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A systematic review case study of urgent and emergency care configuration found citation searching of Web of Science and Google Scholar of similar value

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Abstract

Background: Supplementary search methods, including citation searching, are essential if systematic reviews are to avoid producing biased conclusions. Little evidence exists on how to prioritise databases for citation searching or to establish whether using multiple sources is beneficial.

Objectives: A systematic review examining urgent and emergency care reconfiguration was used to investigate the utility of citation searching on Web of Science (WOS) and/or Google Scholar (GS).

Methods: This case study investigated numbers of studies, additional studies and unique studies retrieved from both sources. In addition, the time to search, the ease of adding references to reference management software and obtaining abstracts of studies for screening are briefly considered.

Results: WOS retrieved 62 references after deduplication of the results, 52 being additional references not retrieved during the database searching. GS retrieved 134 unique references with 63 additional references. WOS and GS retrieved the same three additional included studies. WOS was less time intensive to search given the facility to restrict to English language papers and availability of abstracts.

Conclusions: In a single systematic review case study, citation searching was required to identify all included studies. Citation searching on WOS is more efficient, where a subscription is available. Both databases identified the same studies but GS required additional time to remove non-English language studies and locate abstracts.

KEYWORDS

case studies; database searching; evidence-based medicine; health services research; review and systematic search; search strategies; supplementary searching

Key Messages

- Supplementary search methods were essential to the systematic review process for a review on the distance to emergency care and served multiple purposes.
- Citation searches on Web of Science (WOS) and Google Scholar (GS) retrieved the same additional included studies; citation searches on WOS are more efficient than GS but require a subscription.
- Clarity on the purpose of citation searching may help in deciding when it is appropriate to use the technique, how to identify source citations, how many citations to select and when to undertake the searches. Citation searches can enhance the *interpretation* of the review (complementary) or *increase the number of included studies* (supplementary) depending on the review.

BACKGROUND

The thorough search for eligible studies (variously described as comprehensive or exhaustive) is one of the important processes contributing to producing unbiased conclusions in a systematic review (Centre for Reviews and Dissemination [CRD], 2009). Search strategies must be designed to minimise overt types of publication bias, for example, including grey literature sources while mitigating the effects of other biases such as database bias and language bias (Song et al., 2010). For some time, commentators have contended that addition of multiple databases may increase the comprehensiveness of a search without necessarily increasing its yield (given that prominent journals are indexed in multiple databases) (Hartling et al., 2016; Ogilvie et al., 2005; Stevinson & Lawlor, 2004). In contrast, citation searching may tap into a different, more diverse, sample of the published literature (Goossen et al., 2018; Papaioannou et al., 2010; Stansfield et al., 2014). Within such a context, citation searching would seem to complement bibliographic topic based searching, rightly considered the mainstay of study identification. However, citation searching also has its critics, given known biases in citation behaviour, such as affirmative citation bias (Letrud & Hernes, 2019).

Concern is frequently expressed that thorough searching constitutes a resource intensive activity (Bethel & Rogers, 2019; Beyer & Wright, 2013; Cooper, 2019). Rather than extend the already often considerable resources expended in study identification, it is more realistic to conceive the search process as a fixed 'resource envelope' within which an information specialist seeks to optimise use of searching resources (Campbell et al., 2019). In order to manage these resources efficiently the information specialist needs to access evidence on the differential yield of different search processes. Reference checking (backwards citation searching), facilitated by the full text of included studies, is considered core to study identification for systematic reviews (Briscoe et al., 2020). Although it can be resource intensive, it is typically undertaken by systematic reviewers as a follow up to all included studies, rather than by an information specialist during the initial search strategy. Forward citation searching requires a separate search procedure that tracks citations of eligible studies forward in time to identify subsequent publications (Briscoe et al., 2020). Forward citation searching can be conducted at several points in the review process: as a one-off process following study identification, an update procedure towards the end of a review or, achieved through citation monitoring (an ongoing approach for current awareness throughout the review).

