The writer's guide to education scholarship in emergency medicine: Systematic reviews and the scholarship of integration (part 4)

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ABSTRACT

Objective: Reviews help scholars consolidate evidence and guide their educational practice. However, few papers describe how to effectively publish review papers. We completed a scoping review to develop a set of quality indicators that will assist junior authors to publish reviews and integrative scholarship.

Methods: MEDLINE, Embase, ERIC, and Google Scholar were searched for English language articles published between 2012 and January 2016 using the terms *review*, *medical education*, *how to publish*, and *emergency medicine*. Titles and abstracts were reviewed by two authors and included if they focused on how to publish a review or outlined reporting guidelines of reviews. The articles were reviewed in parallel for calibration, and disagreements were resolved through a consensus.

Results: A full text review of the 25 articles was conducted, and 196 recommendations were extracted from 13 articles. A hand search of the included articles' reference lists and expert recommendation found an additional eight articles. These recommendations were thematically analysed into a list of seven themes and 32 items. Additionally, seven evaluation tools and reporting guidelines were found to guide researchers in optimizing their reviews for publication.

Conclusion: In emergency medicine education, review articles can help synthesize educational research so that educators can engage in evidence-based scholarly teaching. We hope that this work will act as an introduction to those interested in engaging in integrative scholarship by providing them with a guide to key quality markers and important checklists for improving their research.

RÉSUMÉ

Objectif: Les revues systématiques aident les chercheurs à réunir les données probantes, et guident leur pratique de l'enseignement. Toutefois, peu d'articles portent sur la manière de s'y prendre pour publier efficacement des articles de synthèse. Nous avons donc entrepris un examen de la portée afin de dresser une liste d'indicateurs de la qualité qui aideront les jeunes auteurs à publier des revues systématiques et des recherches de synthèse.

Méthode: Nous avons mené, dans les bases de données Medline, Embase et ERIC ainsi que dans Google Scholar, une recherche d'articles publiés en anglais, entre 2012 et janvier 2016, à l'aide des termes *review*, *medical education*, *how to publish* et *emergency medicine*. Les titres et les résumés ont d'abord fait l'objet d'un examen par deux auteurs, puis ont été retenus s'ils portaient principalement sur la publication de revues systématiques ou s'ils exposaient brièvement des lignes directrices sur l'établissement de rapports concernant les revues systématiques. Les articles ont ensuite été examinés en parallèle aux fins d'étalonnage, et les divergences de point de vue ont été résolues par voie de consensus.

Résultats: Nous avons entrepris l'examen de 25 articles en version intégrale, et avons dégagé 196 recommandations provenant de 13 articles. Une recherche manuelle dans les listes de références bibliographiques présentées dans les articles retenus ainsi que la recommandation d'un expert ont permis de trouver 8 autres articles. Ces recommandations ont ensuite fait l'objet d'une analyse thématique, puis ont été divisées en 7 thèmes et 32 points. À cela s'ajoutent 7 outils d'évaluation et lignes directrices sur l'établissement de rapports, qui aideront les chercheurs à améliorer la qualité de leurs revues systématiques aux fins de publication.

Conclusion: Les articles de synthèse permettent, dans l'enseignement de la médecine d'urgence, de présenter une vue d'ensemble des travaux de recherche en enseignement, et aident ainsi les médecins cliniciens à faire reposer leur enseignement sur des données probantes. Aussi espérons-nous que l'article servira d'introduction à celles et ceux qui seraient intéressés par les recherches de synthèse, et qu'il les guidera vers les grands marqueurs de qualité et les principales listes de vérification leur permettant d'améliorer leurs travaux scientifiques.

Keywords: education scholarship, reviews, scholarship of integration, systematic reviews

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CJEM 2018;20(4):626-633 DOI 10.1017/cem.2017.29

INTRODUCTION

In his report for the Carnegie Foundation for the Advancement of Teaching in 1990, Ernest L. Boyer called for a new definition of scholarship, proposing a view that includes discovery, integration, application, and teaching.[1] Review articles fit into Boyer's *scholarship of integration*, aiming to synthesize existing evidence and to provide a comprehensive overview of the current understanding of a specific area or focus.[2] They provide readers with an understanding of what research has already been done, what research has yet to be done, and where the gaps in knowledge exist within the totality of evidence on a particular topic.

