

Implementing Competency-Based Medical Education in Family Medicine: A Narrative Review of Current Trends in Assessment

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BACKGROUND AND OBJECTIVES: The implementation of effective competency-based medical education (CBME) relies on building a coherent and integrated system of assessment across the continuum of training to practice. As such, the developmental progression of competencies must be assessed at all stages of the learning process, including continuing professional development (CPD). Yet, much of the recent discussion revolves mostly around residency programs. The purpose of this review is to synthesize the findings of studies spanning the last 2 decades that examined competency-based assessment methods used in family medicine residency and CPD, and to identify gaps in their current practices.

METHODS: We adopted a modified form of narrative review and searched five online databases and the gray literature for articles published between 2000 and 2020. Data analysis involved mixed methods including quantitative frequency analysis and qualitative thematic analysis.

RESULTS: Thirty-seven studies met inclusion criteria. Fourteen were formal evaluation studies that focused on the outcome and impact evaluation of assessment methods. Articles that focused on formative assessment were prevalent. The most common levels of educational outcomes were performance and competence. There were few studies on CBME assessment among practicing family physicians. Thematic analysis of the literature identified several challenges the family medicine educational community faces with CBME assessment.

CONCLUSIONS: We recommend that those involved in health education systematically evaluate and publish their CBME activities, including assessment-related content and evaluations. The highlighted themes may offer insights into ways in which current CBME assessment practices might be improved to align with efforts to improve health care.

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Competency-based medical education (CBME) is an outcomes-based approach to the design, implementation, assessment, and evaluation of an educational program. It uses an organized framework of competencies, that

ultimately may lead to better care for patients.¹ By definition, CBME demands a robust and multifaceted assessment system that embraces continuous evaluation of trainees.^{2,3} Accurate assessment of competence, or the “meaningful assessment of

competence,”⁴ requires continuing, serial, and direct observation of workplace behavior and monitoring of progress based on feedback.^{3,5}

Since the implementation of effective CBME depends on mounting high-quality assessment practices, building a coherent and integrated system of assessment across the continuum of training to practice is critical.⁶ As such, the developmental progression of competencies must be assessed at all stages of the learning process, including continuing professional development (CPD).⁶⁻¹¹ Yet much of the recent discussion around CBME implementation revolves mostly around residency programs,^{1,12-15} including family medicine residency programs in Canada¹⁶⁻¹⁹ and the United States.²⁰⁻²³ Our recent scoping review²⁴ on the current state of CBME implementation in family medicine residency and CPD programs has also demonstrated the paucity of studies on the applicability or relevance of CBME to physicians in practice.

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Family medicine was one of the earliest adopters of CBME framework in Canada and the United States with its programs being implemented into residency training on a nationwide scale.^{12,16,22,25,26} The challenge is that the studies that have focused on examining competency-based assessment tools (eg, identifying challenges, providing criteria, basic principles, and guidance for good assessment),^{4,6,11,27-30} have not paid sufficient attention to the overall implementation of assessment practices, particularly in family medicine. In other words, there are no studies that have thematically and systematically synthesized the current family medicine literature pertaining to the overall CBME assessment implementation and identified gaps in existing knowledge.

The purpose of this review was to synthesize the findings of studies spanning the last 2 decades that examined competency-based assessment methods used in family medicine residency and CPD, in order to identify gaps in current practices in implementing competency-based assessment tools. Given the breadth of this topic, we specifically focused on the following research questions:

1. What competency frameworks were described in the included studies?
2. What assessment methods and assessment systems were discussed?
3. Was the purpose of the assessment formative, summative, or a combination?
4. What types of educational outcomes, outcome frameworks, and outcome levels were described in the family medicine literature?

For the purpose of this paper, we focused primarily in CBME for use in CPD in family medicine. However, little has been written about practical CBME implementation within CPD in any specialty,^{11,31,32} particularly in family medicine.³³ Therefore, we also searched the residency training in family medicine literature to identify potentially pertinent and transferable findings to CPD. The

findings will facilitate our understanding of how CBME implementation practices in residency training might inform the design and operationalization of CBME implementation strategies in CPD.

Methods

We used a narrative review approach³⁴⁻⁴⁰ to thematically synthesize the current literature and identify gaps in existing knowledge. The present review sets about to identify current studies on competency-based assessment implementation in family medicine residency and CPD.