Recent years have seen the appearance of Google Scholar (GS) in 2004, and similar tools such as Microsoft Academic Search in 2016, as alternatives to the proprietary citation databases of Web of Science (WOS) which has been around since 1963 and Scopus which was launched in 2004. Some estimates attribute unique citation frequencies of almost 40% for GS compared to WOS and Scopus citation alternatives (Martín-Martín et al., 2018). We sought to understand the value of citation searching in the context of systematic reviews by examining the contribution of GS and WOS alongside bibliographic database searching.

What do we already know about the use of citation searching within systematic reviews?

A major cross-sectional study examined the prevalence of backwards and forwards citation searching in 215 Cochrane Reviews added to the Cochrane Database of Systematic Reviews over a 3-month period (Briscoe

et al., 2020). One hundred and seventy-two reviews reported backward citation searching (80%), and 18 reviews (8%) reported forward citation searching. WOS was the most frequently reported citation index. One-third of the reviews reporting forward citation searching used selected studies of importance. The authors observed that reporting of citation searching generally complied with the Methodological Expectations of Cochrane Intervention Reviews standards, but concluded that full transparency requires additional detail currently only present in a minority of reviews. A previous cross-sectional study of 300 systematic reviews reported that 81% reported backward citation searching and 12% reported forward citation searching as a strategy complementary to topic-based bibliographic database searching (Page et al., 2016).

Research on the contribution of citation searching in comparison with bibliographic topic based database searching for systematic reviews

Comparatively little evidence exists on how citation searching contributes in comparison with bibliographic topic based database searching for systematic reviews. Empirical studies have shown citation searching to be particularly effective at retrieving studies where core concepts are difficult to capture using keywords due to various reasons:

- where index terms imperfectly capture the full breadth or nuance of a concept (Cooper et al., 2017, 2018; Hinde & Spackman, 2015; Papaioannou et al., 2010);
- where index terms do not reflect the development of terminology over time (Greenhalgh & Peacock, 2005);
- where a specific citation is closely associated with a specific tool, methodology or method, for example, to find all occurrences of a quality-of-life scale or an implementation framework (Linder et al., 2015). In many cases these tools or methods are not identified in either title or abstracts so are identifiable only via citated references in lieu of access to the full text.

Typically, information specialists and other researchers claim particular value for citation searching on the basis of case study, anecdotal experience or repeated observation. They claim that iterative citation searching is useful for systematic reviews of elusive studies with complex terminology, such as those included in qualitative evidence syntheses (Booth, 2016). For example, a concept (e.g. stigma) may be present in the findings of a study within the full text but may not be the focus of the research question and therefore is absent from the abstract. Citation in this 'elusive' paper to a core paper where stigma is a focus adds a supplementary retrieval point. In such a context, citation searching is essential and is promoted as a primary search method to enhance the contribution of the review, not simply as an additional route to identify more studies (Booth et al., 2018; Cooper et al., 2018).

Less obviously useful are citation searches when a search query is already adequately fulfilled by a topic-based search (Wright et al., 2014). Here, retrieval advantage is claimed via access to sources not included in bibliographic databases (extending "reach") or access to studies in advance of their appearance in bibliographic databases (extending the "time horizon") (Wright et al., 2014). Either supposed advantage may, however, be subverted if this extra yield comprises studies of poorer quality, as demonstrated for clinical trials (Egger et al., 2003), or studies published in potentially predatory journals, as encountered for qualitative studies (Booth et al., 2019). Experience has shown that simply identifying increased numbers of eligible studies is not useful unless these studies hold the potential to make a high-quality contribution to the findings of a review (Egger et al., 2003).

The context for our investigation

The Sheffield Evidence Synthesis Centre, funded by the National Institute for Health Research (NIHR) Health Service and Delivery Research (HS&DR) Programme, is based at the School of Health and Related Research, University of Sheffield. It is one of three review facilities, commissioned on a 3-year renewable contract to conduct literature reviews within time-sensitive windows, to inform both policy and future research (Chambers, Booth, et al., 2021). Future topics are discussed at an annual performance review meeting with members of the NIHR HS&DR Programme team or, subsequently, surface as urgent priorities throughout the rest of the year (Anderson et al., 2021). Review products range from desk based surveys of ongoing research, concluded within three or four working days, to full-scale systematic reviews where multiple reviewers are employed to accelerate the review process. Topics are diffuse, covering service delivery interventions such as group clinics, or identified service challenges such as preventable admissions. As a consequence, search strategies face a dual challenge of many search terms, no standard vocabulary, absence of index terms or indexing terms that are not

consistently applied, coupled with a need to trade-off sensitivity and specificity so that review projects are completed within feasible timescales. Citation searching offers a potential response to such search challenges. The exemplar systematic review showcased in this study was undertaken over 7 months, between January and July 2019 (Chambers, Cantrell, et al., 2020).

