SPECIAL ISSUE PAPER

WILEY Research Synthesis Methods

The impact of the peer review of literature search strategies in support of rapid review reports

Carolyn Spry 🄳 | Monika Mierzwinski-Urban

Research Information Services, Canadian Agency for Drugs and Technologies in Health (CADTH), Ottawa, Ontario, Canada

Correspondence
Carolyn Spry, Research Information Services, Canadian Agency for Drugs and Technologies in Health (CADTH), 600-865 Carling Ave, Ottawa, Ontario K1S 5S8, Canada.
Email: carolyns@cadth.ca

Objective: The objective of this study was to investigate the impact of the peer review of literature search strategies prepared in support of rapid reviews.

Methods: A sample of 200 CADTH rapid reviews was selected. For each rapid review meeting the inclusion criteria, the pre–peer-reviewed and corresponding post–peer-reviewed search strategies were run, and the search results were compared. Bibliographic records retrieved solely by the post–peer-reviewed search strategy and included in the rapid review report were identified as representing "included studies." The publication type of each included study was determined, and the attributes of the corresponding record were analyzed to determine the reason for its retrieval by the post–peer-reviewed search.

Results: The peer review of search strategies resulted in the retrieval of one or more additional records for 75% of the searches investigated, but only a small proportion of these records (4%) represented included studies. The main publication types of the included studies were nonrandomized studies (60%) and narrative reviews (20%). The principal changes to search strategies that resulted in the retrieval of additional included studies were the inclusion of more keywords or subject headings or a change in the way concepts were combined.

Conclusions: The peer review of literature search strategies aids in the retrieval of relevant records particularly those representing nonrandomized studies. The scrutiny of keywords, subject headings, and the relation between search concepts are key components of the peer review process.

KEYWORDS
electronic search strategy, information retrieval, literature search, peer review, rapid review

1 | BACKGROUND

Electronic search strategies are composed of many components. Relevant keywords and appropriate subject headings are key features. Boolean and proximity operators must be used correctly. Search concepts selected must correspond to the research questions and be properly combined. Limits (eg, publication date) and study design filters must be applied as necessary, and appropriate databases must be selected in which to run the search. Due to their complexity, great care must be taken in developing and executing electronic search strategies[1-3] as even a minor mistake or typographical error can have an impact on retrieval.

A study of MEDLINE searches conducted in support of systematic reviews revealed that 90% of the search strategies contained errors.[4] An AHRQ investigation on the peer review of search strategies reported that errors

in search strings were identified by peer reviewers.[5] Some errors may be inconsequential, but others can have a negative effect on retrieval. In a study of search strategies on blood disorders, peer reviewers identified search terms that were missed, and the revised searches resulted in higher retrieval.[6] Given the complexity of many electronic search strategies, these findings are not surprising. Errors can easily creep in and remain undetected by even the most experienced searchers. In response to this concern, the Peer Review of Electronic Search Strategies (PRESS) checklist and guideline document[7,8] was developed to assist in the structured peer review of search strategies. This checklist is an evidence-based tool that includes the elements essential for effective Boolean searches.

Recognizing that well-constructed search strategies are an essential tool in the location of evidence-based information,[9-11] one would expect the methodological guidance documents of organizations that develop standards for conducting systematic reviews to include a requirement for the peer review of literature search strategies as a key part of the process. While the peer review of search strategies is recommended by the Institutes of Medicine,[12] the Centre for Reviews and Dissemination,[13] and the Cochrane Handbook version 5.1,[14] it is not a mandatory requirement. The National Institute for Health and Clinical Evidence (NICE) 2012 guidelines manual suggests several approaches for conducting a "quality assurance" of search strategies with no specific mention of peer review as part of the process.[15] The Agency for Healthcare Research and Quality (AHRQ) requires searchers to use the PRESS checklist in developing the search strategy, but a peer review of the strategy is not compulsory.[16] Quality assurance of the search strategy using the PRESS guideline is a formal component of the search procedure in conducting systematic reviews by the German Institute for Quality and Efficiency in Health Care (IQWiG).[17,18]

This study is focused on the peer review of literature search strategies developed in support of rapid reviews. While there is no standard definition of rapid reviews nor a standardized methodology used in their preparation, they are understood to be a form of knowledge synthesis in which components of the systematic review process are simplified or omitted to produce information in a timely manner.[19-21] The methodological implications of using abbreviated systematic methods to synthesize evidence are an area of interest to the producers of health technology assessments and those who use rapid reviews to inform policy decisions.[22]

Omitting the peer review of search strategies is one approach to accelerating the review process. Polisena et al report that in a study of 29 rapid review programs, the peer review of all rapid review search strategies was mandated by 11 of these producers. Fourteen respondents did not require it, and the remaining four only required peer review for some searches.[21] Given the widespread use of this practice, the consequences of this omission in the context of rapid reviews merit investigation.