To avoid potential pitfalls associated with narrative reviews, such as selection bias, lack of diversity in sources, or drawing conclusions based more on opinion than data, the preparation of narrative reviews must apply the methodological rigor of systematic reviews.^{35,37,40-42} Specifically, we employed a systematic approach to both steps: (1) selecting studies to be included, and (2) extracting information from primary articles.^{35,43,44} A systematic approach implies grouping and analyzing sources with similar findings and/or the same level of evidence. This can be done by placing data from the selected sources in tables and analyzing the data in the main body, without duplicating information.⁴²

A modified form of narrative review, as described by Popay et al,⁴⁵ Ferrari,³⁷ and Baethge et al,⁴⁰ was adopted whereby data extraction enabled synthesis of key data, while also allowing rich narrative description.³⁷ We adapted the steps involved and outlined below from Shaw et colleagues,³⁵ and our research team modified them.

Search Strategy

A preliminary search of the literature was undertaken to see what work in the area of interest had been published and to verify that no similar review had been published already.^{35,44,46} Our scoping search revealed no existing reviews of the state of knowledge regarding CBME assessment implementation

in family medicine residency and/or CPD.

To improve the method of literature selection and to reduce the risk of suboptimal reporting,³⁷ our modified search strategy employed components from a systematic review methodology (PRISMA) which involves screening titles and abstracts as well as data extraction techniques.⁴⁷ The strategy (selecting the databases and defining the inclusion and exclusion criteria and the search terms) was developed by authors S.K., N.D., and the Health Sciences librarian A.H. The initial search (from 2000 through April 30, 2017) was conducted on April 28, 2017, and a follow-up search was done on May 5, 2020, using the following five electronic databases: MEDLINE, ERIC, PsycINFO, Embase, and EdSource. Additionally, we searched government-related and relevant professional organizations' websites. As the Accreditation Council for Graduate Medical Education (ACGME) Outcome Project started in 1999, we restricted our search to the literature published after 2000 to capture information that was relevant to CBME in family medicine. We included all original research, review articles, editorials/commentaries, and regulatory papers.⁴⁸ The full search strategy and the specific search terms, that were identified through input from the research team and an academic librarian, are provided in the Supplemental Digital Appendix (<https://journals.stfm.org/media/3555/hendry-supp-appendix1.pdf>).

Inclusion and Exclusion Criteria

Studies that fulfilled the following criteria were included:

1. focused exclusively on family medicine residency or CPD programs. Any undergraduate medical education article was excluded;
2. discussed CBME;
3. were American or Canadian in origin;
4. published in English;

5. available in a full-text version (the articles were requested through the library if immediate full-text versions were not discovered).

Study Selection

The first reviewer (N.D.) screened and read the titles and abstracts of all identified studies.^{43,44} Studies that fell under the exclusion criteria were removed, as were duplicates and studies that did not meet the inclusion criteria. N.D. screened full-text documents and excluded those not relevant. Questionable cases were read by the second reviewer (S.K.), and a joint decision was reached on whether to include them or not for further review.

Data Extraction

Step 1. We developed a first version of a standardized data extraction form based on the literature.^{4,5,18,49-55} We piloted the data extraction form with all team members three times.

Step 2. A final data extraction form consisted of two parts. We created the first part to draw key demographic characteristics from the articles (publication year, publication type, study design, year, author, country, target audience; see Table 1). The second part of the extraction form included the coding concepts developed through a review of the published literature and revised in consultation with the research team. The definitions for these coding concepts (competency framework, assessment method, assessment purpose, outcomes model, type of educational outcome, and level of outcome) are shown in Table 2.^{4,5,16,18,27,56-82} N.D. collected the data on general characteristics of the articles. Furthermore, several reviewers independently extracted the key elements of CBME assessments; the discussion method was used first and if disagreements could not be resolved, further checks were made. If there were any ambiguous items, the principle investigator (S.K.) reviewed the article, and made

the final decision. We tabulated and analyzed the data.

Data Analysis

We used an inductive approach^{36,44,83,84} to reflect upon the “landscape of events”⁸⁵ of competency-based assessment in family medicine residency and CPD in a North American context. The themes identified were strongly linked to the raw data and were not necessarily related to the research questions posed.^{34,86} The expert/research team members discussed the results of the review to gain an overall understanding of the trends and nature of competency-based assessments evident in family medicine residency and CPD literature during the last 2 decades.^{36,84}

Results

Study Selection

The original search yielded 1,222 potentially relevant citations. After deduplication and relevance screening, 185 citations met the eligibility criteria based on title and abstract and the corresponding full-text articles were procured for review. After data characterization of the full-text articles, we retained 37 articles in the analysis (Figure 1), with 148 being excluded for one of the following reasons: no evidence of CBME assessment tools description (n=62); no evidence of the CBME concept used (n=30); irrelevant to family medicine field (n=27); oral/poster presentations (n=17); not a Canadian or US article (n=7); and undergraduate medical education (n=5).

