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Core Competencies in Evidence-Based Practice for Health Professionals

Consensus Statement Based on a Systematic Review and Delphi Survey

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Abstract

IMPORTANCE Evidence-based practice (EBP) is necessary for improving the quality of health care as well as patient outcomes. Evidence-based practice is commonly integrated into the curricula of undergraduate, postgraduate, and continuing professional development health programs. There is, however, inconsistency in the curriculum content of EBP teaching and learning programs. A standardized set of minimum core competencies in EBP that health professionals should meet has the potential to standardize and improve education in EBP.

OBJECTIVE To develop a consensus set of core competencies for health professionals in EBP.

EVIDENCE REVIEW For this modified Delphi survey study, a set of EBP core competencies that should be covered in EBP teaching and learning programs was developed in 4 stages: (1) generation of an initial set of relevant EBP competencies derived from a systematic review of EBP education studies for health professionals; (2) a 2-round, web-based Delphi survey of health professionals, selected using purposive sampling, to prioritize and gain consensus on the most essential EBP core competencies; (3) consensus meetings, both face-to-face and via video conference, to finalize the consensus on the most essential core competencies; and (4) feedback and endorsement from EBP experts.

FINDINGS From an earlier systematic review of 83 EBP educational intervention studies, 86 unique EBP competencies were identified. In a Delphi survey of 234 participants representing a range of health professionals (physicians, nurses, and allied health professionals) who registered interest (88 [61.1%] women; mean [SD] age, 45.2 [10.2] years), 184 (78.6%) participated in round 1 and 144 (61.5%) in round 2. Consensus was reached on 68 EBP core competencies. The final set of EBP core competencies were grouped into the main EBP domains. For each key competency, a description of the level of detail or delivery was identified.

CONCLUSIONS AND RELEVANCE A consensus-based, contemporary set of EBP core competencies has been identified that may inform curriculum development of entry-level EBP teaching and learning programs for health professionals and benchmark standards for EBP teaching.

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Key Points

Question What are the core competencies in evidence-based practice (EBP) that health professionals should meet?

Findings In this systematic, multistage, modified Delphi survey study, a contemporary set of 68 core competencies in EBP grouped into the main EBP domains was developed.

Meaning This consensus statement of the core competencies in EBP should inform the development of EBP curricula for health professionals.

+ Invited Commentary

+ Supplemental content

Author affiliations and article information are listed at the end of this article.

Introduction

The term *evidence-based medicine* was first developed in the field of medicine in the early 1990s, but as its use expanded to include other health disciplines, it became known as evidence-based practice (EBP). Evidence-based practice provides a framework for the integration of research evidence and patients' values and preferences into the delivery of health care.[1,2] Implementation of EBP principles has resulted in major advances in improving the quality of delivered health care as well as patient outcomes. The last 20 years have seen EBP increasingly integrated as a core component into the curriculum of undergraduate, postgraduate, and continuing education health programs worldwide.[3,4] Many national registration bodies and accreditation councils (eg, the Accreditation Council for Graduate Medical Education in the United States) expect that all clinicians (ie, health professionals and learners of any discipline) should be competent in EBP.[5] The National Academy of Medicine (formerly the Institute of Medicine), an independent, nongovernmental, nonprofit organization that provides advice, counsel, and independent research on major topics in health care, has recognized EBP as one of the core competencies necessary for continuous improvement of the quality and safety of health care.[6]

Although many teaching strategies have been used and evaluated, a lack of EBP knowledge and skills is still one of the most commonly reported barriers to practicing EBP.[7,8] One of the potential explanations is the inconsistency in the quality and content of the EBP teaching programs[9] (also L.A., P.G., T.H., unpublished data, 2018). A standardized set of core competencies in EBP for clinicians and students may therefore improve EBP teaching and learning programs as well as EBP knowledge and skills.[10]

Core competencies have been defined as the essential minimal set of a combination of attributes, such as applied knowledge, skills, and attitudes, that enable an individual to perform a set of tasks to an appropriate standard efficiently and effectively.[11] Core competencies offer a common shared language for all health professions for defining what all are expected to be able to do to work optimally.