CADTH produces several types of rapid reviews that span from providing clients with a simple reference list to providing the results of a rapid health technology assessment.[23] The rapid reviews with the shortest turnaround times are a list of references (5–10 d), a summary of abstracts (15 d), and a summary of abstracts with a critical appraisal (30 d). Published CADTH rapid review reports are freely available on the CADTH website: https://www.cadth.ca/.

For these briefer types of rapid reviews, a limited literature search is conducted on key resources such as PubMed or MEDLINE, The Cochrane Library, and The University of York Centre for Reviews and Dissemination databases. In terms of grey literature, Canadian and major international health technology agency websites are checked for relevant information, and a focused internet search is also carried out using the Google search engine. No supplementary searches are conducted.

The maximum number of results desired is 500 records. For content areas with much published literature, the terms used in the search strategy may be focused, methodological filters may be applied, or the date limit may be adjusted to meet this requirement. Introducing such restrictions at the literature searching phase is a common methodological approach used to streamline the process.[20,21] For each rapid review, the search strategy is saved as an electronic word document. A second in-house information specialist uses the PRESS checklist to check for errors or omissions in the search strategy before it is finalized. Suggestions and comments are added to the search strategy by the peer reviewer, and the word document is renamed and saved. The information specialist who developed the search then considers the peer reviewer's suggestions and makes adjustments to the strategy as necessary.

2 | OBJECTIVE

The objective of this study was to investigate the impact of the peer review of literature search strategies prepared in support of rapid reviews.

3 | METHOD

3.1 | Sample selection

A sample of 200 CADTH rapid reviews published in 2009 related to health devices, pharmaceuticals, medical

procedures, and medical tests was randomly selected using a list randomizer (https://www.random.org/lists/). Reports completed in 2009 were selected as this was the last year during which the peer review of all rapid review search strategies was mandatory at CADTH. The type of rapid review was limited to the following three types: a reference list, a reference list with a summary of abstracts, and a summary of articles with a critical appraisal.

3.2 | Inclusion criteria

Reports were included in the study if the search had been run in the PubMed database, at least one journal article had been cited in the report and both pre–peer-reviewed and post–peer-reviewed search strategies were documented and reproducible. Search strategies were deemed unreproducible when the use of methodological filters or the manner in which the search concepts had been combined was unclear.

3.3 | Data collection

For each report meeting the inclusion criteria, the pre– and post–peer-reviewed searches were run using the same date and language limits. Any additional records retrieved solely by the post–peer-reviewed search were isolated using the NOT Boolean operator. These records were then cross-checked with the corresponding rapid review report to see which, if any, were included. The study type of the additional included records was also identified.

Finally, the search terms and approaches used in the pre– and post–peer-reviewed search strategies were compared to determine which features of the post–peer-reviewed search strategy were responsible for the retrieval of the included studies.

4 | RESULTS

Of the 200 reports randomly selected, 71 met the inclusion criteria.

Once the results of the pre–peer-reviewed strategy were removed from the results of the post–peer-reviewed strategy for each search (using the Boolean NOT operator), there were three possible outcomes:

- No additional records were retrieved by the post–peer-reviewed searches (n = 17, 24%).
- Additional records were retrieved by the post–peer-reviewed searches, but none were included in the report (n = 33, 46%).