Against a background of health service reconfigurations, requiring some people to travel further to access emergency care, the commissioners were interested in exploring the relationship between time to, or distance from, an emergency facility and patient outcomes. Included studies would be heterogeneous, with diverse designs, addressing multiple conditions and examining the effects variously of both time to, and distance from emergency facilities.

OBJECTIVES

The study objectives were to investigate the performance of forward citation searching on WOS or/and GS data sources in identifying additional studies for inclusion in a systematic review that examined the effects of reconfiguration of urgent and emergency care facilities. The review included direct and indirect evidence. Citation searching was conducted on the included direct evidence as a potential route to identify further direct or indirect evidence for inclusion in the review. Furthermore, this study sought to determine the number of additional studies from each data source and to compare the different features of WOS and GS, including ability to restrict to English language and ease of locating and downloading abstracts. In addition, the research team determined the search method used to identify each included paper to isolate the contribution of each search method to this review.

METHODS

For the systematic review, we searched 7 databases in February 2019: Medline, Embase, Cumulative Index to Nursing and Allied Health Literature, the Cochrane Database of Systematic Reviews, Cochrane Central Register of Controlled Trials, Science and Social Sciences Citation Indexes and Health Management Information Consortium. The search was limited to English language publications published from 2000 to February 2019. The extensive database search which retrieved 8870 unique references was supplemented by reference checking for all included studies. The review included 32 items of indirect evidence for association (examining the relationship between travel time or distance and outcomes for routine services) and 12 items of direct evidence for reconfiguration (examining service changes that impact on travel time/distance) studies (Figure 1). In addition, we undertook citation searching which concentrated on the direct evidence supplied by the 12 included reconfiguration studies.

Citation searches for the 12 included reconfiguration studies (Avdic, 2016; Combier et al., 2013a, 2013b; El Sayed et al., 2012; Hansen et al., 2011, 2012, 2014; Knowles et al., 2018; Mustonen et al., 2017; Roberts et al., 2014; Shen & Hsia, 2012, 2016; Yaghoubian et al., 2008) were conducted on WOS and GS in April 2019. WOS was selected due to familiarity with search functionality and an available subscription. GS, a freely available source, was chosen to compare and contrast. The citation searches for reconfiguration studies on WOS were limited to English language publications published from 2000 until February 2019. All the retrieved studies from WOS were imported into Endnote reference management software, and the unique references from this WOS citation search were added to EPPI-Reviewer for reference screening and subsequent review. The unique references from WOS were screened against the review inclusion and exclusion criteria. Citation searches were also completed on GS for each of the included reconfiguration studies. GS does not offer the facility to limit a search to English language studies meaning that results from GS included non-English evidence. All retrieved references from GS were saved using Publish or Perish software Version 7.0 and, imported into Endnote. Studies in languages other than English, and studies previously identified during the review process, were then excluded.

Any additional English language studies identified from the GS citation search were added to EPPI-Reviewer for article selection and screened against review inclusion and exclusion criteria. Following article screening of all the unique references identified by the citation searching, we recorded how many additional studies were included and whether they were identified from GS or WOS or both data sources. In addition, we analysed how all of the review's included studies had been identified: either from the main search on the seven different databases (analysis included the database from which the studies were retrieved), from the citation search or from reference list checking.

