


Entrustable professional activities in health care education: a scoping review

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CONTEXT The shift in medical education from time-based learning to outcome-based learning has drawn much attention to entrustable professional activities (EPAs) as an ideal assessment framework to translate competencies into clinical practice. Given the relative novelty of EPAs, this review aims to highlight research gaps and explore and consolidate available evidence pertaining to the development and implementation of EPAs in health care.

METHOD Arksey and O'Malley's scoping review framework was used to present the findings. The authors performed a systematic search of PubMed, Embase, CINAHL, Scopus, MedNar, OpenGrey and ProQuest Dissertation and Theses for English articles published from the inception of each database to May 2018. A manual search of the reference lists of the included studies was conducted and an expert panel was consulted. Two reviewers screened the articles for eligibility using the inclusion criteria. All authors extracted key data and analysed the data descriptively. Thematic analysis was used to categorise the results into themes.

RESULTS Eighty articles were included in the review. All articles were published between 2010 and 2018. Three major themes and eight sub-themes were generated: (i) development of EPAs (frameworks for EPA development and implementation, identifying core or specialty-specific EPAs, and EPAs for faculty development), (ii) evaluation of EPAs and EPA entrustment factors (revised curriculum, entrustment decisions for professional activities, and feedback on implemented EPAs and the development process), and (iii) future directions and recommendations for EPAs (implementation of EPAs in undergraduate medical education and specific disciplines, and other criticisms and recommendations for EPAs).

CONCLUSIONS Entrustable professional activities are an essential means to translate competencies into observable and measurable clinical practice. However, high-level evidence-based research on the efficacy, development and implementation of EPAs for specific target groups (i.e. undergraduates and staff) and geographical regions (i.e. Asia and Africa) is still lacking, which suggests a direction for future research.

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INTRODUCTION

Since the 20th century, there has been a paradigm shift in medical education from time-based learning to outcome-based learning, more commonly known as competency-based medical education (CBME).¹ CBME structures educational experiences around competencies, is learner centred, is focused on outcomes, is independent of time and promises greater accountability to patients.^{2–4} However, competencies are multifarious and varied; therefore, an integrated assessment system is required to assess workplace competencies. According to Teherani and Chen (2014),⁵ the concept of entrustable professional activities (EPAs), introduced by Ten Cate,¹ is the assessment framework most widely adopted by medical educators because it grounds competencies in multiple day-to-day skills.⁵

Although competencies are more theoretical and describe personal qualities involving knowledge, skills, attitudes and values, EPAs are units of professional practice that can be described as responsibilities or discrete tasks that supervisors entrust trainees with once they achieve adequate competencies.² EPAs are not meant to replace competencies but are a mode of translation of competencies into clinical practice.⁶ According to Ten Cate,⁷ EPAs should be observable, measurable, executed within a designated time frame and suitable for entrustment decisions by qualified personnel; otherwise EPAs can pose a problem during the assessment process. This coincides with Ericsson's expertise theory,^{8,9} which states that the rate of development of an expertise (or competence) within a given domain is predicted by the amount of practice by an individual, coupled with a quality curriculum and expert coaching. In terms of patient safety, an EPA-based curriculum ideally provides a safe and justifiable way to gradually increase the responsibilities and autonomy of trainees.¹⁰ The level of autonomy granted to a trainee is determined by an EPA-based assessment based on five levels of supervision.⁷ The designation of a supervision level heavily involves entrustment decision making, which is complex when working with EPAs.¹¹

Following the emergence of the EPA concept, the Association of American Colleges of Medicine (AAMC) identified 13 core EPAs for entering residency¹² and the Canadian Medical Education Directives for Specialists (CanMEDS) framework

defined seven core definitions, which can be mapped to EPAs.³ In recent years, education committees in various medical departments proposed EPA-based curricula derived from the AAMC's and the CanMEDS's frameworks and milestones.^{13,14} The enthusiasm and speed with which medical schools and residency training programmes embraced EPAs in recent years highlight the need for the consolidation of available evidence to better inform curriculum development.^{15–17}

