Supplemental Digital Content

Supplemental Digital Appendix 1

Scoping Review Protocol

Overview

The methodology for this scoping review was based on the framework suggested by Arksey and O'Malley[22] and the subsequent recommendations proposed by Tricco and colleagues.[24] This scoping review included six stages: identifying the research questions; identifying relevant studies; study selection; charting the data; collating, summarizing, and reporting results; and consultation (an optional stage). To increase methodological rigor, we introduced some improvements in our review, most notably making consultation the first, and an ongoing, step.

Ongoing Consultation

This was both a mandatory and ongoing process within this scoping review. The scoping review protocol draft was circulated for feedback from experts (H.L., G.V., A.W., I.O.) in the following three domains: CPD, postgraduate medical education, and family medicine. The expert panel members were formally engaged in providing references about potential studies to include in the review as well as valuable insights into issues relating to the implementation of CBME-based assessment activities in Family Medicine postgraduate education and CPD.

Complete Search Strategy

Our research strategy involved searching for evidence via different sources (electronic databases, bibliographies, hand-searching of key journals, relevant organizations, and experts' recommendations). As Arksey & O'Malley[22] note, the adoption of this strategy helps in achieving the goal of a comprehensive scoping of the field through identifying primary studies (published and unpublished). The main search strategy developed by the University of Ottawa librarian, was circulated to the expert panel and revised, as necessary.

We searched the five electronic databases Medline (OVID), ERIC (OVID), PsycINFO, Embase, and Education Source (EBSCO) using the *following search terms*:

"competency-based medical education" OR "CBME" OR "competency-based education" OR "competence," OR "CanMEDS" OR "the Institute of Medicine competencies" OR "ACGME competencies" OR "outcomes project" OR "ACGME".

AND
"continuing professional development" OR "CPD" OR "continuing medical education" OR "CME" OR "education, medical, continuing" OR "continuing education"

AND
 "residency" OR "residency program" OR "residency programme" OR "residency training" OR "postgraduate medical education" OR "PGME" OR "postgraduate training" OR "graduate medical education" OR "education, medical, graduate" OR "internship and residency" OR "medical residency"

AND
 "family medicine" OR "family practice" OR "general practice" OR "family physician(s)" OR "general practitioner(s)" OR "primary care physician(s)"

AND
Canada OR Canadian OR CanMEDS OR United States OR American OR North America

The search strategy also included **manual selection of key journals, bibliographies of identified articles and the Web sites of relevant organizations:**

- Contacting *relevant national and/or local organizations* working in the field has been shown to be instrumental in generating information about primary research and included Accreditation Council on Graduate Medical Education, American Academy of Family Medicine, American Academy of Family Physicians, American Board of Family Medicine, Association of Family Medicine Residency Directors, College of Family Physicians of Canada**,** Resident Doctors of Canada, Society of Teachers of Family Medicine, and the Alliance for Continuing Education in the Health Professions.

- The project team (S.K., N.D., P.H.) and the expert panel (H.L., G.V., A.W., I.O.) identified the following journals for *hand-search: Academic Medicine, Canadian Family Physician, Family Medicine, and the Journal of Continuing Education in the Health Professions.*

Charting the Data

To extract data from each article a standardized data extraction form (a data charting form) was developed using a Microsoft Excel spreadsheet. For ensuring the rigor of the process and the credibility of the findings, we followed Reeves et al.'s protocol[30] for two or more independent reviewers with quality checks from a third party. **While piloting the use of the extraction form** (data charting form), the expert panel (H.L., G.V., A.W., I.O.) independently coded the charted data from 5 articles using a customized coding manual. The entire team, including the project group (S.K., N.D., P.H.) and the coders met and, refined, through an iterative process, the definitions of each type of data to be extracted and created a second version of the extraction /data charting form. Five more articles were further reviewed by the expert panel (H.L., G.V., A.W., I.O.) using the second version of the extraction form. Another team meeting was held during which complete agreement was achieved on all data extraction items. The coding manual was also revised during the coding process based on input from the expert panel (H.L., G.V., A.W., I.O.) and specific coding decisions. Coding rules were added to the manual to ensure the consistent coding of the dataset.

Supplemental Digital Appendix 2

Coding Manual

CODING MANUAL

Table of Content

All screenshots were captured using Microsoft Excel for Mac, version 15.30, Microsoft Corporation, Redmond, Washington. Used with permission from Microsoft.

GENERAL INFORMATION

OVERVIEW

The Coding Manual is divided into two major parts:

1. **Coding Book for Data Abstraction (pages 7-9)** lists and defines the major categories to be coded.
2. **Data Charting Form (pages 10-15)** describes how to use the provided Excel Workbook.