RESULTS

The citation search on WOS retrieved 62 references. After the removal of duplicate records, there were 52 references

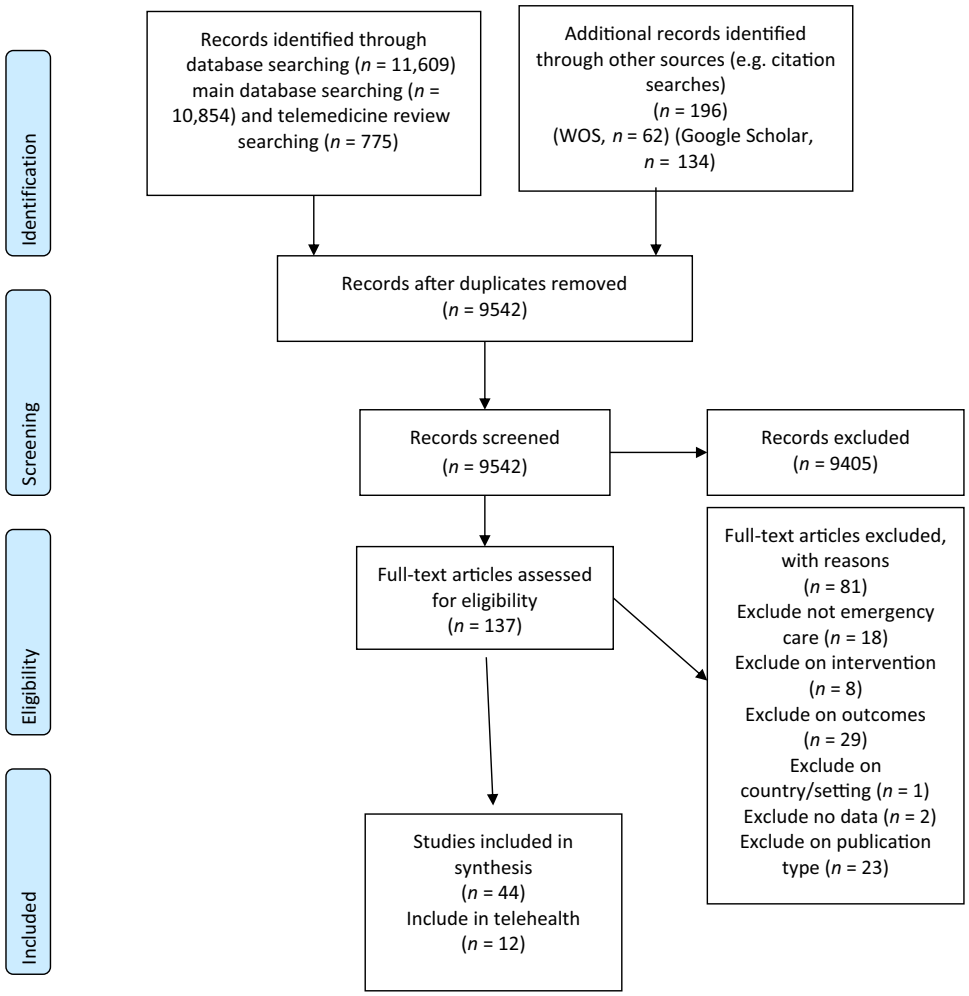

FIGURE 1 Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) flow diagram

that were not retrieved in the database searches to screen for the review (Table 1). Two of the included reconfiguration studies could not be located on WOS (Mustonen et al., 2017; Roberts et al., 2014), therefore citation searching was not done for these studies on WOS. The citation search on GS retrieved 134 references; this included non-English language studies that were not screened for this review. From the 134 references, there were 63 additional references that had not been retrieved in the database searches. One study (Mustonen et al., 2017) registered zero citations on GS.

Impact on study identification

Other than within the resource-intensive context of Cochrane reviews (Lefebvre et al., 2021), little guidance is available on how to select source citations for citation searching or indeed how many citations should be selected to provide optimal coverage within feasible resources. Anecdotally, we suggest that a suitable source citation for citation searching could be to have been published 5 or more years ago in order to accrue sufficient citations, and hence coverage of the literature. This would need to be investigated further in other reviews and the situation could be changing due to the growth of preprints which are included in GS.

