



Design and Implementation of a Competency-Based Transfusion Medicine Training Program in Canada



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ABSTRACT

Transfusion medicine training in Canada is currently undergoing a transformation from a time- and process-based curriculum to a competency-based medical education framework. Transfusion medicine is the first accredited postgraduate medical education training program in Canada to adopt a purely competency-based curriculum. It is serving as an example for a number of other postgraduate medical training programs undergoing a similar transition. The purpose of this review is to highlight the elements of competency-based medical education, describe its application to transfusion medicine training, and report on the development and implementation of the new transfusion medicine curriculum in Canada.

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Contents

Competency-Based Medical Education	31
Evolution of Medical Education Frameworks	31
Assessment in CBME	31
Does CBME Work?	32
Applying CBME to Transfusion Medicine	32
Case Study: The Canadian Experience	33
History of Transfusion Medicine Education in Canada	33
Process of Curricular Development for a CBME Transfusion Medicine Training Program	33
Conclusion	35
Conflict of Interest	35
References	35

Competency-based medical education (CBME) is an approach to education that is currently being applied to medical training programs across North America. Competency-based medical education was first described in the 1970s and since that time has evolved significantly in its definition, structure, and delivery [1–3]. The need for a revision in the method of delivering medical education and health professional training was borne out of increasing demand for public accountability,

heightened focus on patient safety, and limitations of conventional educational approaches [1,3]. Transfusion medicine training is well suited to a competency-based training program and has been at the forefront of this change.

As a multifaceted discipline bridging clinical and laboratory medicine, expertise in transfusion medicine requires a broad scope of knowledge and experience. Content material is experiential and requires longitudinal exposures and preceptorships; and key objectives, including the development of managerial and operational leadership skills, require hands-on experiences in the work place. In addition, trainees embarking on a transfusion medicine training program must have completed 1 or more medical training program to be enrolled; thus, they are

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generally self-sufficient, motivated by specific career goals, and familiar with the process of evaluation. Transfusion medicine was the first accredited training program in Canada to adopt a purely competency-based curriculum and currently serves as a model for other postgraduate training programs. The purpose of this narrative review and case study is to provide an overview of CBME, describe the application of CBME to transfusion medicine, and describe recent experience with competency-based transfusion medicine training.

Competency-Based Medical Education

In health professions education, a *competency* is defined as an observable ability of a health professional that integrates knowledge, skills, values, and attitudes (Text Box 1) [4]. Competency-based education in general is defined as an outcome-based approach to the design, implementation, assessment, and evaluation of curricula organized by frameworks of competencies [4]. For medical education, this means that curricula are designed to ensure that all competencies required to function as an unsupervised physician are taught, experienced, and assessed rather than focusing on the process (eg, types of patient encounters) and exposure time (eg, no. of patient encounters, length of rotations).

Evolution of Medical Education Frameworks

Medical education has evolved from apprenticeship models, to traditional assessment models, to a competency-based framework. Apprenticeship models were variable in content, structure, and length and involved one-on-one mentorship. The apprenticeship model evolved into a more merit-based structure, with fixed training lengths, standardized educational content, and mandatory periods of supervised practice [1,5]. After publication of the Flexner report, a study surveying the quality of medical education in the United States and Canada in 1910, prerequisites for medical training were recommended, state regulation of medical licensure was imposed, and increased structure over clinical instruction by medical schools was adopted [2]. During this time, medical instruction evolved to include bedside instruction (led by Sir William Osler) and the incorporation of humanities and patient-centered learning [6,7]. These ideals defined the structure, content, and delivery of medical education for most of the 20th century [8].