Study Characteristics

The 37 studies^{5,18,20,33,55,60-63,66,67,69,87-111} were published between January 2000 and May 2020, with nearly half of the articles (17/37; 46%) published within the past 5 years (2015-2020). The general characteristics of the articles included in this study are reported in Table 1. The majority (21/37; 57%) of all studies originated from the United States. Research articles (24/37; 65%) and

commentary/reflective papers (8/37; 22%) comprised most documents; articles characterized as editorial (2/37; 5%), review (2/37; 5%), and regulatory (1/37; 3%) were underrepresented. Among 24 studies eligible for classification by a type of research paradigm, 50% (12/24) used a quantitative approach, 38% (9/24) used a qualitative approach, and the remaining used mixed methods (3/23; 12%).

Almost all studies (36/37; 97%) were identified in published literature. Only one article was found in the gray literature; the article was published on the College of Family Physicians of Canada (CFPC) website. The articles were published in 13 different journals, although two-thirds of the papers (25/37; 67%) were concentrated in three journals. These included 37% (14/37) of studies published in *Family Medicine*, 19% (7/37) in *Canadian Family Physician*, and 11% (4/37) in *Academic Medicine*. More than half of the studies (23/37; 62%) reported residents being their target population followed by both faculty and residents (11/37; 30%), and family physicians (3/37; 8%).

Frequency of Coding Concepts Across the Data Set: Competency Framework, Assessment Method, Assessment Purpose, Type of Educational Outcome, Level of Outcome, and Stage of Assessment Implementation

Table 2 provides the definitions and summarizes coding frequencies of the eight coding concepts across the data set. The ACGME/ABMS framework was discussed more frequently (21/37; 57%), followed by the CanMEDS-FM (14/37; 38%) and Triple C frameworks (2/37; 5%). While the majority of the articles (20/37; 54%) focused on individual assessment methods, the remaining studies discussed assessment systems (13/37; 35%) as reviewed in Table 2. Half of the studies (20/37; 54%) focused solely on formative purpose of assessment, but 13 (35%) papers discussed

both formative and summative assessments. None of the studies concentrated exclusively on summative assessment.

The coding concept “outcomes model” was retrieved from one source only. We mapped the different types of educational outcomes (highlighted in Table 2) to the assessment frameworks of Moore et al.,⁵⁰ Miller,⁷⁴ and Kirkpatrick and Kirkpatrick,⁷⁵ as suggested by Price et al.⁷³ The majority (17/37; 46%) of studies targeted program-level followed by individual-level outcomes (12/37; 32%). Eight papers (22%) described both levels of outcomes. We grouped all articles by a stage of assessment method implementation, ranging from the stage “development of assessment methods” to the stages “implementation

and initial evaluation of assessment methods,” and “outcome and impact evaluation of assessment method.” Nearly half of the studies (18/37; 40%) described assessment tools at their initial stage of implementation (eg, defining, designing, and planning of assessment instruments), while the other half (19/37; 51%) discussed partially implemented (5/37; 13%) or fully implemented and evaluated assessment methods (14/37; 38%).

Differences and Similarities Between Family Medicine Residency and CPD

Table 2 also highlights the frequency of the coding concepts among the three categories of the articles: residency articles, CPD articles, and CPD/residency articles. Direct

observation was the only assessment method described in CPD articles, while CPD/residency studies more often discussed multiple assessment tools (3/11; 27%). Yet, residency articles equally focused on the two assessment methods: direct observation (4/37; 17%) and competency-based achievement system (4/37; 17%). The individual level of educational outcomes was used more often in CPD/residency (6/11; 55%), whereas the program level outcomes were most common in residency (12/23; 52%) and CPD studies (3/3; 100%). Finally, all CPD and almost half of residency studies (11/23; 48%) described assessment tools at their initial stage of implementation (eg, defining, designing, and planning of assessment instruments). In

Figure 1: PRISMA Flow Diagram of the Search and Selection Process in a Narrative Review of Literature to Identify Evidence Pertaining to CBME Frameworks, Assessments Methods, and Educational Outcomes in Family Medicine Residency and CPD Programs

