research and advocacy group for equity in marginalized populations globally, and (8) the Health Science Camps for Kids teaches

elementary and junior high school students in urban and remote communities about careers in the health sciences.

The plethora of initiatives demonstrates the diversity of areas, interests, and multidisciplinary collaboration that social accountability encompasses. The recent expansion of these groups reflects a culture of “civic professionalism” among medical students, where their scope of medicine has broadened beyond the individual obligation to the patient to the collective obligation to local and global communities.⁷ Students in medicine and a wide array of health disciplines have been the leaders of this culture shift at the University of Saskatchewan. Students informally interviewed about the proliferation of student activity suggested that revised admissions processes and grading policies that emphasize life experience and communication skills have changed the makeup of the student body. They also referred to a perception that advocating for social accountability has become not only acceptable but expected. The level of energy, enthusiasm, and passion in undertaking social accountability initiatives embodies the need to “remind ourselves that medical education is fun—and we should avoid taking ourselves overly seriously if we want to effect practical change.”¹ Former Making the Links participant Dr. Breanna Davis adds:

Reflecting on my educational experience at the College of Medicine, Making the Links was by far the most influential, challenging and rewarding experience of medical school. The importance of serving the underserved, community engagement and development, and service-learning, reinforced by the [Making the Links] program, guided me into a rural family medicine residency and on to a practice in Northern Saskatchewan with a continued interest in global health. It is important to me to stay interested, engaged and excited in this career and I am so grateful to have observed successful teachers, with such strong community ties, who exemplify the rewards of social accountability in practice.

Accounting for social accountability

Although the CARE model serves to assess ongoing activities, a more comprehensive assessment is needed to formally evaluate where and to what extent cultural change is occurring. The extensive literature on cultural change in organizations (for a comprehensive review,

see Jung et al¹²) provides a range of potential tools in the form of quantitative instruments and qualitative methodologies, and recent initiatives to measure and evaluate cultural change in universities^{13,14} are important resources. Empirical evaluations of cultural shift could determine the effectiveness of the Social Accountability Committee and the CARE model on the development of a culture of social accountability at this medical school.

It would also be useful to compare our experiences with those of an institution that took a different approach to integrating social accountability into its activities. An assessment of the culture at our institution led to the choice of a dedicated committee approach. And although the existence of a hub for social accountability activity, complete with support staff, has certainly led to success in some areas, some departments do not engage with the committee in any meaningful fashion. Whether the supportive structures established by the committees represent barriers to some members of the college community or result in a perception that social accountability is something to be taken care of by others are important questions that we have not yet formally explored. Certainly, frequent communication and open avenues for dialogue with the Division of Social Accountability will be key to mitigating any potential isolation.

Overall, however, the concentrated approach and the CARE model seem to have served the College of Medicine at the University of Saskatchewan quite well. Many faculty members and the great majority of students are involved in some aspect of the official social accountability activities, while the continued support from the administration has kept the committees and their activities visible and valued. The CARE model was featured in a plenary session on social accountability at the May 2011 Canadian Conference on Medical Education in Toronto, giving us the opportunity to engage more formally with other faculties of medicine in comparing approaches to social accountability and in advancing the vision outlined in *Social Accountability: A Vision for Canadian Medical Schools*.⁷

Developing a Culture of Social Accountability

The experience at the College of Medicine at the University of Saskatchewan presents

one model for promoting a culture of social accountability. The CARE model offers a new way to envision the work of a medical school and, if further developed, to evaluate success in developing a health system based on people’s needs. The combination of the two offers an excellent starting point for other faculties interested in furthering the social accountability of their institutions and the profession as a whole.

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References

- 1 Woollard RF. Caring for a common future: Medical schools’ social accountability. *Med Educ.* 2006;40:301–313.
- 2 Boelen C, Woollard B. Social accountability and accreditation: A new frontier for educational institutions. *Med Educ.* 2009;43:887–894.
- 3 Boelen C, Heck JE. Defining and Measuring Social Accountability of Medical Schools. Geneva, Switzerland: World Health Organization; 1995. http://whqlibdoc.who.int/hq/1995/WHO_HRH_95.7.pdf. Accessed May 17, 2011.
- 4 World Health Assembly. Reorientation of Medical Education and Medical Practice for Health for All. WHA Resolution 48.8. Geneva, Switzerland: World Health Organization; 1995.
- 5 Boelen C. Prospects for change in medical education in the twenty-first century. *Acad Med.* 1995;70(7 suppl):S21–S29. http://journals.lww.com/academicmedicine/Abstract/1995/07000/Prospects_for_change_in_medical_education_in_the_17.aspx. Accessed May 25, 2011.
- 6 Boelen C. Towards Unity for Health: Challenges and Opportunities for Partnership in Health Development: A Working Paper. Geneva, Switzerland: World Health Organization; 2000. http://www.who.int/hrh/documents/en/TUFH_challenges.pdf. Accessed May 17, 2011.