Citations can either be selected comprehensively for coverage or purposively for yield or diversity. The numbers of citations could be used as an indicator of viability. As demonstrated by Table 1, the four citations with 15 or more GS citations (Hsia et al., 2012, 2014; Combier et al., 2013a, 2013b; Shen & Hsia, 2012) all fall on or outside our suggested 5-year margin. However, a further three references from this same time band (El Sayed et al., 2012; Hansen et al., 2011; Yaghoubian et al., 2008) have only accrued 16 citations between them suggesting that both time since publication and number of citations should be factored into citation selection. In actuality, we conducted citation searches for each of the 12 included studies to avoid having to make arbitrary judgements on eligibility for each particular source citation. However,

this may not always be possible, particularly for larger topic areas. Further comparative research on whether to selected citations comprehensively or purposively is required.

GS retrieved a total of 10 of the 44 studies included in the review. Six of these were reconfiguration studies (Hsia et al., 2012, 2014; Combier et al., 2013a, 2013b; Shen & Hsia, 2016; Mustonen et al., 2017; Knowles et al., 2018) and four were time/distance association studies (Berlin, 2016; Engjom et al., 2017; Featherstone et al., 2016; Pilkington et al., 2014). This means that between them the 12 citation searches identified 50% of the 12 studies included in the reconfiguration subset of the review. Three of the highly cited studies (>15 citations) identified above were cited by one other included study suggesting that it is particularly valuable to follow up highly cited studies as a route into additional studies for inclusion.

WOS identified almost half the number of citations identified by GS (69 vs. 134). Highly cited items were defined as those accruing 15 or more citations. This criterion identified three highly cited studies (Combier et al., 2013a, 2013b; Hsia et al., 2014; Shen & Hsia, 2012). Two of these highly cited studies were cited by other included studies. These highly cited studies fell within the time band of 5 or more years since publication. However, this left a larger number ($n = 4$) of studies (El Sayed et al., 2012; Hansen et al., 2011; Hsia et al., 2012; Yaghoubian et al., 2008) that were published within the same time band but, between them, only acquired a total of 21 citations. A further two studies were not indexed on WOS for citations (Mustonen et al., 2017; Roberts et al., 2014). One study (Knowles et al., 2018) referenced 3 (25%) of the 12 included reconfiguration studies. However, all three of these studies had already been identified either from the scoping search (Roberts et al., 2014) or from the seven-database comprehensive search (Hsia et al., 2014; Shen & Hsia, 2016). These findings suggest that it is more difficult to identify and select citations as targets for citation searching using the criteria of fewer than 10 citations on WoS.

TABLE 1 Number of unique citations retrieved for each of the 12 reconfiguration studies on GS and WOS

References	GS	WOS
Avdic (2016)	12	4
Combier et al. (2013a, 2013b)	33	15
El Sayed et al. (2012)	8	5
Hansen et al. (2011)	2	1
Hsia et al. (2012)	20	8
Hsia et al. (2014)	19	13
Knowles et al. (2018)	1	1
Mustonen et al. (2017)	0	0[a]
Roberts et al. (2014)	4	0[a]
Shen and Hsia (2012)	28	14
Shen and Hsia (2016)	1	1
Yaghoubian et al. (2008)	6	7
Total	134	62

[a]Not indexed on WOS.

Abbreviations: GS, Google Scholar; WOS, Web of Science.

Impact on study inclusion

Three additional studies were added from the screening of references from the citation searches against the review inclusion and exclusion criteria (Engjom et al., 2017; Featherstone et al., 2016; Pilkington et al., 2014). Both WOS and GS retrieved the three additional included studies exclusively retrieved by the citation search. All three studies related to the association of time/distance with outcome, not to reconfiguration, confirming the inter-relationship between the two literatures targeted by the review. This suggests that additional reconfiguration studies might conceivably have been retrieved by conducting additional citation searches for the 32 time/distance studies.