Reviewing the literature for one's own edification in medical education

For the early career scholar or for the experienced researcher entering a new field, an overview of the current literature is essential to gain understanding and context.[3] Scholars benefit from completing informal topic reviews of the key concepts within a field. Additionally, because education research lends itself to many different perspectives and research techniques, junior medical education researchers may find it useful to review the literature to gain a better understanding of how various scientists use different methods to approach the same question. Reviewing the methods used in the field of medical education can be quite helpful for junior educators looking to conduct new research.[4]

Concepts in medical education span across multiple disciplines, so review search strategies must go beyond the traditional databases (i.e., PubMed) and include others such as PsychInfo, ERIC, Google Scholar, and so forth.[5] A knowledgeable mentor or an expert-recommended foundational paper can serve as a good starting point for these informal reviews. Although topic and methodological reviews are not generally accepted for publication in journals today, successful researchers use these to formulate pertinent research questions and to determine the most appropriate study design for their inquiry.

Reviewing the literature to conduct the scholarship of integration

Traditionally, the health care field has concentrated on methodologically rigorous systematic reviews concentrated on quantifying the effects of interventions or the accuracy of diagnostic tests.[6] However, many other types of knowledge synthesis methods exist, several of which are better suited to the complex qualitative data synthesis often required in medical education.[5] Non-systematic, narrative reviews integrate research to identify new insights, whereas systemic reviews summarize research on a focused topic and evaluate quality of existing bodies of evidence.[3] The least rigorous review articles, commentary papers and summary documents, are usually written by experts in the field and integrate concepts and a large body of literature to provide a short overview for readers.

The heterogeneity of studies within medical education presents unique challenges, particularly with the systematic review.[7] Additional challenges stem from its history of intuition-based practice and the myriad of ideological backgrounds of medical education authors.[5] Historically, these challenges have led to a body of evidence lacking rigor and interest compared to the more traditional clinical trials in medicine.

The primary objective of this publication is to perform a scoping review to collate guidance on publishing review articles in medical education. It is meant for novice educators and hopes to provide a synthesis summary of existing recommendations, but not to deliver an in-depth description of review types and specific methodologies. We hope that it will provide guidance to junior authors writing medical education reviews in emergency medicine (EM).

METHODS

Search strategy

A scoping review was undertaken to collate existing literature on how to publish a review in EM medical education. All efforts were made to adhere to Arksy and O'Malley's framework.[9,10] A systematic database search was undertaken with an expert librarian using MEDLINE, Embase, ERIC, and Google Scholar. Each search was limited to English-language journal articles and assessed in parallel by two independent authors (KW and AM). Articles were excluded if they were duplicates, deemed redundant, or did not address the focused research question on how to publish a systematic review as determined by a consensus review. A senior author was available to mediate any disagreements if a consensus could not be reached, and authors erred on the side of inclusion when a disagreement ensued.

Initially, MEDLINE was searched using "and/or" combinations of variations of keywords: "medical

education," "review literature as a topic," "EM," and "conducting systematic reviews." A second search of Embase was performed using "and/or" combinations of the following keywords: "medical education," "review," "publishing," "writing," and "EM." A third search of ERIC was performed using the key phrases, "how to publish a review" and "medical education." The differences in search terms were due to the lack of consistent terminology among databases. Search terms needed to be altered in consultation with the librarian based on taxonomy specific to each database and outputs. The first 500 titles sorted by relevance as per the ERIC search engine were reviewed for relevance and duplicates. A final search was undertaken via Google Scholar using the following three phrases: "how to publish a review in medical education," "how to publish a review in medicine," and "how to publish a review in EM." The first 500 titles, as sorted by relevance as per the Google Scholar search engine, were screened.[11] Figure 1 shows that 2,489 titles were screened initially, of which 2,444 were excluded based on irrelevance, language, or publication type.

One reviewer (KW) also performed a supplemental hand search of 15 EM and 12 medical education journals from 2014-2016 to augment the database. These 27 journals were chosen from a list of all MEDLINE-indexed journals in EM and medical education as reviewed by a co-investigator (AH) for current activity and appropriate focus. Journals were hand-searched for author guidelines, recommended quality evaluation tools, and relevant articles pertaining to the publication of systematic reviews. Additional articles were obtained through expert consultation and ancestry searching of relevant article reference lists.