- 7 Health Canada. Social Accountability: A Vision for Canadian Medical Schools. http://www.afmc.ca/pdf/pdf_sa_vision_canadian_medical_schools_en.pdf. Accessed May 17, 2011.
- 8 Association of Faculties of Medicine of Canada. The Future of Medical Education in Canada (FMEC): A Collective Vision for MD Education. http://www.afmc.ca/fmec/pdf/collective_vision.pdf. Accessed May 17, 2011.
- 9 University of Saskatchewan College of Medicine. College of Medicine and School of Physical Therapy Integrated Plan: 2008–2012. <http://www.medicine.usask.ca/leadership/integrated-plan/index.html>. Accessed May 17, 2011.
- 10 Student Wellness Initiative Towards Community Health Web site. <http://switchclinic.ca>. Accessed May 17, 2011.
- 11 University of Saskatchewan College of Medicine. Making the Links. www.makingthelinks.usask.ca. Accessed May 17, 2011.
- 12 Jung T, Scott T, Davies HTO, et al. Instruments for the Exploration of Organisational Culture. <http://www.scothub.org/culture/instruments.html>. Accessed May 17, 2011.
- 13 Bartell M. Internationalization of universities: A university culture-based framework. *Higher Educ*. 2003;45:43–70.
- 14 Fralinger B, Olson V, Pinto-Zipp G, DiCorcia M. Organizational culture at the university level: A follow-up study using the OCAI instrument. In: 2010 EABR & ETLC Conference Proceedings; June 7–10, 2010; Dublin, Ireland. http://www.cluteinstitute.com/proceedings/2010_Dublin_ETLC_Articles/Article%20375.pdf. Accessed May 17, 2011.

Teaching and Learning Moments

Learning to Be Helpful

“What can I do to help?” As a medical student new to the wards, I have often struggled for ways to be more than an enthusiastic bystander. If life in the hospital were adapted for the theater, I would surely be typecast as “Eager Short White Coat”—energetic and easily occupied, yet, in the context of the classic “see one, do one, teach one” triptych, perpetually stuck at seeing. Opportunities to be helpful, however, sometimes emerge unexpectedly. The last day of my anesthesiology rotation, I followed my team to the labor and delivery operating rooms, where we found Mrs. Z., a 28-year-old woman whose slender figure was barely discernible under her gown.

“G1P0 here by herself, you know the drill,” announced the anesthesiologist, and the resident hurried into action. I dashed out of his way around the table and discovered that the patient looked rather like me, ethnically speaking, which was rare at this hospital. I introduced myself and extended my right hand; she winced as a cold cleansing sponge was applied to her back.

“You’re going to feel some pressure,” the resident said. Mrs. Z. remained motionless.

“She doesn’t really speak English,” a nurse hollered across the operating room.

Retreating to the other side, I tried to focus on the spinal needle and the resident’s meticulous technique, but I was distracted by our patient’s soft cries and the loneliness reflected in her eyes; perhaps it was the other way around. As the catheter was threaded, my attending turned to face me.

“Any questions?”

Medical students live for this moment—the chance to ask one startlingly excellent question that can at once challenge and impress. I usually pause during such moments to craft the perfect inquiry, but this time, there was no hesitation.

“Just one for the patient,” I replied, circling back to Mrs. Z. and again offering my hand, this time palm up. “*Nin shuo guoyu ma?*” Do you speak Mandarin?

Awaiting a response, I suddenly panicked, fearing I had insulted my attending or assumed too much about my patient. But Mrs. Z. smiled in surprise, and then she exhaled, fast and freely, her breath carrying away the heavy burden of unfamiliarity and isolation. As the sterile drapes were unfurled over her, she shared with me her anxiety that this C-section would prove she was unfit, physically and spiritually, to be a mother. Grasping her hand reassuringly, I realized how I, too, had been plagued by a gnawing

uncertainty about belonging on the wards, and how Mrs. Z. and I had found common ground, first through language, and then by the respective new roles in our lives.

Mrs. Z. delivered a healthy baby girl, whom I had the privilege to hold as the anesthesiologist put an encouraging hand on my shoulder. “That was the best thing you could have done today,” he told me, “because you helped her do her job so that we could do ours.” Being helpful, I thought as I lay the baby in her mother’s arms for the first time, is not always about finishing prerounds before the morning meeting or having an extra pair of gloves in my pocket. Rather, it is a thoughtful recognition of the kind of clinical care my colleagues would want to give and my patients to receive, and an honest awareness of my own instincts and abilities that I am, on occasion, uniquely able to employ in order to support both. With time, I know I will get to perform bedside procedures and manage complex illnesses; but, for now, while still an eager short white coat, I am learning to measure helpfulness not merely by what I can do for others but by what I can give of myself.

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