Recognizing it as a promising way of reforming and managing medical education and ultimately improving quality of care,[12,13] the Institute of Medicine report *Health Professions Education: A Bridge to Quality* endorsed competency-based education across the health professions.[4] Implementation of competency-based education involves the identification of core competencies, designing curricula and teaching programs that clearly articulate the attributes underpinning each core competency, and developing assessment tools that provide a valid and reliable evaluation of these core competencies.[14]

A clear outline of core competencies is critical in any health care education setting, as it informs the blueprinting of a curriculum, including learning outcomes, assessment strategies, and graduate attributes.[15-17] Therefore, defining core competencies is a priority in health care education.[11,18-22] Unaware of any systematically derived set of core competencies in EBP, we set out to remedy this deficiency. The objective of this study was to develop a consensus-based set of core EBP competencies that EBP teaching and learning programs should cover.

Methods

We conducted a multistage, modified Delphi study, in which we (1) generated, from a systematic review, an initial set of potential competencies to be considered for inclusion in the EBP core competencies set; (2) conducted a 2-round modified Delphi survey to prioritize and gain consensus on the most essential EBP core competencies; (3) held a meeting to finalize the consensus on the set of EBP core competencies; and (4) sought feedback and endorsement from EBP experts and planned for dissemination.

Generation of an Initial Set of Relevant EBP Competencies

We previously completed a systematic review of EBP educational studies, following Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA) reporting guidelines.[23] Studies were eligible if they were controlled (that is, had a separate group for comparison) and had investigated the effect of EBP education among clinicians (irrespective of the level of training, profession, or intervention format). Of 1682 articles identified, we screened 714 titles and abstracts for eligibility. Of these, 286 full-text articles were obtained for review, and 83 articles proved eligible. Results of the review, rather than competencies, are reported elsewhere.[23] We reviewed included studies to identify EBP competencies addressed in these studies. In addition, EBP curricula and key statements (eg, Sicily statement on EBP,[24] Institute of Medicine reports,[4] and the Informed Health Choice key concepts[25,26]) were identified by contacting experts in this field and reviewing suggested documents. These were reviewed for relevant EBP competencies, which were defined as "attributes such as applied knowledge, skills and attitudes that enable an individual to perform a set of tasks to an appropriate standard efficiently and effectively."[11] Three of us (L.A., T.H., and P.G.) independently extracted EBP competencies from a random sample of 20 articles and continued discussion until consensus was attained. Afterward, one of us (L.A.) extracted EBP competencies from the rest of the included articles. These authors reviewed this set of initial EBP competencies for duplication, overlap, and clarity, leaving uniquely specified competencies. The same 3 authors grouped these competencies into the relevant EBP steps (introductory, ask, acquire, appraise and interpret, apply, and evaluate). eMethods 1 in the Supplement presents detailed methods of this stage.

Two-Round Delphi Survey

We used a modified 2-round Delphi survey to obtain the input of a broad range of experts and stakeholders on the most essential EBP core competencies.[27-30] We used a purposive and snowball sampling approach to invite clinicians who had significant experience in teaching and/or practicing EBP to register their interest in participating in our Delphi survey (February 2017). We sent email invitations to the evidence-based health care listserv and other networks of national and international evidence-based health societies and posted announcements on social media (eg, Twitter and Facebook).

The **Figure** illustrates the process of the modified Delphi survey. The round 1 survey (March-April 2017) consisted of 86 competencies grouped into EBP steps (introductory, ask, acquire, appraise and interpret, apply, and evaluate). We invited participants who responded and registered their interest to participate in round 1. Participants rated the relative importance of each competency as "omitted: is not a priority to be included in an EBP teaching program," "mentioned: should be just mentioned in an EBP teaching program (ie, provide common knowledge of the competency)," "explained: should be briefly explained in an EBP teaching program (ie, provide understanding of the competency but without practical exercises)," or "practiced with exercises: should be practiced with exercises in an EBP teaching program (ie, provide a detailed understanding of the competency, enhanced with practical exercises)." We chose this rating scale to reflect the desired learning outcome and clinical competence (ie, Miller's Pyramid of Clinical Competence[31]) and the required level of detail and time commitment to be delivered. For round 2, we retained EBP competencies that attained a predefined consensus level of at least 70% of participants per competency or a combined rating of greater than or equal to 85% across 2 rating categories (eg, combined rating of mentioned and explained ≥85%).