Presently, there are no existing reviews that have consolidated evidence from studies across all medical faculties. Although there is mutual recognition across medical faculties (e.g. nursing, pharmacy, and paediatrics) of the benefits of EPAs, the available literature for each faculty is scarce.^{18–21} Additionally, EPAs are a relatively new topic and most of the available research is of varied focus and research designs. The available literature ranges from the development of EPAs to the discussion of sustainability and recommendations for EPAs. Therefore, it is difficult to conduct a systematic review. As such, we aimed to consolidate all available evidence on development and implementation of EPAs via a scoping review. As this is a scoping review, no definitive geographical boundaries or methodological restrictions were imposed on presenting the available literature. The purpose of a scoping review is to provide a summative map of evidence from existing literature and to identify research gaps, especially in areas that have not been extensively reviewed. However, it does not synthesise quantitative findings or require an appraisal of the quality of the literature. Because of emerging and heterogeneous literature, a scoping review was deemed the most appropriate methodology for this study.²²

METHOD

The five-stage framework proposed by Arksey and O'Malley²² was used to guide the review. However, an optional stage involving a consultation exercise was excluded in this review.

Stage 1: identifying the research question

The main purpose of this review was to explore what is known about the development or implementation of EPAs in the health care setting in order to better inform health care-related curriculum development. Therefore, the research

question was purposefully refined to encompass the extensive range and nature of existing research activities in the literature. The research question was: What is the current available evidence related to the development or implementation of EPAs in health care?

Stage 2: identifying relevant studies

A preliminary search was conducted of the Cochrane Library and Joanna Briggs Institute's Database of Systematic Reviews and Implementation Reports to verify if there were any available reviews on this topic. Four electronic databases (PubMed, Embase, CINAHL and Scopus) were searched systematically for English articles published from the inception of each database to May 2018. A search strategy was developed by two members of the research team and a librarian was consulted to recommend relevant databases and verify search terms. Different combinations of the following keywords were used during the search: nursing, medicine, allied health, entrustable professional activity, and EPA. The following MeSH terms were used to replace the term 'entrustable professional activity': clinical competence, competency-based education, professional competence, internship, and residency. Thesaurus terms were used for database-specific keywords in different databases. The detailed search strategy can be found in Appendix S1.

In order to reduce publication bias and increase the comprehensibility of the reviewed literature, three electronic databases (MedNar, OpenGrey, and ProQuest Dissertation and Theses) were reviewed for grey literature. The bibliographies of the included articles were searched thoroughly for additional relevant articles.

Stage 3: study selection

Because EPAs are a newly emerged research topic and literature regarding EPAs is scarce, no time limit was set for the literature search and all article types, except letters to editors, were included. Only English articles were included for logistical reasons. In order to gather more inclusive evidence on EPAs, no other inclusion criteria were set. Articles were excluded if (i) the study's main focus was not related to the development or application of EPAs (e.g. the validation or development of assessment tools for EPAs) or (ii) the article was a primer or an overview of EPAs (which only focuses on describing and defining EPAs).

After the removal of duplicates, articles were screened by their titles and abstracts according to the exclusion criteria by two reviewers independently. Shortlisted articles were again assessed for full-text eligibility. Any discrepancies between the two reviewers were resolved by consensus or by consulting a third reviewer. Because of the present lack of guidelines on the reporting of scoping reviews, the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) guideline²³ was used to report the flow of the included articles in this review (Appendix S2).

Stage 4: charting the data

Key items of information from the included articles were charted onto a form that was developed based on the research question. Key information extracted included first author's name, title, year of publication, country of origin, clinical department, type of article or study design, aim or research questions, and summary or general findings. Two reviewers tested the chart on the first five studies and met up afterwards to provide feedback and critically discuss further improvements. Upon arriving at a consensus, the chart was revised and used to collate information from all included articles. Only minor amendments were made and no additional variables were added.

Stage 5: collating, summarising and reporting the results

After the extraction, separation, grouping and abstraction of text findings, two reviewers independently categorised the findings into main themes and sub-themes using Braun and Clarke's²⁴ framework of thematic analysis. A manual colour-coding method was employed to highlight different concepts and generate initial codes. Related codes from all excerpts were collated to generate sub-themes and overarching themes, which were reviewed comprehensively for homogeneity by both authors. Upon further discussion, prominent themes constituting frequently reported overlapping data were selected from the authors' independent analyses, renamed and included in the final analysis. To enhance reflexivity, the first phase of analysis was carried out independently by the two authors. Any discrepancies between the two authors over the thematic analysis were clarified by consulting the third author until a consensus on the final themes and sub-themes was reached. Additionally, the authors of this review represented different health care backgrounds, which provide

varied perspectives of summarising available evidence on the development and application of EPAs.