In the mid-20th century, nonmedical educational institutions began to shift focus from a purely instructional or didactic process to an outcome-based education, laying the foundation for what would eventually be known as CBME [1]. Outcome-based education is a student-centered approach to curriculum planning that requires specification of learning outcomes and cohesion (eg, mapping) between curricular content, teaching methods, assessment, learning context, and learning outcomes [9]. Table 1 compares elements of traditional medical training to competency-based medical training. Traditional medical training emphasizes time- and process-based educational programs, whereby trainees passively become competent practitioners [11]. In this approach, the teacher is primarily responsible for the student's knowledge acquisition. A CBME model is more focused on the quality of learning rather than the process and emphasizes individual learner needs. In

Text Box 1 “Competency Based Education (CBE) is an outcomes-based approach to the design, implementation, assessment, and evaluation of a medical education program using an organizing framework of competencies.” In CBME, the unit of progression is mastery of specific knowledge, skills, and attitudes and is learner-centered. Frank et al [3]

Table 1

Comparison of elements of time- and process-based vs competency-based educational model

Elements	Educational model	
	Time and process based	Competency based
Educational goal	Knowledge acquisition	Knowledge application
Responsible for content	Teacher	Teacher and learner
Assessment tool	Single subjective measure	Multiple objective measures
Assessment timing	Summative ^a	Formative ^b
Evaluation standard	Norm referenced ^c	Criterion referenced ^d
Program completion	Fixed time	Variable time

Adapted from Carraccio et al [2] and Weinberger et al [10].

^a Summative refers to feedback given at the end of a rotation or at the end of a training program. A certification examination provides summative feedback.

^b Formative refers to feedback that is provided within the context of the learning experience, for example, mid-rotation or during a clinic, as opposed to at the completion of a rotation, or of a program.

^c Norm referenced refers to comparing learners to each other to determine grading criteria.

^d Criteria referenced refers to use of a set criteria or standard in determining grading.

addition, both the teacher and learner play active roles in content delivery, with a focus on knowledge application [2].

Over the past 2 decades, national medical training associations and regulators in the United States, Canada, United Kingdom, and Scotland have adopted CBME into medical training programs [4,12,14]. In 1996, before the shift to CBME, the Royal College of Physicians and Surgeons of Canada (RCPSC) adopted an outcome-based framework of competencies called CanMEDS, which describes the core knowledge, skills, and abilities of specialist physicians (Table 2) [15]. The CanMEDS framework of competencies went beyond the Medical Expert Role to include other roles of the physician such as collaborator, manager, and others (Table 2). CanMEDS is currently adopted in multiple jurisdictions with influence in multiple professions [15,16]. Competency-based approach to training was developed more recently to address the best way to teach, learn, and assess the CanMEDS competencies. Reasons for the shift to a competency-based approach included the following: (1) increased demand for public accountability and transparency of medical training curricula to ensure that medical graduates are safe to practice; (2) increased scrutiny of deliverables from increasingly costly graduate medical education programs; (3) emphasis on learners' ability over their knowledge; (4) emphasis on learners' developmental progression through competencies; and (5) the need to provide clear goals of training [4,17].

Assessment in CBME

Miller's Pyramid (Fig 1) is a common framework used to illustrate the hierarchy of learning from the most basic level of “knows” through to the top of pyramid, “does” [18]. One of the biggest challenges with CBME is assessment and evaluation. The goals of assessment are to facilitate developmental progression of competence [19]; foster reflective practice, lifelong learning, and critical approach to guided self-assessment [20]; provide motivation and frameworks of knowledge, skills, and professionalism to drive learning [21]; maintain high professional standards and flag students for gaps in knowledge [21]; and guide decisions about student advancement [19,21]. Assessment tools have been developed to measure the “know,” “knows how,” and “shows” with variable degrees of reliability and validity. These tools are highly dependent upon repetitive sampling, content authenticity, context, and standardization [22,23]. Measuring the highest level of learning, “does,” is the greatest challenge for assessment because actions take place in the clinical environment and requires objective means of judging practice in real time [22,24]. These types of work-based assessments are a focus of CBME [25].

Competencies are observable and measurable. A program of assessment is a collection of assessment tools from multiple sources [26] that

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