Participants who responded and completed the round 1 survey were invited to participate in round 2 (May-June 2017). For this round, we revised the retained competencies based on feedback from participants and arranged them into 5 groups (Figure). Group A included competencies that a predefined consensus (≥70%) agreed should be practiced with exercises or explained or mentioned; participants were advised that these would be included in the final set of core competencies unless strong objection was received in that round. Groups B, C, and D were competencies that did not achieve the predefined consensus level in round 1, but most (≥85%) agreed should be practiced with

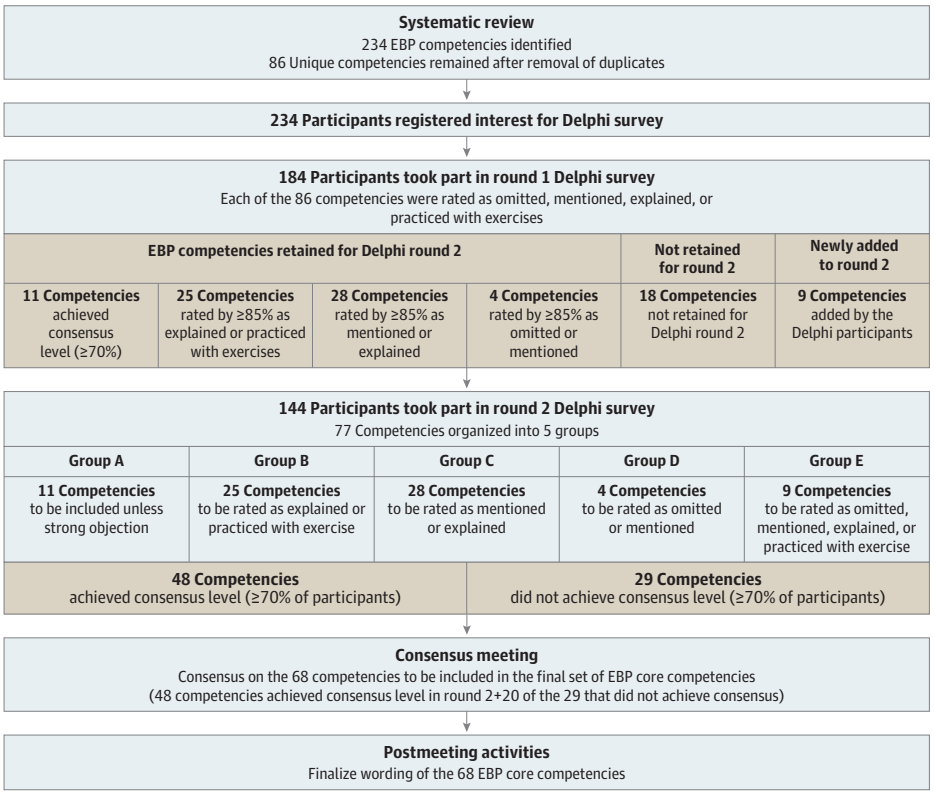
exercises or explained; explained or mentioned; or mentioned or omitted, respectively. Participants in round 2 were asked to rate whether these competencies should be practiced with exercises or explained, explained or mentioned, or mentioned or omitted. Group E included new competencies that were suggested by round 1 participants, who then rated them omitted, mentioned, explained, or practiced with exercises.

Survey Monkey, a web-based survey service, provided the platform for the surveys. In both rounds, participants were given a chance to suggest additional competencies, argue for or against proposed competencies, and comment on competency wording and comprehension. We obtained ethics approval for this study from the Human Research Ethics Committee at Bond University. Participants were informed that consent was assumed if they responded to the survey. Detailed methods of the Delphi survey are presented in eMethods 2 through 4 in the Supplement.

Consensus Meeting and Postmeeting Activities

A 2-day consensus meeting (July 10-11, 2017) was organized by the Centre for Research in Evidence-Based Practice (L.A., T.H., and P.G.) and involved 10 participants purposively chosen to represent a range of health professions, experience in teaching EBP, geographical locations, and representation of EBP societies and organizations. We presented the results of the systematic review and the 2-round Delphi survey. Following presentation of the results, the group participated in focused discussions addressing the proposed set of core competencies and made final decisions on the inclusion of each competency and its wording and description. To ensure that the consensus set of competencies reflected the decisions made, participants reviewed a document presenting the consensus set of competencies after the meeting. To ensure the validity, applicability, utility, and clarity of the competencies, we sent the final set of EBP core competencies for external feedback to 15 EBP experts (purposively identified to represent different EBP organizations and societies,