DATA ABSTRACTION

Research Question

- How are competency-based medical education (CBME), competency, and competence conceptualized within the CPD/CME and residency family medicine educational literature?

Concepts to Be Coded

- *Definition and conceptualization of competency-based medical education (CBME)*
  - **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 deemphasizes time-based training and promises greater accountability, flexibility, and learner centeredness.[1]
- *Definition and conceptualization of competency*
  - **Competencies** are "observable ability(ies) 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. Competencies are thus the ingredients of competence."[2]

- *Definition and conceptualization of competence*
  - *Competence* is "the array of abilities across multiple domains or aspects of physician performance in a certain context. Statements about competencies require descriptive qualifiers to define the relevant abilities, context, and stage of training. Competence is multi-dimensional and dynamic. It changes over time, experience, and setting."[2]

Coding Book for Data Abstraction

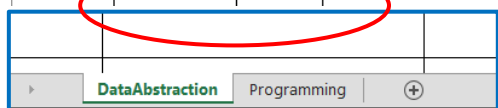| Coding Categories	Corresponding Columns in Excel File	Description
Concept(s) to be coded	Column M	Specify the concept(s) to be coded described in the article by choosing from the list below. Enter *"not applicable"* if none of the concepts below was described. • CBME • competency • competence • CBME and competency • CBME and competence • CBME, competency, and competence • competency and competence • not applicable
Presence of a definition	Column N	State if the concept(s) from the previous Column M was explicitly defined in the article: • Yes • No
Definition	Column O	Copy and paste a definition(s) of CBME, competency, and/or competence and provide the page number.
Definition source	Column P	Provide a reference citation/source(s) used to define CBME, competency, and/or competence.

1. Frank JR, Mungroor R, Ahmad J, Wang M, De Rossi S, Horsley T (2010). Toward a definition of competency-based education in medicine: a systematic review of published definitions. *Med Teacher* **32**: 631–7.
2. Frank JR, Snell L, ten Cate O, Holmboe ES, Carraccio C, Swing SR, et al. Competency-based medical education: theory to practice. Med Teacher. 2010;32:638-45.

DATA CHARTING FORM

OVERVIEW

- **The Data Charting Form** is the Excel file that we will be using to conduct data abstraction by extracting data from each article and entering the extracted data into specific cells in Excel spreadsheet.

- Each coding group will have a separate **Data Charting Form (Workbook)** customized to their group and containing the same coding categories as those included in the Coding Book **(page 9).**

- The **Data Charting Form** (below) will have some information already filled in by the Project Team (Columns A through K), namely, general characteristics (e.g., title, author(s), country, publication year, publication type, research approach, target population, sample size, and practice setting).

A	B	C	D	E	F	G	H
Ref No	Author(s)	Year	Title	Article Source	Country	Publication Type	Research Approach

DataAbstraction   Programming   ⊕

- *Note:* in the bottom left corner there are tabs for two workbooks. *"DataAbstraction"* is the workbook where the coding is to be done, and *"Programming"* contains the programming for the dropdown menus. Please avoid altering anything in the Programming workbook, as it may interfere with the dropdown menus.

USING THE DATA CHARTING EXCEL WORKBOOK

IN-DOCUMENT CODING DESCRIPTIONS

When a title (coding category) for any column (e.g., *Type of Intervention*) is selected, a brief explanation (a pop-up) of the coding category will appear (see below).
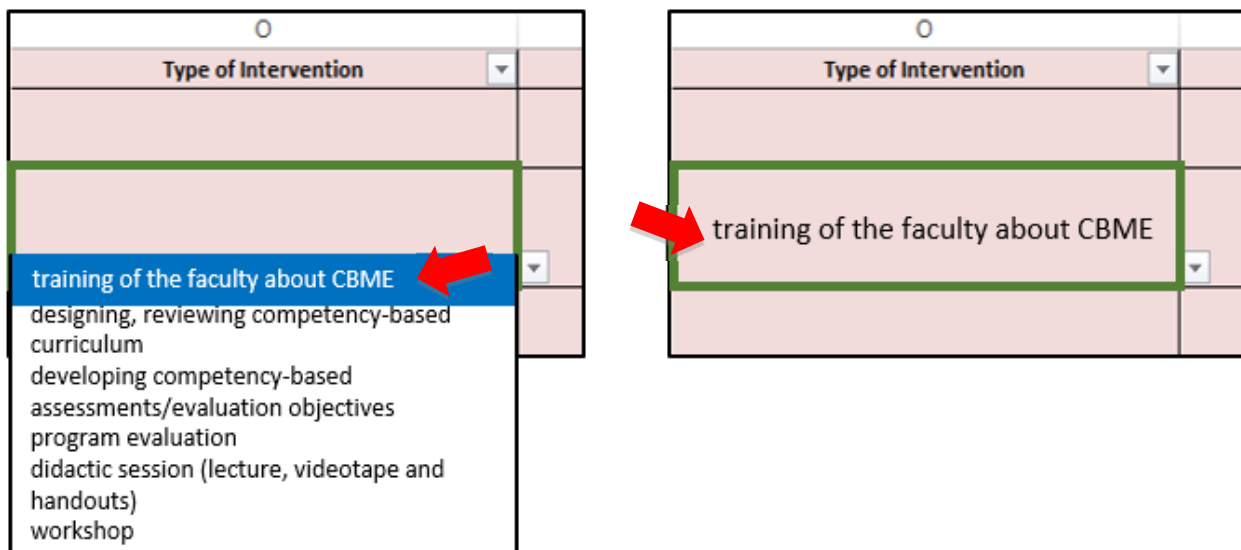
N	O	P
Definition Source	Type of Intervention	Other Types of Intervention