RESULTS

Characteristics of the papers

A total of 284 articles were screened and assessed for eligibility, resulting in a final inclusion of 80 articles in the review (Fig. 1). All included articles were published during 2010–2018. Most of the studies and reports were from Western countries, specifically Canada ($n = 5$), the USA ($n = 51$), the Netherlands ($n = 11$), Germany ($n = 4$) and Australia ($n = 5$). The articles were multidisciplinary, with more focus on graduate medical education (GME) ($n = 30$), especially internal medicine ($n = 9$) and paediatrics ($n = 7$). Article types included narrative articles ($n = 13$), research reports ($n = 40$), perspective papers ($n = 10$), commentaries ($n = 11$), an editorial ($n = 1$) and summit reports ($n = 5$). A summary of the characteristics of the included articles is presented in Table 1. Full details of the included papers can be found in Appendix S3.

Based on the thematic analysis, three themes and eight sub-themes were generated. The main themes are as follows: (i) development of EPAs, (ii) evaluation of EPAs and EPA entrustment factors, and (iii) future directions and recommendations for EPAs.

Theme 1: development of EPAs

Frameworks for EPA development and implementation

Medical education committees from various clinical departments (e.g. paediatrics and pharmacy) proposed detailed step-by-step frameworks for developing or implementing core or specialty EPAs ($n = 12$).^{13,18,25–30} The general process included (i) conducting a literature review, (ii) defining draft EPAs based on attributes, (iii) determining components of EPAs, (iv) developing EPAs and assessment strategies, (v) defining competencies and milestones, (vi) mapping milestones to EPAs and (vii) faculty development.

Identifying core or specialty-specific EPAs

The majority of the existing literature ($n = 28$) on EPAs focused on identifying or listing core-

specialty-specific EPAs with only brief mentions of the approaches used. Most adopted the Delphi approach or a modified version of it,^{31–40} and some sought expert discussions.^{20,21,41–46} A few studies shortlisted important EPAs through online surveys or focus groups.^{19,47–52} EPAs were mostly mapped to their respective competencies or curricula's milestones.

EPAs for faculty development

Four papers^{53–56} emphasised the necessity for the implementation of EPAs for the teaching faculty staff, specifically undergraduate medical education (UME) educators, surgical simulation leaders and residency programme directors, in order to ensure and assess their competencies. Specific EPAs with varying complexities were proposed to better match the responsibilities and competencies of different faculty members, specifically in UME and GME. Other studies proceeded to develop and identify 12 EPAs for faculty members,⁵³ propose a shared mental model for entrustment,⁵⁵ and provide an example on linking competencies with EPAs for instructors.⁵⁶

Theme 2: use and evaluation of EPAs and EPA entrustment factors

Revised curriculum

Four papers^{57–60} proposed revised workplace and school curricula to incorporate EPAs to address the lack of standardised curricula and assessment methods. Mulder et al.⁵⁹ provided guidelines on developing and implementing EPA-based curricula, whereas the other papers^{57,58,60} suggested and described revision and implementation processes. The revised curricula included the mapping of observable practice activities, performing a needs assessment, shortlisting relevant core EPAs and a 1-day boot camp for increasing competency skills. Such curricula aim to bridge the gap between expected and actual skill sets by developing specialty-specific competencies.

Entrustment decisions for professional activities

Progressive entrustment is necessary to train competent and fully autonomous clinicians, and many papers sought to identify factors influencing supervisors' entrustment decisions ($n = 7$).^{10,61–66} The main factors were trainees' characteristics, trainees' experiences, supervisors' characteristics, characteristics of the task at hand and contextual factors. A conceptual model was developed to examine how the interaction of such factors affects