Of note is the fact that all three additional studies identified from citation searches could conceivably have been retrieved from subject searches of PubMed. However, manual review revealed that MeSH subject indexing was not sufficiently specific to isolate these studies. Potential broad MeSH terms included 'Health Facilities', 'Health Services Accessibility' and 'Travel', respectively. Relevant title terms ranged from the obscure ('outside an institution') through the uncommon ('geographic accessibility') to more obvious terms ('distance'). However, the term 'Distance' in title alone would retrieve 16,000 plus references in just the MEDLINE database indicating that distance as a term is not specific enough, with no universally agreed phrases to offer specificity; *distance from hospital* or *distance to hospital* register absurdly low numbers of hits.

Table 2 demonstrates the different search methods necessary to retrieve the review's included studies. Nine included studies (P) were retrieved in the preliminary scoping search. Thirty-one included studies were retrieved in the main database search and 23 of these were retrieved only from the main database search and not identified by supplementary search methods. Most citations were available from multiple (up to four) databases; with the mode being two. Each of the seven databases retrieved one or more unique references indicating

TABLE 2 Type of study for all 44 included studies and sources by which they were identified

References	Topic of study	Database search (number of databases that retrieved the reference)	Citation searching	Reference list checking
Acharya et al. (2011)	Time/distance	X (2)		
Andersson et al. (2019)	Time/distance	X (1)		
Avdic (2016)	Reconfiguration	X (3)		
Balamurugan et al. (2016)	Time/distance	X (2)		
Balamurugan et al. (2018)	Time/distance	X (2)		
Berlin (2016) (P)	Time/distance	X (2)	GS	
Bussières et al. (2018)	Time/distance	X (1)		
Combier et al. (2013a, 2013b)	Reconfiguration	X (1)	GS and WOS	
Di Domenicantonio et al. (2016)	Time/distance	X (2)		
Dummer and Parker (2004)	Time/distance			X
Durkin et al. (2005)	Time/distance	X (1)		
El Sayed et al. (2012) (P)	Reconfiguration	X (2)		
Engjom et al. (2017)	Time/distance		GS and WOS	
Featherstone et al. (2016)	Time/distance		GS and WOS	
Gomez et al. (2010)	Time/distance	X (1)		
Gonzalez et al. (2009)	Time/distance	X (3)		
Grzybowski et al. (2011)	Time/distance			X
Hansen et al. (2011)	Reconfiguration	X (1)		
Hsia et al. (2012) (P)	Reconfiguration	X (3)	GS and WOS	
Hsia et al. (2014)	Reconfiguration	X (1)	GS and WOS	
Jarman et al. (2018)	Time/distance	X (1)		
Knowles et al. (2018) (P)	Reconfiguration		GS	
Koch et al. (2016)	Time/distance	X (4)		
Langabeer et al. (2016)	Time/distance	X (2)		
Lee et al. (2018)	Time/distance	X (1)		
Lerner et al. (2003)	Time/distance	X (1)		
Leyden et al. (2011)	Time/distance	X (2)		
McCoy et al. (2013)	Time/distance	X (1)		
Murata and Matsuda (2013)	Time/distance	X (2)		
Mustonen et al. (2017) (P)	Reconfiguration	X (1)	GS	
Nicholl et al. (2007) (P)	Time/distance	X (2)		
Parker (2000)	Time/distance			X
Pilkington et al. (2014)	Time/distance		GS and WOS	
Postma et al. (2014) (P)	Time/distance	X (2)		
Ravelli et al. (2011)	Time/distance			X
Roberts et al. (2014) (P)	Reconfiguration			
Rudge et al. (2013) (P)	Time/distance			
Shen and Hsia (2012)	Reconfiguration	X (3)		
Shen and Hsia (2016)	Reconfiguration	X (3)	GS and WOS	
Souza and Strachan (2005)	Time/distance			X

(Continues)

TABLE 2 (Continued)

References	Topic of study	Database search (number of databases that retrieved the reference)	Citation searching	Reference list checking
Svensson et al. (2003)	Time/distance	X (2)		
Wei et al. (2008) (P)	Time/distance	X (2)		
Yaghoubian et al. (2008)	Reconfiguration			X

Note: (P) indicates reference initially retrieved by a preliminary scoping search.
Abbreviations: GS, Google Scholar; WOS, Web of Science.

the importance of searching multiple databases. Reference checking identified six additional studies indicating the importance of this search technique. Citation searches on GS and WOS retrieved three additional studies that were included within the time/distance part of the review. In addition, GS retrieved six of the included studies overall, and WOS retrieved five. GS retrieved more unique citations indicating potential wider coverage.