Figure. Flow Diagram of the Process of Developing the Set of Evidence-Based Practice (EBP) Core Competencies



Participants in the 2-round Delphi survey rated the relative importance of each competency as "omitted: is not a priority to be included in an EBP teaching program," "mentioned: should be just mentioned in an EBP teaching program (ie, provide common knowledge of the competency)," "explained: should be briefly explained in an EBP teaching program (ie, provide understanding of the competency but without practical exercises)," or "practiced with exercises: should be practiced with exercises in an EBP teaching program (ie, provide a detailed understanding of the competency, enhanced with practical exercises)."

including the International Society for Evidence-Based Health Care board members). Based on feedback from EBP experts, we further revised the wording and explanation of the competencies. All coauthors were emailed the draft document and provided minor wording suggestions.

Results

Generation of an Initial Set of Relevant EBP Competencies

We identified 234 EBP competencies, which decreased to 86 unique competencies after removal of duplicates. eTables 1 and 2 and the eFigure in the Supplement present details.

Delphi Survey and Consensus Meeting

Of the 234 individuals who registered their interest (88 [61.1%] women; mean [SD] age, 45.2 [10.2] years), 184 (78.6%) participated in round 1 of the Delphi survey, and 144 participated in round 2 (61.5%, or 78.3% of round 1 participants). Of the 144 round 2 participants, 88 (61.1%) were women, 63 (43.8%) were 30 to 44 years old, 60 (41.7%) were 45 to 59 years old, and 115 (79.9%) currently taught EBP, with a mean (SD) of 10.9 (7.4) years of EBP teaching experience. Participants were from 28 different countries. In total, 59 participants (41.0%) were medical professionals (not including nurses, who were categorized separately) and 56 (38.9%) were allied health professionals. More than one-third of participants (n = 54 [37.5%]) had both clinical and academic (teaching or research) roles. The majority (n = 118 [81.9%]) were working in a university setting, and 53 participants (36.8%) worked in hospitals (**Table 1**).

After round 1, 11 competencies attained the predefined consensus level (≥70%) (group A); 25 competencies were rated by the majority (≥85%) practiced with exercises or explained (group B); 28 were rated by the majority (≥85%) explained or mentioned (group C); 4 were rated by the majority (≥85%) mentioned or omitted (group D); and 9 new competencies were suggested by participants (group E). After round 2, 48 competencies had achieved the consensus level (≥70%): 20 competencies were rated as practiced with exercises; 20 as explained; and 8 as mentioned. In total, 29 competencies did not achieve the a priori consensus level and were retained for further discussion at the consensus meeting; 20 were subsequently included. The Figure illustrates the results of the modified Delphi survey. eTables 3 and 4 in the Supplement present detailed results of rounds 1 and 2.

Core Competencies in EBP

After the 2 rounds of Delphi survey and the consensus meeting, a total of 68 competencies achieved consensus for inclusion in the final set of EBP core competencies. **Table 2** presents the final set of EBP core competencies (eTable 5 in the Supplement includes the set and an elaboration of each competency). The final set of EBP core competencies are grouped into the main EBP domains: introductory (n = 5); ask (n = 3); acquire (n = 4); appraise and interpret (n = 9); apply (n = 4); and evaluate (n = 2). We also provide a description of each key competency and the level of detail or delivery for each one (a proxy of the time that should be dedicated to teaching each competency—M, mentioned; E, explained; and P, practiced with exercise). We found that most of the core competencies could be classified within the 5-step model of EBP, which is also used by the Sicily statement,[24] except for the introductory competencies, which we therefore retained.

Discussion

This study was a rigorous process, which involved integrating evidence from a systematic review, conducting a modified Delphi survey, holding a consensus meeting, and receiving external feedback from EBP experts, to achieve consensus on the most essential core competencies that should be taught in EBP educational programs for clinicians and students. The final consensus set includes 68 core competencies.

A previous study has developed a set of EBP competencies, but it was limited to a single discipline (nursing) and country (United States) and did not use a systematic review to inform the Delphi survey.[32] Some competencies appear in this previously identified set (eg, critical appraisal of a research article, formulate a clinical question using PICO [patient, intervention, comparison, outcome]). However, our competencies are more specific and extend to include the application of evidence, including through shared decision making, and evidence implementation at the individual clinical level. The set of EBP core competencies highlights the required level of detail needed (ie, mentioned, explained, and practiced with exercises) for each EBP competency as a proxy for the amount of time that should be dedicated to each. Additionally, we view this set of EBP core competencies as a contemporary and dynamic set. As the field matures, new competencies will undoubtedly need to be added, and others removed. For instance, shared decision making and the Grading of Recommendations Assessment, Development and Evaluation (GRADE) approach are 2 recent competencies that were not taught in EBP curricula previously. We plan to review this set periodically and welcome any feedback.