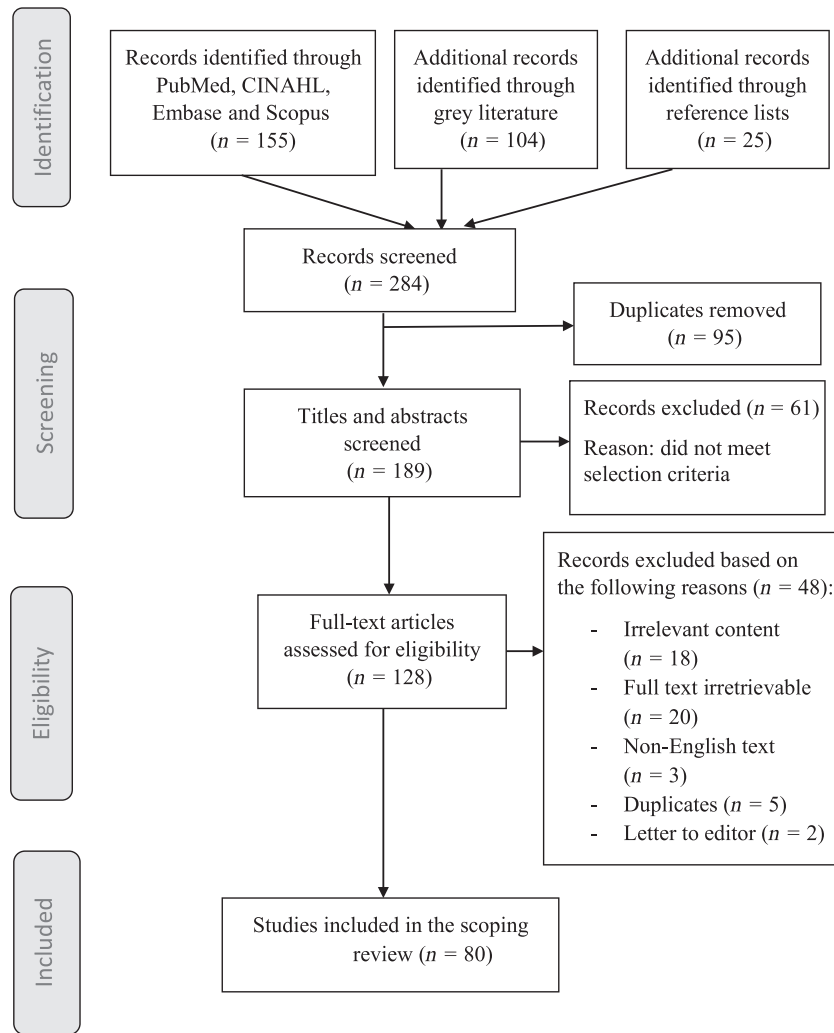


Figure 1 PRISMA flow diagram on the outcomes of the search strategies

the relationship between the intention to entrust and a particular level of supervision of the trainee.⁶⁵ Additional guiding principles for making entrustment decisions were established⁶¹ and 25 facets of trainees' competencies to facilitate supervisors' trust were also identified.⁶²

Feedback on implemented EPAs and the development process

Six papers explored the perceptions and opinions of 14 patients, 10 clinicians, 60 medical students and 323 resident programme directors on the core EPAs initiative.^{67–72} There is generally a large gap between programme directors' expectations and students' confidence in performing EPAs without direct supervision.^{71,72} Programme directors felt that new interns should have mastered the core EPAs by their first day of school and mentioned the

importance of providing bidirectional feedback on competency assessments.⁶⁷ Similarly, students indicated a preference for immediate feedback on EPAs conducted by credible and trustworthy sources, focusing on their strengths, points for improvement and follow-up instructions.⁶⁹ Patients were also shown to provide unique contributions to EPAs by describing unique expectations of trainees, which overlap with clinicians' inputs and directly informed EPA descriptors.⁷⁰

Theme 3: future directions and recommendations for EPAs

Implementation of EPAs in undergraduate medical education and specific disciplines

Many papers discussed the barriers to and the possible implementations of EPAs in UME and

Table 1 Summary of the characteristics of the literature (n = 80)

Characteristics	No. of studies (%)
Country	
Australia and New Zealand	5 (6)
Canada	5 (6)
Europe	16 (20)
India	2 (3)
United States of America	51 (64)
Not specified	1 (1)
Medical department	
Anaesthesiology	3 (4)
Emergency medicine	3 (4)
Family medicine	4 (4)
General (unspecified)	23 (29)
Hospice and palliative medicine	2 (3)
Internal medicine	9 (11)
Nursing	2 (3)
Pathology	2 (3)
Paediatrics	7 (8)
Pharmacy	3 (4)
Psychiatry	3 (4)
Rheumatology	2 (3)
Surgery	4 (4)
Others*	13 (16)
Target learners	
Undergraduates	9 (11)
Postgraduates/residents	30 (38)
Both undergraduates and postgraduates	3 (4)
Faculty members	4 (5)
Unspecified	34 (42)
Type of article	
Commentary	11 (14)
Summit reports	5 (6)
Narrative articles	13 (16)
Perspective papers	10 (13)
Research reports	40 (50)
Editorial	1 (1)