Combining the initial database search, relevant titles were obtained through hand searching and expert recommendations; a total of 73 abstracts were screened in parallel by two authors (KW and AM). From these, 24 full-text articles were read in detail and assessed for relevance. Thirteen articles were deemed appropriate and included in guideline synthesis on how to publish a review in medical education.

Analysis

Two investigators independently reviewed the final 13 selected full-text articles to extract quality markers, and a master list was created. These quality markers were analysed with a thematic analysis.[12,13] Audit trails were created, and a final list was generated based on a consensus review by two primary authors (KW and AM).

RESULTS

Thematic analysis

Thirty-two quality indicators emerged along seven themes: pitfalls to avoid, preparation, introduction, methods, results, discussion, and funding (Table 1).

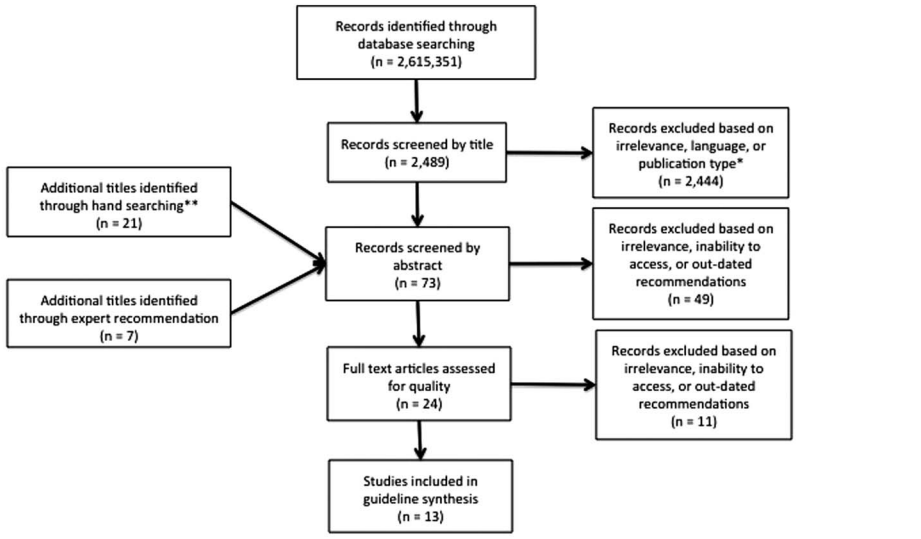

Figure 1. Flow diagram of the review process.

Author guidelines

Tables 2 and 3 outline specific guidelines for review articles associated with their respective journals obtained through hand searching of relevant EM and medical education journals that publish review articles.

Quality evaluation tools and reporting guidelines

Seven quality evaluation tools and reporting guidelines for reviews were identified and are outlined in Table 4. These quality checklists serve as a useful resource for the implementation and quality evaluation of review research.

Table 1. Quality indicators

	Features of strong systematic reviews in EM
Pitfalls to avoid	• Ignorance of literature.[4,14] • Misunderstanding/misapplying data/literature.[14,15] • Poor research design.[14,15]
Preparation	• Evaluate whether systematic review is appropriate.[5,16] • Use framework (PRISMA).[5,16–19] • Assemble team.[5,17,18,20] • Seek input from experienced systematic reviewer.[18–20] • Seek input from statistician.[18,20] • Seek input from librarian.[18–21] • Consider data handling system.[18,20] • Consider bibliographic software.[5,17,21]
Introduction	• Describe rational in context of what is known.[16,18,20,22] • Provide explicit statement of questions being addressed with reference to participants, interventions, comparisons, outcomes, and research design.[5,17,18,20–24]
Methods	• Explicitly describe type of study.[16,22] • Indicate whether a review protocol exists.[5,16–18,20,21] • Specify study characteristics used as criteria for eligibility, giving rationale.[5,15,18,20,21,23] • Describe all information sources used in the search.[16,18] o Use multiple databases.[15,18,20-21,23-24] o Include ancestry searching.[15,18,21] o Include citation-index searching.[18,20,21] o Include journal hand searches.[15,17,18,20-22] o Contact experts for unpublished literature.[15,16,18,20,21,24] o Include international literature.[18,21,24] o Include grey literature.[18-21,24] • State process of selecting studies.[5,15,16,18,20-22,24] • Describe method of data extraction from reports.[5,16,17,20] • List and define all variables for which data were sought.[16,20,22] • Describe methods used to assess bias.[16,20] o Suggest staged method to determine study eligibility.[15,18,21,24,25] o Abstract data in duplicate.[5,18,20] • Describe methods of handling data and combining results of studies.[5,15-17] • Describe how quality was assessed.[15-17,20]
Results	• Include PRISMA flow diagram,[5,16,18] table with key features of each study,[5,16] and table with details of each study's quality features.[5,16] • Give numbers of studies screened, assessed for eligibility, and included in the review with reasons for exclusions.[16,18] • Present data on risk of bias of each study and any outcome-level assessment.[16,18,20] • Present results of each meta-analysis done.[16,18] • Present results of any assessment of risk of bias across studies.[16,18,20]
Discussion	• Summarize main findings, including strength of evidence for each main outcome.[16,18] • Discuss limitations.[16,20] • Provide interpretation of results in context of other evidence and implications for future research.[5,16,18,22]
Funding	• Provide details of funding.[16]