- Additional records were retrieved by the post–peer-reviewed searches, and one or more was included in the report (n = 21, 30%)

The post–peer-reviewed searches retrieved a total of 2507 additional records. Ninety-nine (4%) of these records were included in reports.
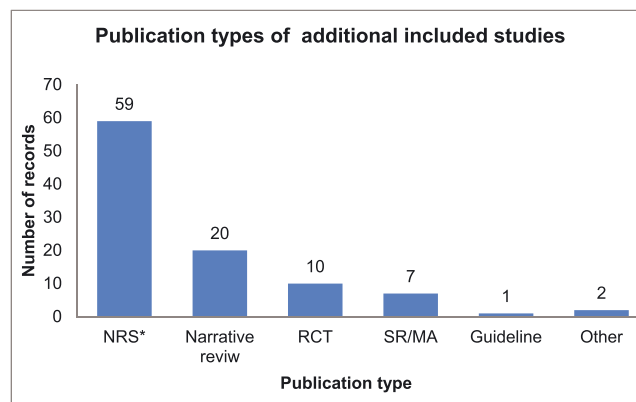
4.1 | Publication type

While the majority of additional studies identified by the post–peer-reviewed searches was nonrandomized studies, several randomized controlled trials and systematic reviews were also captured. See Figure 1 for a breakdown of study types.

4.2 | Changes to search strategies

In most cases, the retrieval of additional records representing included studies was attributed to the inclusion of more keywords or medical subject headings or both during the peer review process. Combining concepts in a different way also contributed to the retrieval of many new relevant records. To a lesser extent, broadening the search strategy by removing methodological filters, splitting up a long phrase, or eliminating a subheading also had an impact on retrieval. In one search strategy, the removal of an alphanumeric keyword led to the retrieval of one record. See Figure 2.

5 | DISCUSSION

The results of this study show that in the absence of peer review, some relevant records would not have been retrieved by the PubMed search strategy. Unless captured

NRS: non-randomized study
RCT: randomized controlled trial
SR/MA: systematic review/meta-analysis
Other: comment, summary of an RCT

FIGURE 1 Publication types of additional included studies captured by post–peer-reviewed search strategies [Colour figure can be viewed at wileyonlinelibrary.com]
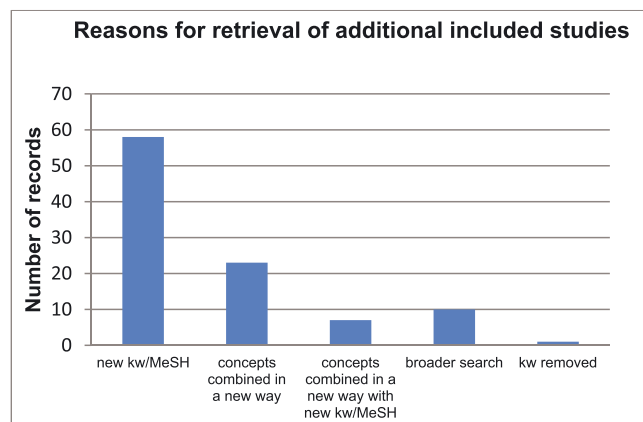
FIGURE 2 Reasons for retrieval of additional included studies by post–peer-reviewed search strategies [Colour figure can be viewed at wileyonlinelibrary.com]

in the accompanying grey literature search, these records would not have appeared in the published rapid review reports. This in turn affects the integrity of the reports. When relevant information is omitted, the quality of the rapid review may be compromised. As health care decision makers depend increasingly on high-quality evidence produced in a short timeframe, reliance on rapid reviews is becoming more prevalent.[24] A concern among researchers is the potential introduction of bias due to the use of accelerated processes.[19,25] Based on the results of this investigation, forgoing the peer review of search strategies could be a contributing factor in some content areas.

Of the included studies captured by the post–peer-reviewed search, the main publication type was nonrandomized studies. This finding suggests that not all search strategies in support of rapid reviews need be thoroughly scrutinized. Peer review could be reserved for topics that rely mainly on evidence provided by research based on quasi-experimental or nonexperimental study designs. In such studies, there is no randomization of study groups, and the environment is neither controlled nor manipulated by the researcher.[26] Research in this area suggests that the records of nonrandomized studies often have characteristics that make them inherently more difficult to retrieve than other study types. Randomized controlled trials, for example, are generally well indexed in bibliographic databases, and the titles and abstracts use precise terminology.[27] Nonrandomized studies may lack appropriate subject headings, standardized structured abstracts, and clear titles.[28] If the peer review of search strategies is topic dependent, however, there are methodological implications.