* Gastroenterology, geriatrics, medicine and veterinary, neurology, obstetrics and gynaecology, orthopaedic, pharmacology, physical medicine and rehabilitation, physical therapy, public health and preventive medicine, pulmonary and critical care, and radiology.

specific medical fields such as physical therapy, neurology, anaesthesiology and pharmacology (n = 11). Seven papers^{73–79} criticised and described the potential benefits and relevance of EPAs in their fields, specifically in family medicine, neurology, anaesthesiology, physical therapy and pharmacology, whereas three papers^{72,80,81} argued about the use of core EPAs in UME and how EPAs can be further refined to bridge the continuum between UME and GME. One paper even proposed the adaptation of the EPA framework in Germany, Switzerland and Austria to reform the current postgraduate medical education systems.⁸²

Other recommendations for EPAs

Ten papers provided recommendations to refine and improve existing EPA frameworks,^{82–91} with five papers endorsing the linkage of EPAs with milestones or integrating these EPAs with longitudinal integrated clerkships. Unique papers included a method to translate results from EPA-based evaluations into Accreditation Council of Graduate Medical Education (ACGME) milestone progress reports,⁹⁰ a suggestion to adapt teaching and assessment processes of electroconvulsive therapy for EPAs,⁹¹ and a push for a universal definition and understanding of the language used to specify and evaluate EPAs.⁸⁹

DISCUSSION

The findings from this scoping review add to the literature by mapping available evidence on EPAs. Most of the articles were based in Western countries, with few originating from Asia and other global regions such as Africa and the Middle East. Although there are some evidence-based research articles, half of what is known about EPAs in health care is not based on strong evidence in the medical education field. However, our scoping review was not intended to dismiss the large body of EPA literature, which has informed the development of EPAs. The overview of content of the included papers largely ranges from preliminary stages of developing EPA frameworks to evaluation stages and recommendations for the future advancement of EPAs in medical education. Our review highlighted key steps for the development of EPAs, main entrustment decision factors, the need for specific EPAs for staff and undergraduate students, the importance of including stakeholders' feedback, and ways to further refine and improve EPA frameworks.

Programmes that considered applying EPAs usually had existing milestones or training frameworks that could be enhanced by EPAs.^{47–49} The first step to incorporating EPAs into existing curricula is to establish a process to identify, elaborate and validate these EPAs.⁷ Additionally, Aylward et al.⁹² were the first to discover the necessity for programme directors to select a clinical skill that is both important for a physician's development and integral to the safety of patients. This corresponds with other studies^{26,93} that emphasise the need for the alignment of EPAs with a curricular vision to enhance quality, safety, equity, evidence and patient centredness in today's health care systems.

Moreover, because of the lack of required demonstration of competency for faculty staff⁵⁶ and the inefficiency of current staff training,⁹⁴ few studies believed that it is vital to develop a specific set of EPAs for faculty members and educators before they conduct EPA-based curricula with trainees.^{53–56} This can better inform entrustment decisions for professional activities,⁵⁵ increase the involvement of stakeholders and promote trust building within the faculty hierarchy.⁵³ Similar to the trickle-down approach in economics, the advantages of EPA-based faculty training and faculty competency assessments will trickle down to benefit the entire educational system.⁹⁵ Hence, the development of EPAs for medical faculty members might be a crucial step before the development of EPAs for medical trainees.

According to Ten Cate's five levels of supervision for the assessment of EPAs,⁷ there are two high-stakes decisions for two entrustment levels (level 1, unable to perform; level 4, perform independently) that will have consequences for trainees' participation.⁹² This indicates the need for guidelines for entrustment decision making for professional activities and to identify factors that will affect decision making so that variability can be reduced and more accurate evaluations of competencies promoted.⁶¹ One of the vital factors of entrustment decision making is the quality of the relationships between supervisors and trainees.⁶⁵ This corresponds with a previous study⁹⁶ that discovered that performance results and positive experiences for trainees are determined by supervisor–trainee relationships and not by the mere presence of or time spent together with a supervisor.