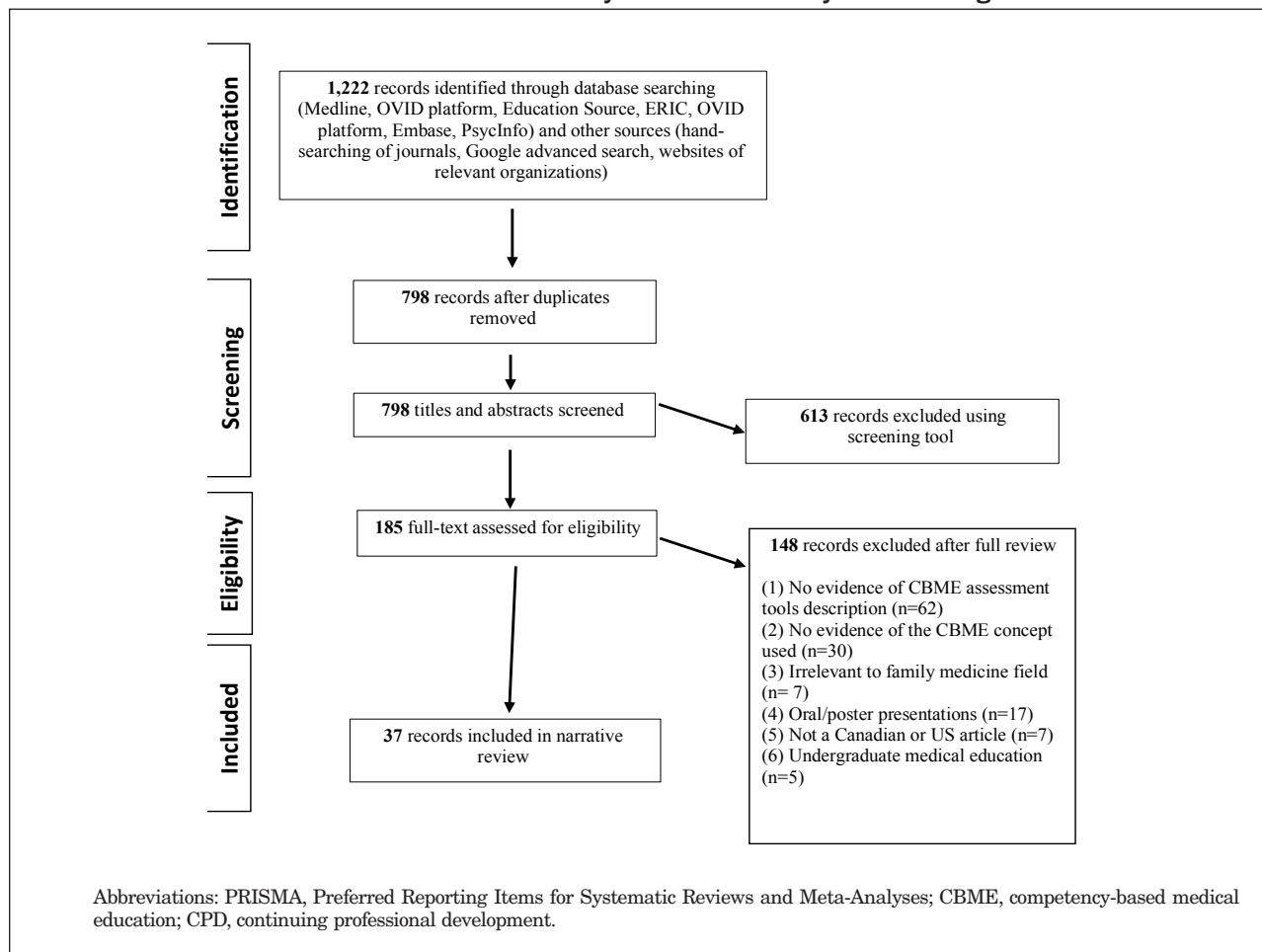


Table 1: Descriptive Statistics of 37 Articles Included in the Narrative Review, 2000–2020

Characteristic	No. of Articles ^a	% of Articles
Country		
United States	21	57
Canada	16	43
Publication Type		
Research article	24	65
Commentary/reflective paper	8	22
Review	2	5
Editorial opinion	2	5
Regulatory	1	3
Research Paradigm^b		
Quantitative	12	50
Qualitative	9	38
Mixed methods	3	12
Target Population		
Residents	23	62
Faculty and residents	11	30
Community physicians	3	8

^a No. of articles indicates those articles (n=37) in which each characteristic was reported.

^b Only research articles (n=24) could be classified into these three research paradigms. The denominator includes only the 24 research articles.