Studies of rapid review methods and reports of discussion meetings on rapid review methodology have shown that there is no standard approach to conducting rapid reviews.[21,22,29,30]

A study of 29 rapid review programs found that there was no single cohesive method used by producers of rapid review reports.[21] A scoping review of rapid review methods identified 50 different approaches to conducting a rapid review.[29] A survey of 23 health technology assessment agencies similarly showed that there is no standard methodology.[30] Since there is no formalized methodology to follow at this time, transparency may be the best policy. The processes used in producing CADTH rapid reviews are publicly posted on the CADTH website.[23]

Given that only a small proportion of the new records retrieved by all the peer-reviewed searches investigated were considered relevant (4%), one could argue that the time and effort dedicated to the peer review of rapid review search strategies are difficult to justify. If a full peer review of the search strategy is not feasible, the results suggest ways the process could be streamlined. The changes to the search strategy following peer review that garnered the most new results were the addition of keywords and medical subject headings and/or a change in the way the concepts were combined. In the absence of a full peer review, a quick check for these elements could be helpful.[7,8]

6 | LIMITATIONS

The search strategies this study investigated were not highly sensitive. They were developed quickly due to short turnaround times, and retrieval was limited to a predetermined number of search results. A further constraint is that for rapid review reports that do not include a critical appraisal, researchers base their selection solely on information contained in the abstract rather than the full-text article. The use of this selection method means that some relevant articles may have been excluded. A similar study of search strategies with no limit regarding retrieval, more rigorous inclusion criteria, and reliance on the full-text article could offer different results.

The choice of database in which the searches were run (PubMed) is another limitation of this study. In the interest of consistency, only strategies developed for use in PubMed were investigated. Including search strategies from other databases such as MEDLINE and Embase, with different search features and syntax, could influence the results.

Another issue that could confound the study results lies in the reporting of the search strategies. All the search strategies were saved as word documents. It is possible that there were inadvertent discrepancies between the

search strings entered into PubMed and the documented search strategies.

Further, the searchers' range of skill levels was not controlled in selecting rapid reviews for this investigation. It is possible that there is a larger discrepancy in search results between the pre–peer-reviewed and post–peer-reviewed searches for strategies developed by a novice searcher than an experienced one.

Finally, although we can assume the results of the peer-reviewed search strategy are superior to the results of the pre–peer-reviewed strategy, this may not always be the case. It is conceivable that the peer review process, in changing the search strategy, eliminated relevant records. Testing this theory is not possible however as our study is retrospective. The content of each report is based only on the results retrieved by the peer-reviewed search.

7 | CONCLUSION

The peer review of literature search strategies in support of rapid review reports aids in the retrieval of relevant records. Rapid review topics that rely on information contained in nonrandomized studies in particular stand to benefit the most from the peer review process. The scrutiny of keywords, medical subject headings, and the relation between search concepts is important in ensuring that relevant records are captured.

CONFLICT OF INTEREST

The authors reported no conflict of interest.

ORCID

Carolyn Spry https://orcid.org/0000-0002-7163-8517

REFERENCES

1. McGowan J, Sampson M. Systematic reviews need systematic searchers. *J Med Libr Assoc.* 2005;93(1):74-80.

2. Russell-Rose T, Chamberlain J. Expert search strategies: the information retrieval practices of healthcare information professionals. *JMIR Med Inform.* 2017;5(4):e33.

3. Volpato ESN, Betini M, Puga ME, et al. Strategies to optimize MEDLINE and EMBASE search strategies for anesthesiology systematic reviews. An experimental study. *Sao Paulo Med J.* 2018;136(2):103-108.

4. Sampson M, McGowan J. Errors in search strategies were identified by type and frequency. *J Clin Epidemiol.* 2006;59(10):1057-1063.

5. Relevo R, Paynter R. *Peer Review of Search Strategies.* Rockville (MD): Agency for Healthcare Research and Quality (AHRQ); 2012.

6. Crumley E, Bhatnagar N, Stobart K. Peer reviewing comprehensive search strategies to revise the clinical practice guidelines for hemophilia and von Willebrand disease. *J Can Health Lib Assoc.* 2004;25(4):113-116.

7. McGowan J, Sampson M, Salzwedel DM, Cogo E, Foerster V, Lefebvre C. PRESS Peer Review of Electronic Search Strategies: 2015 guideline statement. *J Clin Epidemiol.* 2016;75:40-46.

8. McGowan J, Sampson M, Salzwedel DM, Cogo E, Foerster V, Lefebvre C. *PRESS Peer Review of Electronic Search Strategies: 2015 Guideline Explanation and Elaboration (PRESS E&E).* Ottawa: CADTH; 2016.