With the increased availability of trustworthy preappraised evidence resources, clinicians can practice EBP without being fully competent in detailed critical appraisal of individual studies. What they must know, however, is how to critically interpret and apply the results presented in these preappraised sources.[33,34] This full understanding is necessary to trade off desirable and undesirable

Table 1. Characteristics of Participants in Each Stage of Modified Delphi Survey

Characteristic	No. (%)		
	Registration of Interest (n = 234)	Round 1 (n = 184)	Round 2 (n = 144)
Age, mean (SD), y	45.2 (10.2)	NA	NA
<30	NA	4 (2.2)	4 (2.8)
30-44	NA	83 (45.1)	63 (43.8)
45-59	NA	75 (40.8)	60 (41.7)
≥60	NA	22 (12.0)	17 (11.8)
Female	141 (60.3)	110 (59.8)	88 (61.1)
Countries and continents	36 countries (12 Europe, 13 Asia, 4 Africa, 6 Americas, and Australia)	32 countries (11 Europe, 12 Asia, 3 Africa, 5 Americas, and Australia)	28 countries (11 Europe, 10 Asia, 2 Africa, 4 Americas, and Australia)
Australia	57 (24.4)	59 (32.1)	45 (31.3)
United Kingdom	55 (23.5)	41 (22.3)	31 (21.5)
United States	27 (11.5)	21 (11.4)	22 (15.3)
Other	95 (40.6)	59 (32.1)	46 (31.9)
Health discipline			
Medicine	80 (34.2)	75 (40.8)	59 (41.0)
Nursing	33 (14.1)	26 (14.1)	18 (12.5)
Allied health	66 (28.2)	72 (39.1)	56 (38.9)
Other	56 (23.9)	13 (7.1)	11 (7.6)
Current role[a]			
Teaching	178 (76.1)	145 (78.8)	112 (77.8)
Clinical	160 (68.4)	140 (76.1)	110 (76.4)
Research	106 (45.3)	68 (37.0)	50 (34.7)
Setting or institution[a]			
University	NA	148 (80.4)	118 (81.9)
Hospital	NA	69 (37.5)	53 (36.8)
Other (eg, governmental)	NA	21 (11.4)	15 (10.4)
Currently teaching EBP	183 (78.2)	147 (79.9)	115 (79.9)
EBP teaching experience, mean (SD), y	NA	10.5 (7.4)	10.9 (7.4)
Clinical experience, mean (SD), y	21.2 (10.8)	NA	NA

Abbreviations: EBP, evidence-based practice; NA, not available.

[a] Participants could choose more than 1 option.