Table 2: Definitions and Distribution of Coding Concepts Across the Included Studies in the Narrative Review, 2000-2020^a

Description of Coding Concept		No. (%) of Studies			
		All Included Studies, n=37	Residency Articles, n=23	CPD Articles, n=3	CPD/Residency Articles, n=11
ACGME	In 1999, the Accreditation Council for Graduate Medical Education (ACGME) and American Board of Medical Specialties (ABMS) endorsed six general competencies through the Outcome Project—an initiative to evaluate medical residency programs on the basis of “actual accomplishments” rather than “the potential to educate. ^{55,56} As a result of this project, ACGME identified six ACGME Core Competencies: patient care; medical knowledge; practice-based learning and improvement; interpersonal and communication skills; professionalism; and systems-based practice.	21 (57)	14 (64)	0	6 (55)
CanMEDS-FM	CanMEDS-Family Medicine (CanMEDS-FM) is an adaptation of CanMEDS 2005, ⁵⁷ the competency framework for medical education developed by the Royal College of Physicians and Surgeons of Canada. ⁵⁸ It includes seven physician roles: Family Medicine Expert, Communicator, Collaborator, Manager, Health Advocate, Scholar and Professional.	14 (38)	7 (32)	3 (100)	4 (36)
Triple C	The Triple C Competency-based Curriculum (Triple C) is a competency-based curriculum in family medicine that is comprehensive, focused on continuity, and centered in family medicine. ¹⁶	2 (5)	1 (4)	0	1 (9)

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Table 2: Continued

Description of Coding Concept		No. (%) of Studies			
		All Included Studies, n=37	Residency Articles, n=23	CPD Articles, n=3	CPD/Residency Articles, n=11
Individual Assessment Tool					
Direct observation	By simply observing a resident's or practicing physician's behavior in clinical environments, preceptors can identify a specific weakness or strength and then use the information to assess the resident and provide feedback. ^{59, p.e220} For example, observable behavior to assess communication skills; ⁵⁹ assessing global competencies in the ambulatory setting; ⁶⁰ to assess patient-centered communication skills; ⁶¹ interdisciplinary direct observation via closed-circuit television. ⁶²	8 (22)	4 (17)	2 (67)	2 (18)
Multiple tools	Portfolio, multisource feedback (MSF), direct observation, reviews of written treatment plans, Objective Structured Clinical Examination (OSCE), video-monitoring, multiple-choice questions, adviser-advisee meetings	6 (16)	3 (13)	0	3 (27)
Field notes	<i>Field notes</i> are brief notes that document a resident's performance in the clinical environment and summarize the verbal feedback given about his or her. ⁶³	2 (5)	0	0	2 (18)
In-training examination	A written examination to evaluate expert role, specifically knowledge acquisition and application; a series of progress tests to serve as formative feedback for residents in planning future learning experiences. ⁶⁵	2 (5)	2 (9)	0	0
Chart stimulated recall	<i>Chart stimulated recall (CSR)</i> is a hybrid assessment format that combines chart review and an oral examination, with both based on a clinician's documented patient encounter. ⁶⁴	1 (3)	1 (4)	0	0
Simulated clinical examination	A Simulated Clinical Examination (SCE) method as means of assessing the clinical skill competencies of entry-level family medicine residents using standardized patients. ⁶⁶	1 (3)	0	0	1 (9)
Assessment System					
CBAS	Competency-based achievement system (CBAS) was designed to measure competence using 3 main principles: formative feedback, guided self-assessment, and regular face-to-face meetings. It is a valid, reliable, and cost-effective system of evaluating competence using documented formative feedback. ^{5,68} CBAS is unique among existing competency-based assessment systems owing to its focus on authentic workplace-based assessments. All formative feedback in the CBAS comes from direct observation of clinical practice and behavior during encounters. The CBAS does not rely on summative examinations, checklists, or OSCEs. ⁵	5 (13)	4 (17)	0	1 (9)
EPAs-based system	Entrustable professional activities (EPAs) are "professional activities that together constitute the mass of critical elements that operationally define a profession". ^{67, p.544}	3 (8)	2 (9)	0	1 (9)