Noting the importance of incorporating the perceptions of various stakeholders in the

development process of EPAs,⁹⁷ this review also revealed clinicians' and students' perceptions of EPAs and the value of patients' inputs in the development process of EPAs. Apart from the large gap between clinicians' expectations and students' actual competencies,^{67,68,71} there was a suggestion for a bidirectional feedback mechanism from programme directors. Rooted in behaviourism learning theories, feedback is essential for improving learner performance⁹⁸ and development of expertise.⁸ Students' preferences for immediate post-activity feedback⁶⁹ not only adhere to the expertise theory⁸ but were also proven to be the most effective in past studies.^{98,99} In addition to providing patient-centred care, the consideration of patient safety and the integration of patients' inputs during the development of EPAs are necessary.^{70,72} This corresponds with previous studies, in which patients' feedback was shown to be essential for the improvement of the quality of health care.^{100–102} Overall, it is important to include various stakeholders' feedback in the development or implementation of EPAs to better address stakeholders' needs.

A major setback for competency-based medical education is the vague and theoretical definition of competencies.^{103,104} The enthusiastic worldwide response to the adoption and tailoring of EPA methods demonstrates a global urgency and need for a means to identify core skill sets that will in turn boost the efficacy of medical training and increase trainees' competencies.^{51,83,105,106} To improve transparency in EPA usage, a universal understanding of and definitions for competency-based terms are required.⁸⁹ However, the sustainability of this educational innovation is uncertain as it is a demanding process and requires high commitment from multiple stakeholders.^{92,107} As a result, many clinicians are still hesitant to omit present regulations in favour of competencies, as they are still seen as a theoretical construct that may be phased out.^{1,89} This calls for the need for faculty development to promote strategies to ensure the sustainability of EPAs and competencies.

To address the need to bridge the education continuum between UME and GME, some articles suggested developing and aligning core, specialty and subspecialty EPAs,^{80,81} whereas others endorsed the linkage of EPAs with milestones.^{13,90} Considering the different underlying constructs of EPAs and milestones, studies have proposed ways to translate results from EPA assessments to milestones progress reports.^{5,60,82,84,90} Furthermore, the

integration of EPAs with other frameworks, such as longitudinal clerkships in UME, is exploring how trust between students and supervisors can inform student assessment.⁸⁵ The extrapolation of EPAs from mainstream frameworks is essential for setting the stage for medical education advancements. Especially, alignment of EPAs with emergent health care needs is required to inform students' education and professional practice to ultimately improve the health care outcomes of prospective patients.

Because of gaps in knowledge on the development and implementation of EPAs in medical education, more rigorous and extensive evidence-based research on EPA-based curricula should be conducted by medical education scholars in all fields to address problems such as a lack of competency assessment tools and the performance gap of medical trainees. Literature on the development and implementation of EPAs, specifically for undergraduates and faculty members, is also particularly lacking and can be considered in future research. Additionally, despite the gradual implementation of EPAs worldwide, there is a lack of African- and Asian-based EPA studies, which future studies can consider because cultural variability may be an important aspect of the development or implementation of EPAs. Future research on EPA development should also include consultations with stakeholders to ensure more holistic patient-centred care.

Limitations

One of the limitations of the current review is the sole inclusion of English papers, which might have led to missing out relevant papers published in other languages. However, the broad inclusion of types of papers adds to the breadth and depth of the included articles in this scoping review. Additionally, unlike what was suggested by Arksey and O'Malley,²² we did not consult with stakeholders, which could have resulted in an over-emphasis of the gaps that need to be filled. However, approximately 60% of all scoping reviews do not include consultations with stakeholders.¹⁰⁸ This review excluded articles on the development of assessment tools for EPAs as it does not align with the purpose of the current review. However, this may have caused the review to miss out important information regarding EPAs. Therefore, future reviews can consider consolidating evidence on existing assessment tools used to measure EPAs.

CONCLUSION

This scoping review provided a map of the literature on EPAs in the health care sector. The literature is broad, recent and predominantly describes the development and implementation of EPAs in various health care disciplines. High-level evidence-based research on the efficacy and validity of EPAs is lacking globally. In addition to recent calls for the expansion and implementation of EPAs in UME and other health care faculties or subspecialties, this scoping review identified areas for potential educational research and future exploration. Completing systematic reviews focused on specific research questions about EPAs in medical education may be a valuable next step.

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SUPPORTING INFORMATION

Additional Supporting Information may be found in the online version of this article:

Appendix S1. Search strategies for each database and library search track sheet.

Appendix S2. PRISMA 2009 Checklist.

Appendix S3. Characteristics table and reference list of the included studies.

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