Table 2. Final Set of EBP Core Competencies Grouped Into the Main EBP Domains

EBP Core Competencies	Rating
0. Introductory	
0.1 Understand EBP defined as the integration of the best research evidence with clinical expertise and patient's unique values and circumstances[a]	E
0.2 Recognize the rationale for EBP	M
This competency includes the need to recognize	
The daily clinical need for valid information to inform decision making, and the inadequacy of traditional sources for this information	M
The disparity between diagnostic skills and clinical judgment, which increase with experience, and up-to-date knowledge and clinical performance, which decline with age and experience	M
Lack of time to find and assimilate evidence as a clinician	M
The gaps between evidence and practice can lead to suboptimal practice and quality of care	M
The potential discordance between a pathophysiological and empirical approach to thinking about whether something is effective[a]	M
0.3 For each type of clinical question, identify the preferred order of study designs, including the pros and cons of the major study designs[a]	E
This competency includes	
Classify the major study designs for each type of clinical question	E
0.4 Practice the 5 steps of EBP: ask, acquire, appraise and interpret, apply, and evaluate[a]	P
0.5 Understand the distinction between using research to inform clinical decision making vs conducting research[a]	M
1. Ask	
1.1 Explain the difference between the types of questions that cannot typically be answered by research (background questions) and those that can (foreground questions)[a]	E
1.2 Identify different types of clinical questions, such as questions about treatment, diagnosis, prognosis, and etiology[a]	P
1.3 Convert clinical questions into structured, answerable clinical questions using PICO[a]	P
This competency includes	
Recognize the importance of and strategies for identifying and prioritizing uncertainties or knowledge gaps in practice	M
Understand the rationale for using structured clinical questions	E
Identify the elements of PICO questions and use variations of it when appropriate (eg, PICOT, PO, PECO—Exposure) to structure answerable clinical questions	P
2. Acquire	
2.1 Outline the different major categories of sources of research information, including biomedical research databases or databases of filtered or preappraised evidence or resources[a]	E
This competency includes	
Outline the advantages of using filtered or preappraised evidence sources and recognize relevant resources	E
Indicate the differences between the hierarchy of evidence, level of processing of evidence, and types of evidence-based medicine resources[a]	E
2.2 Construct and carry out an appropriate search strategy for clinical questions[a]	P
This competency includes	
Know where to look first to address a clinical question	P
When necessary, construct a search strategy that reflects the purpose of the search[a]	P
Apply a general search strategy including the use of search terms, and the role of Boolean operators; truncation; and search filters for more efficient searches[a]	E
2.3 State the differences in broad topics covered by the major research databases	M
2.4 Outline strategies to obtain the full text of articles and other evidence resources[a]	E
3. Appraise and Interpret	
3.1 Identify key competencies relevant to the critical evaluation of the integrity, reliability, and applicability of health-related research	E
This competency includes	
Understand the difference between random error and systematic error (bias)[a]	E
Identify the major categories of bias and the impact of these biases on the results[a]	E
Interpret commonly used measures of uncertainty, in particular, confidence intervals[a]	P
Recognize that association does not imply causation and explain why[a]	E
Recognize the importance of considering conflict of interest and funding sources	M
Recognize the uses and limitations of subgroup analysis and how to interpret its results[a]	M
3.2 Interpret different types of measures of association and effect, including key graphical presentations[a]	P
This competency includes	
Identify the basic types of data such as categorical and continuous[a]	E
Recognize the meaning of some basic frequency measures	M
Identify the difference between "statistical significance" and "importance," and between a lack of evidence of an effect and "evidence of no effect"[a]	E

(continued)

Table 2. Final Set of EBP Core Competencies Grouped Into the Main EBP Domains (continued)

EBP Core Competencies	Rating
3.3 Critically appraise and interpret a systematic review[a]	P
This competency includes	
Recognize the difference between systematic reviews, meta-analyses, and nonsystematic reviews[a]	M
Identify and critically appraise key elements of a systematic review	P
Interpret presentations of the pooling of studies such as a forest plot and summary of findings table	P
3.4 Critically appraise and interpret a treatment study[a]	P
This competency includes	
Identify and appraise key features of a controlled trial	P
Interpret the results, including measures of effect	P
Identify the limitations of observational studies as treatment studies, and recognize the basics of adjustment methods and their limitations	E
3.5 Critically appraise and interpret a diagnostic accuracy study[a]	P
This competency includes	
Identify and appraise key features of a diagnostic accuracy study	P
Interpret the results, including interpret measures to evaluate diagnostic accuracy[a]	P
Recognize the purpose and use of clinical prediction rules	M
3.6 Distinguish evidence-based from opinion-based clinical practice guidelines[a]	P
3.7 Identify the key features of, and be able to interpret, a prognostic study	E
This competency includes	
Identify and appraise key features of a prognostic study	E
Interpret the results including measures of effect (eg, Kaplan-Meier survival curves) and uncertainty	E
Recognize the purpose and use of clinical prediction rules	M
3.8 Explain the use of harm and etiologies study for (rare) adverse effects of interventions[a]	E
This competency includes	
Indicate that common treatment harms can usually be observed in controlled trials, but some rare or late harms will only be seen in observational studies	E
3.9 Explain the purpose and processes of a qualitative study	E
This competency includes	
Recognize how qualitative research can inform the decision making process	M
4. Apply	
4.1 Engage patients in the decision making process, using shared decision making, including explaining the evidence and integrating their preferences[a]	P
This competency includes	
Recognize the nature of the patient's dilemma, hopes, expectations, fears, and values and preferences	M
Understand and practice shared decision making	P
Recognize how decision support tools such as patient decision aids can assist in shared decision making	M
4.2 Outline different strategies to manage uncertainty in clinical decision making in practice	E
This competency includes	
Recognize professional, ethical, and legal components and dimensions of clinical decision making, and the role of clinical reasoning	M
4.3 Explain the importance of baseline risk of individual patients when estimating individual expected benefit	E
This competency includes	
Recognize different types of outcome measures (surrogate vs composite endpoints measures)	M
4.4 Interpret the grading of the certainty in evidence and the strength of recommendations in health care	E
5. Evaluate	
5.1 Recognize potential individual-level barriers to knowledge translation and strategies to overcome these	M
This competency includes	
Recognize the process of reflective clinical practice	M
5.2 Recognize the role of personal clinical audit in facilitating EBP	M