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Table 2: Continued

Milestone assessments	According to the ACGME Advisory Committee on Educational Outcome Assessment, milestones “describe, in behavioral terms, learning and performance levels residents are expected to demonstrate for specific competencies by a particular point in residency education.” ^{101, p.730} Many programs use the milestone rubrics as stand-alone instruments for direct assessments of residents. ¹⁰⁴	3 (8)	3 (13)	0	0
PASS	Portfolio assessment support system (PASS) supports competency development, scaffolds the use of self-regulated learning skills, and promotes professional identity formation. ¹⁸ Portfolios have been recognized as useful structures for collecting, organizing, and managing the large volume of assessment information necessary to support these educational models. ⁶⁹ A broad definition of a portfolio as a framework and process for collecting, analyzing, and documenting the successful acquisition of competence and performance. ⁷⁰	1 (3)	1 (4)	0	0
M3App system	Mobile medical milestones (M3App) includes observation, recording, and narrative feedback. M3App allows faculty to record observations of learner behavior at the point of observation and relate them to specific milestone sub-competencies. The app also collates observations to provide periodic feedback directly to learners and to inform the work of the CCC (Clinical Competency Committee). ⁵⁴	1 (3)	0	0	1 (9)
Not applicable		4 (11)	3 (14)	1 (33)	0
Assessment Purpose		All Included Studies, n=37	Residency Articles, n=23	CPD Articles, n=3	CPD/Residency Articles, n=11
Formative	Effective <i>formative assessment</i> is typically low stakes, often informal and opportunistic in nature, and is intended to stimulate learning. ²⁶ <i>Assessment for learning</i> 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 observation, and an emphasis on formative feedback. ⁴	20 (54)	11 (48)	2 (67)	7 (64)
Both		13 (35)	9 (39)	0	4 (36)
Summative	Effective <i>summative assessment</i> is typically medium or high stakes and is primarily intended to respond to the need for accountability. It often requires coherent, high-quality test material, significant content expertise, a systematic standard-setting process, and secure administration. ²⁶ <i>Assessment of learning</i> aligns with the continuing need to gauge progress against targeted outcomes and criterion-referenced standards. ⁷¹	0	0	0	0
Not applicable		4 (11)	3 (13)	1 (33)	0

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Table 2: Continued

Type of Educational Outcome ^b		All Included Studies, n=37	Residency Articles, n=23	CPD Articles, n=3	CPD/Residency Articles, n=11
Level 7	Community health - RESULTS	0	0	0	0
Level 6	Patient health - RESULTS	0	0	0	0
Level 5	Performance (does in workplace) - BEHAVIOR (TRANSFER)	23 (62)	14 (61)	0	9 (82)
Level 4	Competence (shows how) – BEHAVIOR (TRANSFER)	8 (22)	4 (17)	2 (67)	2 (18)
Level 3B	Procedural knowledge (knows how) - LEARNING	2 (5)	2 (9)	0	0
Level 3A	Declarative knowledge (knows what) - LEARNING	0	0	0	0
Level 2	Satisfaction - REACTION	0	0	0	0
Level 1	Participation – REACTION	0	0	0	0
Not applicable		4 (11)	3 (13)	1 (33)	0
Level of Outcome ^c		All Included Studies, n=37	Residency Articles, n=23	CPD Articles, n=3	CPD/Residency Articles, n=11
Program		17 (46)	12 (52)	3 (100)	2 (18)
Individual		12 (32)	6 (26)	0	6 (55)
Multilevel		8 (22)	5 (22)	0	3 (27)
Stage of Assessment Implementation ^d		All Included Studies, n=37	Residency Articles, n=23	CPD Articles, n=3	CPD/Residency Articles, n=11
Stage 1: Developing assessment methods	Defining, designing, and planning of assessment instruments, describing assessment programs, designing assessment tools based on observable behaviors	18 (49)	11 (48)	3 (100)	4 (36)
Stage 2: Initial evaluation of assessment methods	Pilot implementation, small-scale studies (e.g., impact of assessment methods/instruments on residents and faculty)	5 (13)	3 (13)	0	2 (18)
Stage 3: Outcome and impact evaluation of assessment methods	Full evaluation studies (e.g., reliability of assessment methods and intention to use them, impact of assessment instruments on residents and faculty)	14 (38)	9 (39)	0	5 (46)

^a By using the data extraction process, the present study aimed to identify the following coding concepts in the family medicine residency and CPD literature: competency framework, assessment method or assessment system, purpose of assessment, outcomes model, educational outcome, and level of outcome. During data collection, one more coding concept “stage of assessment implementation” was added.

^b As described by Price et al,⁷² the types of educational outcomes extracted from the included studies were mapped to the assessment frameworks of Moore et al⁴⁹ —participation, satisfaction, knowledge, competence, performance, patient health, community health, Miller⁷³ —knows, knows how, shows, does, and Kirkpatrick and Kirkpatrick⁷⁴ —reaction, learning, behavior, results.

^c Level of outcome is defined as whom we target at or “action target” of interventions.^{75,76}

^d For the purposes of this article, “implementation” is defined as “a specified set of activities designed to put into practice an activity or program of known dimensions”.⁷⁷ We identified three stages of assessment implementation. The stages range from “Developing Assessment Methods” to “Initial Evaluation of Assessment Methods,” and to “Outcome and Impact Evaluation of Assessment Methods”⁷⁸ and map onto three well-accepted phases of implementation: preimplementation, implementation, sustainability.⁷⁹⁻⁸²

contrast, the majority of CPD/residency papers (5/11; 46%) discussed fully implemented and evaluated assessment methods.