Table 2. Medical education journals that accept review articles

Medical education journal	Author guidelines specific to review articles
Perspectives on Medical Education	-Up to 3,500 words, six figures, and five tables. -Same structure as original research articles. -Include a "what this paper adds" box.
Advances in Medical Education and Practice	-Up to 7,500 words.
Canadian Medical Education Journal (Calgary, AB)	-Up to 4,500 words, including an abstract of up to 200 words.
International Journal of Medical Education	-No specific guidelines for review articles.
Journal of Educational Evaluation for Health Professions (Seoul, Korea)	-Up to 5,000 words, 250-word abstract, 10 tables/figures, and 50 references.
The Clinical Teacher (Oxford, UK)	-No specific guidelines for review articles.
BioMed Central Medical Education	-Encourages prospective registration of systematic reviews (in a registry such as PROSPERO), and inclusion of the registration number as the last line of the manuscript abstract. -See PRISMA and PRISMA-P checklists. -Provide a link to an additional file from the "methods" section, which reproduces all details of the search strategy (see Cochrane Reviewers' Handbook for guidance).
Academic Medicine	-No specific guidelines for review articles.
Teaching and Learning in Medicine	-No specific guidelines for review articles.
British Journal of Medical Education	-See PRISMA and MOOSE checklists. -Include a nonspecific referenced guideline for authors in how to get published.
The Journal of the American Medical Association	-Specific guidance for 1) systematic reviews, 2) advances in diagnoses and treatment, and 3) narrative reviews. -Indicate type of review in title. -See PRISMA and MOOSE checklists for systematic reviews and meta-analyses.
Journal of Medical Education	-Less than 3,000 words, plus a structured abstract of no more than 300 words. -References must be in Vancouver style. -Up to two tables or figures. -Systematic or critical reviews will be held to the criterion of needing to advance understanding beyond the current.

DISCUSSION

We have performed a thorough literature search to develop a list of recommendations and to collate guidelines that will assist authors in publishing reviews in EM medical education.

Our findings demonstrate that while there is an abundance of research dedicated to how to *perform* a review, very little research exists on how to *write* or *publish* a review. Additionally, the vast majority of papers focused on systematic reviews, leaving our paper void of recommendations for other review types. There are several explanations for this finding. Although the health care field is familiar with systematic reviews, the remaining types of review studies are less common, with a corresponding decrease in published research relating to non-systematic reviews. The lack of consistent terminology for the other types of knowledge synthesis methods further complicated our literature search. With such a heterogeneity of review studies available in medical education, a prominence of systematic reviews in the literature, in combination with the lack of consistent terminology for the other types of synthesis methods, resulted in our focus on systematic reviews.

Although the collated recommendations were broad, we hope that the quality indicators will be useful to junior researchers in assisting them to successfully publish a review in medical education. Additionally, several quality checklists and reporting guidelines were found applicable to various types of reviews. We hope these guidelines will be useful to junior scholars during the design, development, and publications stages of their scholarship.