Abbreviations: E, explained; EBP, evidence-based practice; M, mentioned; P, practiced with exercises; PECO, population, exposure, comparison, outcome; PICO, patient, intervention, comparison, outcome; PICOT, population, intervention, comparison, outcome, time; PO, population, outcome.

[a] Core competencies that achieved the consensus level in Delphi round 2.

consequences, particularly when they are closely balanced. Furthermore, shared decision making requires clearly communicating about the trade-offs with patients. However, clinicians may still sometimes need to critically appraise individual studies (for example, when there are no trusted preappraised resources that answer a clinical question, or when a new study challenges their current practice). In addition, skills in critical appraisal are helpful in determining the trustworthiness of preappraised evidence.

The core competencies should be suitable to inform the curricula for an introductory course in EBP for clinicians of any level of education and any discipline. The competencies provide building blocks for EBP educators to use to develop their own curriculum, tailored to local learning needs, time availability, discipline, and the previous EBP experience of the learners. Competencies are unlikely to be exhaustive or tailored to the specific needs of any one discipline. However, some of the competencies might be more relevant to one discipline than another (eg, diagnosis is more relevant to the discipline of medicine than to others). The order of the EBP core competencies in the set does not reflect the order of their importance or sequence in teaching. Educators can modify their approach to teaching these competencies based on case-based scenarios or articles, and it is likely that optimal communication of competencies will require teaching in more than one setting using a number of different scenarios and/or articles. For example, a teaching session can be initiated using an equivocal risk-benefit balance case scenario and teaching the shared decision-making skills needed, providing patient decision aids where possible. Then, teachers can explain the evidence incorporated into the decision aids and the derivation and interpretation of quantities, such as absolute risk difference and number needed to treat or harm.

Educators and curriculum developers in EBP are encouraged to evaluate the content of their current curriculum and integrate these competencies into it. Educators may find mapping core competencies to existing curricula will allow identification of any gaps in the coverage of essential content. Programs can address other additional advanced competencies (eg, implementation science, economic analysis) depending on the needs and desires of their learners.

This set of core competencies in EBP represents just one of several needed steps for the implementation of competency-based EBP education. Dissemination and integration of this set of core competencies in academic and clinical practice may assist in delivering a more uniform and harmonized education to EBP learners. Open access online databases of learning resources (eg, the Critical Thinking and Appraisal Resource Library [CARL])[35] represent an important resource to enhance the sharing and accessibility of learning resources relevant for the EBP core competencies.

The development of appropriate assessment tools to evaluate the identified EBP competencies is challenging but useful for monitoring learners' progress in each of the competencies or evaluating the effectiveness of different teaching methods. A systematic review of 85 studies evaluating EBP educational interventions found that more than half of the included studies did not use a psychometrically robust, high-quality instrument to measure their outcomes (L.A., P.G., T.H., unpublished data, 2018). Therefore, EBP education researchers should identify, and if necessary develop, specific assessment tools (both formative and summative) that provide accurate, reliable, and timely evaluation of the EBP competencies of learners. Future work should also focus on defining core competencies needed for each training level and comparing different modalities (including the sequence) when teaching these competencies.

Limitations

A key strength of the study is the systematic review and Delphi survey approach to achieving international consensus about a contemporary set of core competencies in EBP curricula. Although we selected Delphi participants to represent a diverse range of health professions and expertise, they may not adequately represent the full spectrum of views held by individuals within a single profession.

Conclusions

Based on a systematic consensus process, a set of core competencies in EBP to inform the development of EBP curricula for health professional learners has been developed and described.

ARTICLE INFORMATION

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SUPPLEMENT.

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