Emergent Themes

Through the process of iterative reading and discussion of the literature by the research team, three broad themes emerged: ways to improve assessment methods, assessors' needs and challenges, and learners' needs and challenges. A summary of the themes and sub-themes along with frequency counts are presented in Table 3.

Discussion

The purpose of this review was to synthesize the findings of studies spanning the last 2 decades that examined the competency-based assessment methods used in family medicine residency and CPD, in order to identify gaps in current practices in implementing CBME assessments. Our analysis shows that there is a very small body of published work on competency-based assessments in family medicine residency and CPD.

The following discussion highlights the three major implications of our analysis: (1) trends in competency-based assessment, (2) challenges to implementing competency-based assessment, and (3) key elements for supporting competency-based CPD.

Trends in Competency-Based Assessment

The paucity of articles (14/37; 38%) reporting reliability of assessment methods, intention to use them, and impact of assessment instruments on residents and faculty is not surprising, given the lack of frameworks that define a CBME program,^{112,113} inconsistency around the CBME language,¹¹⁴⁻¹¹⁶ the difficulties inherent in assessing competence,⁵ and a limited focus on a broad range of issues related to fidelity of CBME implementation.²⁴ Articles that focused solely on formative assessment were most prevalent among all three categories of articles (Table 2). This

may reflect that CBME programs are paying increasing attention to competencies beyond knowledge. It may also reflect the use of formative rather than summative in-training examinations in residency programs.

The most common types of educational outcomes were performance (23/37; 62%) and competence (8/37; 22%; Levels 5 and 4 of Moore et al's pyramid⁵⁰), suggesting that a portfolio of formative assessment techniques has been shown to be effective at measuring competence and performance within any proposed outcomes-based framework.^{50,100} In contrast, we found no studies on the assessment of patient and community health outcomes in our search, which may be explained by multiple challenges related to their measurement (eg, lack of available data, compounding due to multiple interventions).¹¹⁷ While summative assessment techniques are well established and have been proven effective for measuring knowledge, these assessment methods were less commonly identified in our review (13/37; 35%). Given program directors' need to sign off on their residents' preparedness to enter practice, this percentage (35%) appears low from a residency perspective. From a CPD perspective, this is rather high, because outside of board certification/maintenance of certification, most CPD programs were not designed for summative evaluation, but rather to promote continuous improvement of practice.

Challenges to Implementing Competency-Based Assessment

Based on the thematic analysis of the literature, we identified that the Family Medicine educational community faces several challenges with CBME assessment (Table 3). Those challenges reflect some of the current trends in the general medical educational literature regarding competency-based assessment.^{4,11,118,119}

We found that the most popular concern for assessors was the need for standardised training for assessment. There were calls for faculty

development training to focus on the effective use of field notes and observation, better interrater consistency and reliability, training on how to effectively teach and evaluate the intrinsic roles (communicator, collaborator, leader, health advocate, scholar, and professional), and training on being faculty advisors. These results are in line with many studies identifying gaps in skills required by faculty to consistently assess competencies as part of the redesign of residency training programs.^{28,120,121} Additionally, faculty overload was mentioned as one of the major challenges, particularly the ability to integrate assessments within workflow in a clinical setting, which is in agreement with previous studies.^{27,122} In contrast, the most common concern for learners was the need for better constructive feedback, followed by the need for residents' [to receive] better orientation vis-à-vis expectations and processes prior to the start of the sessions. It has been shown that learners actively seek out critical feedback to help them accomplish the competency goals in order to advance through the stages of formal education.¹²³ The theme of "ways to improve assessment methods" included several subthemes; "having end-user input for the evaluation of the assessment tools" was the most frequently-cited topic. Feedback from residents, advisors, program directors, program and site administrators, and off-service preceptors was suggested as a means of improving the assessment tools. The active engagement of learners in their own assessment and feedback from faculty are both important, as they ensure the ultimate acceptability of an assessment tool by the key stakeholders.^{5,124-127}

Key Elements for Supporting Competency-Based CPD

Finally, despite continuing discussion about the role of CPD in building CBME assessment across the continuum of training to practice,^{4,6,31,128} the main gap in the educational literature we uncovered was

Table 3: Three Broad Themes and Several Subthemes Identified in 37 Articles Included in the Narrative Review, 2000-2020