9. Cooper C, Booth A, Varley-Campbell J, Britten N, Garside R. Defining the process to literature searching in systematic reviews: a literature review of guidance and supporting studies. *BMC Med Res Methodol.* 2018;18(1):85.

10. Franco JVA, Garrote VL, Escobar Liquitay CM, Vietto V. Identification of problems in search strategies in Cochrane reviews. *Res Syn Meth.* 2018.

11. Karimi S, Pohl S, Scholer F, Cavedon L, Zobel J. Boolean versus ranked querying for biomedical systematic reviews. *BMC Med Inform Decis Mak.* 2010;10(1):58.

12. Institute of Medicine. *Finding What Works in Health Care: Standards for Systematic Reviews.* Washington (DC): National Academies Press; 2011: https://www.nap.edu/read/13059/chapter/1 Accessed 2018 Sep 28.

13. *Systematic Reviews: CRD's Guidance for Undertaking Reviews in Health Care.* York (UK): Centre for Reviews and Dissemination (CRD); 2009: https://www.york.ac.uk/media/crd/Systematic_Reviews.pdf Accessed 2018 Sep 25.

14. Higgins JPT, Green S (Eds). *Cochrane Handbook for Systematic Reviews of Interventions. Version 5.1.* London: The Cochrane Collaboration; 2011.

15. *The Guidelines Manual.* London: National Institute for Health and Clinical Excellence (NICE); 2012: https://www.nice.org.uk/process/pmg6/resources/the-guidelines-manual-pdf-2007970804933 Accessed 2018 Sep 28.

16. *Methods Guide for Effectiveness and Comparative Effectiveness Reviews.* Rockville (MD): Agency for Healthcare Research and Quality (AHRQ); 2014: https://effectivehealthcare.ahrq.gov/sites/default/files/pdf/cer-methods-guide_overview.pdf Accessed 2018 Oct 15.

17. *General Methods.* Cologne (DE): Institute for Quality and Efficiency in Health Care (IQWiG); 2013.

18. Sampson M, McGowan J, Cogo E, Grimshaw J, Moher D, Lefebvre C. An evidence-based practice guideline for the peer review of electronic search strategies. *J Clin Epidemiol.* 2009;62(9):944-952.

19. Khangura S, Konnyu K, Cushman R, Grimshaw J, Moher D. Evidence summaries: the evolution of a rapid review approach. *Syst Rev.* 2012;1(1):10.

20. Ganann R, Ciliska D, Thomas H. Expediting systematic reviews: methods and implications of rapid reviews. *Implement Sci.* 2010;5(1):56.

21. Polisena J, Garritty C, Kamel C, Stevens A, Abou-Setta AM. Rapid review programs to support health care and policy decision making: a descriptive analysis of processes and methods. *Syst Rev.* 2015;4(1):26.

22. Polisena J, Garritty C, Umscheid CA, et al. Rapid review summit: an overview and initiation of a research agenda. *Syst Rev.* 2015;4:111.

23. *About the Rapid Response Service.* Ottawa: CADTH; 2018: https://www.cadth.ca/about-cadth/what-we-do/products-services/rapid-response-service Accessed 2018 Sep 28.

24. Khangura S, Polisena J, Clifford TJ, Farrah K, Kamel C. Rapid review: an emerging approach to evidence synthesis in health technology assessment. *Int J Technol Assess Health Care.* 2014;30(1):20-27.

25. Schunemann HJ, Moja L. Reviews: rapid! rapid! rapid! ... and systematic. *Syst Rev.* 2015;4(1):4.

26. Nonexperimental designs. In: *Encyclopedia of Research Design*; 2010 http://methods.sagepub.com/reference/encyc-of-research-design/n271.xml. Accessed 2018 Oct 15.

27. Evans D. Database searches for qualitative research. *J Med Libr Assoc.* 2002;90(3):290-293.

28. Glanville J, Eyers J, Jones AM, et al. Quasi-experimental study designs series-paper 8: identifying quasi-experimental studies to inform systematic reviews. *J Clin Epidemiol.* 2017;89:67-76.

29. Tricco AC, Antony J, Zarin W, et al. A scoping review of rapid review methods. *BMC Med.* 2015;13(1):224.

30. Watt A, Cameron A, Sturm L, et al. Rapid reviews versus full systematic reviews: an inventory of current methods and practice in health technology assessment. *Int J Technol Assess Health Care.* 2008;24(2):133-139.