> **Type of intervention**
> Specify the type of intervention described in the article by choosing from the list below. Enter "not applicable" if it is not empirical research

DROPDOWN VERSUS FREE-TEXT

- Some of the cells have ***dropdown lists*** for you to select from, while others require ***free-text.***

- If a dropdown list is available, the symbol ▼ will appear to the ***right outside of the cell*** when you click on it.

O	P
Type of Intervention	Other Types of Intervention

Click on [▼] and the *dropdown list* will appear. Select your answer and it will automatically populate the cell.

- If you want to change your answer:
  - Simply repeat this process above, or;
  - Select the cell and hit "delete" on your keyboard.

REORDERING YOUR DATA

- The information in your **Data Charting Form** can be reorganized (alphabetically or numerically) by any of the categories.
  - *For example, you can organize your dataset by year, title, article source, country, etc.*

- Go to the first row, which is *grey* and contains the titles for each column. Select the arrow on the bottom right corner of the box.

Year	Title	Article Source	Country
2011	Integration of CanMEDS Expectations and outcomes	Members of the FMEC PG consortium;	Canada
2013	Plain Films of Dedication Free Documentaries, CanMEDS-FM, and a Commitment to the Person First	ANON	Canada
2014	Care of the Elderly Program: Training Future Physicians and Promoting Research and Clinical Excellence for the Medically Complex Senior	University of Alberat	Canada

- A new window will pop up. You can now choose to sort your data in *ascending* or *descending* order based on the information contained in that column.

- The information should automatically reorganize itself as soon as you make your selection. For example, below *ascending* was selected for publication year. As soon as *ascending* was clicked, the dataset reorganized itself from earliest to most recent publication.

- Click the X button in the top left corner of the pop-up window to exit it.

Publication types in the initial dataset

Publication Type	Definition	Numbers
Research Article	Original primary research (qualitative or quantitative) that contain sections recognizable as introduction, methods, results and discussion.[1]	**37**
Review	An article or book published after examination of published material on a subject. It may be comprehensive to various degrees and the time range of material scrutinized may be broad or narrow, but the reviews most often desired are reviews of the current literature. The textual material examined may be equally broad and can encompass, in medicine specifically, clinical material as well as experimental research or case reports.[2]	**5**
Commentary/Reflective Paper	Opinion papers, points of view, position papers, recommendations, "blueprints" for proposed action. Debates, interviews, panel discussions, questions and answers, dialogues, transcripts. Essays, short expository/speculatory papers, "think" pieces, philosophical pieces, criticism, interpretation, editorials, pros and cons.[3]	**26**
Editorial Opinion	Work consisting of a statement of the opinions, beliefs, and policy of the editor or publisher of a journal, usually on current matters of medical or scientific significance to the medical community or society at large. The editorials published by editors of journals representing the official organ of a society or organization are generally substantive.[2]	**1**
Regulatory	Regulations, regulatory agency materials. Codes, administrative codes, codes of student behavior, agreements, rules, policy statements, master plans, contracts (model), collective bargaining agreements, and other materials governing the behavior of various groups. Standards (e.g., ANSI, ISO, FIPS), specifications, accreditation standards, professional standards. Executive orders, Federal Register pronouncements. Does not include documents merely 'about' specific court cases or legal issues.[3]	**11**

1. American Psychological Association (APA) (2010). *Publication Manual of the American Psychological Association*. 6th ed. Washington, DC: APA.
2. U.S. National Library of Medicine (2016). Publication characteristics (publication types) with scope notes: 2016 MeSH edition. Available at: https://www.nlm.nih.gov/mesh/pubtypes.html. Accessed April 20, 2017.
3. ERIC: Publication Types (2016). Available at: http://proquest.libguides.com/eric/pubtypes. Accessed April 20, 2017.