Theme	Subtheme	Coding Frequency ^a
Ways to Improve Assessment Methods		N=43
	Having end-user input (from residents, advisors, program directors, program and site administrators, and off service preceptors) for the evaluation of the assessment tools	12
	Considering context (eg, residents' characteristics, clinical settings, culture of safety)	8
	Establishing inter-rater reliability and external validity of the assessment tools	6
	Using theory-based design to create assessments	5
	Recognizing the importance of providing narrative data for feedback to promote learning	5
	Providing robust administrative support to residents and faculty while implementing assessments	4
	Using multiple diverse interdisciplinary observers	3
Assessors' Needs and Challenges		N=22
	The need for a standardised training for assessment (eg, observation, interrater consistency and reliability, potential bias in the feedback process)	10
	Faculty overload (time constrains)	7
	The need for identifying residents who are having difficulties	5
Learners' Needs and Challenges		N=14
	The need for better constructive feedback	9
	The need for residents' better orientation vis-à-vis expectations and processes prior to the start of the sessions (e.g., in using formative feedback to develop competence)	5

^aThe number of times the theme was coded directly from 37 articles included in the narrative review.

a total absence of studies related to the ongoing assessment of practicing physicians. This seems to be in line with the overall lack of formal evaluation studies in family medicine CPD reported previously by our group.³³ Likewise, our recent scoping review has revealed a shortage of scholarships on CBME implementation practices within family medicine CPD.²⁴ One elephant in the room is the disjointed nature of contemporary medical education¹²⁹—the silos that exist between undergraduate, graduate, and continuing medical education. Given that the continuum of learning ideal has yet to be realized, we advocate for closer collaboration among stakeholder organizations responsible for each level of medical training in order to design a comprehensive system of assessment.^{6,33,129} Additionally, the integration of

efforts across the four domains (continuing education, knowledge translation, patient safety, and quality improvement) should aim to develop a systematic approach to competency assessment across the continuum of health professions education and practice.^{6,33,129} Without a structural basis for competency assessment across the continuum, the difficulties of evaluating competency-based assessment efforts will remain. We suggest that for CBME to be successfully applied to practice, strategies are needed to consistently integrate novel approaches to learning (direct observation, simulation, audit and feedback, multisource feedback, educational outreach visits, etc). These new learning activities (which are both assessment activities and educational interventions) can provide physicians with ongoing assessment

and feedback leading to clinical behavioral change.³¹ Unlike residents, physicians after the completion of training often do not have a formal system that is designed to provide personal support for learning and improvement. Recent recommendations for maintenance of certification systems to evolve systems of CPD to support learning and continuous improvement of practice are strategic attempts to address this specific concern.^{130,131} Traditional continuing medical education programs, the primary formal educational support structure for practicing physicians, is limited in its ability to change performance and patient outcomes. Practicing physicians need access to trusted practice data with the opportunity to review their data with a peer, coach, or mentor to enable identification of (and minimize

resistance to) needed practice changes.¹³²⁻¹³⁵ Physicians will need access to resources and an infrastructure to support and motivate them to sustain practice change.¹³⁶ While CBME is primarily directed toward individuals, improving health outcomes will likely require a team-based strategy along with educational and clinical care systems in order to provide the conditions enabling continuous improvement.

Strengths and Limitations

This is the first review study to examine the nature and trends of competency-based assessment methods in family medicine. Its strengths include the assembly of key content and methodological experts from diverse backgrounds.³⁵⁻³⁹ We acknowledge several limitations of this review. Our review was based on a small set of articles, which speaks to the limited number of publications in the field. In addition, the shortage of CPD articles restricted our ability to compare between residency and CPD studies, so there may be interesting differences or similarities among the two stages of the learning continuum. Lastly, although we sought to search multiple databases including the gray literature, the scope of the search was limited to articles in English published in Canada and the United States, which have similar residency programs in family medicine.¹³⁷

Conclusions

In this narrative review, we attempted to inform future approaches and research by analyzing and synthesizing the findings of publications that described CBME available assessment tools in family medicine residency and CPD. Our analysis shows: (1) a very small body of published work currently exists around competency-based assessments in family medicine; (2) a lack of studies on assessment methods among practicing physicians (a gap in ongoing assessment in clinical practice); and (3) common themes that

may offer insights into how current assessment practices might be improved to ensure alignment with modern conceptions of health professional education for the ultimate goal of improved health care. We recommend that those involved in family medicine education should strive to systematically evaluate and publish their CBME activities, including assessment-related content and evaluations. In addition, one of the important avenues for future research should illustrate residents' and faculty's perception of how new approaches to curriculum design and evaluation are impacting their learning/teaching. Finally, we suggest that in building a coherent and integrated system of assessment, evaluation of the key contextual factors across the continuum of education to practice is of increasing importance in the field of CPD.

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