LIMITATIONS

One limitation of the review is that very few articles answered the question of "how to get published," thus limiting our search. Despite the assistance of two

Table 3. EM journals that accept review articles

EM journal	Author guidelines specific to review articles
EM International (Cairo)	-No specific guidelines for review articles.
International Journal of Emergency Medicine (London)	-Abstract up to 350 words, Vancouver style references.
The Western Journal of Emergency Medicine (Irvine, CA)	-Systematic review: up to 3,000 words, 350-word abstract, and five figures/tables/images; see PRISMA checklist. -Other review: up to 4,000 words, 350-word abstract, and seven figures/tables/images.
Emergency Medicine Australasia (West Melbourne, VIC)	-No specific guidelines for review articles; unclear submission process.
BMC Emergency Medicine (London)	-No specific guidelines for review articles.
Emergency Medicine Journal (London)	-Open to literature reviews and systematic reviews. -For systematic reviews, follow PRISMA. -Up to 3,000 words, 6 tables, and 40 references.
CJEM	-Narrative or non-systematic reviews will not be accepted. -See PRISMA checklist. -From 3,000-4,000 words, excluding figures/tables, references, and abstract.
Academic Emergency Medicine (official journal of SAEM)	-No specific guidelines for review articles. -Adhere to PRISMA, MOOSE, and other established guidelines when possible.
European Journal of Emergency Medicine (official journal of the European Society for EM)	-Up to 5,000 words (including abstract, illustrations, and references), six figures/tables, and 60 references. -Suggestions for reviews are welcome, and potential authors of review papers are invited to discuss their ideas with the editor.
American Journal of Emergency Medicine	-Publish definitive, in-depth, state-of-the-art reviews of clinical and research subjects; do not publish unsolicited reviews (welcome contact with the editor for consideration).
The Journal of Emergency Medicine	-No specific guidelines for review articles.
Annals of Emergency Medicine	-Accepts a variety of review types. -See PRISMA and MOOSE checklists for systematic reviews and meta-analyses.
Emergency Medicine (Parsippany, NJ)	-Up to 5,000 words, 250-word abstract, 4 tables/figures, and a title of up to 100 characters.
Eurasian Journal of Emergency Medicine	-See PRISMA and MOOSE checklists for systematic reviews and meta-analyses. -Up to 5,000 words, 200-word abstract, 50 references, 6 tables, and 10 figures or 20 images.
Resuscitation	-Up to 4,000 words, 250-word abstract, 8 tables/illustrations, and 75 references. -Systematic reviews must follow and include a PRISMA checklist.

Table 4. Brief overview of several review types and associated resources

Type of review	Purpose	Helpful resources
Systematic review	Summarize a large body of literature. Clarify quality of studies on a topic and assess consistency of results. Attempt to explain the reasons for conflicting reports in the literature. Document the need for further study. Collect data needed to plan large clinical trials (i.e., expected variance, typical patient accrual rates, etc.).	Cochrane Collaboration Joanna Briggs Institute Campbell Collaboration • PRISMA checklist[16] • MOOSE guidelines for meta-analysis of observational studies [26] • STORIES checklist [27] • QUADAS checklist [28]
Systematic review + meta-analysis	Provide a quantitative estimate of treatment effect. Improve precision of an estimated treatment effect. Detect smaller treatment effects from individual studies. Investigate variation in treatment effects through subgroup analysis.	
Rapid systematic review	More limited scope and resources than a full systematic review. Useful for certain types of clinical and policy questions.	
Narrative review	Provide expert opinion based on evidence, personal experience, and judgment.	ENTREQ checklist for qualitative research[29]
Realist review	Provide a detailed, realistic understanding of complex activities that can be applied to planning and implementing programs.[4]	RAMESES [30,31]
Scoping review	Assess the general characteristics of a problem and provide information about trends in existing data.	Arksey and O'Malley Framework [9,10]
Effectiveness review	Provides understanding about how to enhance outcomes of an educational process of teaching/learning.	BEME Collaboration[32]
Definitional review	Seeks to suggest a consensus definition for a concept in health education.	BEME Collaboration[32]

librarians and the vast database selection, our highest yield publications came from expert recommendation. One notable difficulty in studying the review literature was the lack of consistent terminology. Search terms had to be altered with the consultation of a librarian based on taxonomy specific to each database and outputs. We were left with a few very sensitive but non-specific search strategies, producing many irrelevant articles to scan through. This increases the chance that relevant articles were missed and highlights the importance of consistency in the reporting of review articles. Because most papers focused on systematic reviews, recommendations for other review types were lacking.

CONCLUSION

Review papers permit readers to quickly update their knowledge of a given topic through the synthesis of education research and support educators to use evidence-based practices. This research identified key recommendations to enable those interested in engaging in integrative scholarship by providing them with a guide to key quality markers and important checklists for improving their work in the writing and publishing phases.

Competing interests: None declared.

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