DISCUSSION

Citation searching is an important component of the systematic review search process (Wright et al., 2014). GS and WOS both offer the facility to undertake forward citation searching. Citation searching of both sources retrieved the same three indirect studies which were included, so in this particular case an efficient review process probably only required searching one data source for the citation searching.

An important distinction can be made between citation searching as a source of extra records (i.e. records not included at all within the database sources for the subject search) and citation searching as an extra retrieval strategy for records present in the database sources, but missed by the subject searching (Wright et al., 2014). This distinction is equally important, although often neglected, in connection with subject search databases. Addition of databases does not necessarily add additional relevant records but may, through alternative indexing or added retrievable detail, offer a further opportunity to identify records missed from the initial selection of databases (Booth, 2010). Not to be underestimated, therefore, is the role of supplementary searching (including citation searching), as a 'safety net' for items missed by subject searching. Alternatively, given less pressured time constraints, any additional relevant terms could be fed back into a subsequent iteration of the subject based search.

These findings suggest that citation networks may serve a further purpose beyond identification of unique studies, in suggesting when one has identified a core set of included studies. However, further empirical evidence is required to examine whether one could formally calculate when a point of 'bibliographic sufficiency' has been reached (i.e. when additional relevant references are unlikely to be identified) and, indeed, how to calculate an optimal number of citations from which to conduct citation searches.

Cost is an important consideration when deciding which databases to use for citation searches. WOS is an expensive subscription service with superior functionality, including limiting to specific languages and ease of direct downloading of results into reference management software. WOS generally includes abstracts that can be viewed when reviewing your search results or downloaded with the references. Additional information in the abstract makes screening decisions easier than those based on the title alone. GS is a free service that enables citation searching but it does not possess advanced features of limiting to specific languages and downloaded results generally include only bibliographic details and a brief extract of text in context, requiring extra time to locate abstract information by following hyperlinks. The availability of *Publish or Perish* has enhanced the usability of GS for citation searching providing an auditable search result, and retrieved references can be automatically downloaded in Excel and Endnote formats with hyperlinks to retrieved studies.

The context of our review is important in informing our interpretation of results. Reviews produced for the NIHR HS&DR contract are by their nature rapid, requiring that they are completed within short timescales. In addition, the fact that reviews are externally funded makes it feasible to access subscription databases, rather than depend upon free data sources. Our review was limited to English language only, but for an international review the facility to identify via citation searching, extra references in languages other than English may be critical. For example, two French language analyses

TABLE 3 Hypotheses for further testing

Finding	Hypotheses for further testing
Evaluation of citation searching only explored the added value of citation searches against database searching	The relative performance of citation searching depends upon the corresponding quality/lack of quality of database searching
Citation searching did not identify additional direct evidence studies	Citation searching may help to confirm 'bibliographic sufficiency' (i.e. that the core set of includable studies has already been identified by subject searching)
Citation searching only revealed additional indirect studies	Citation patterns do not observe inclusion/exclusion parameters thus source citation for citation searching need not represent included studies
Citation searching retrieved studies missed by subject searches	Citation searches may offer a safety net to mitigate against inadequate indexing, signposting by authors or prohibitively sensitive search strategies Citation searches may be particularly appropriate for diffuse subjects/terminologies Citation searches may be used formatively to inform iterations of subject search strategies Citation searching may not be the most efficient use of time where the intention is to identify studies not indexed in core databases, as opposed to retrieving missed studies
Number of target citations depends upon whether citation searching occurs after a preliminary search or following the subject based sift process	The information specialist should decide, with the review team, whether citation searches are primarily formative (to inform the terminology and sufficiency of overall search strategies) or summative (to identify additional studies). If summative, the relative value of other supplementary search techniques (e.g. use of study registers) should be evaluated
No guidance exists for how to identify and select the targets for citation searches	Selection by publication date or number of citations is inadequate in isolation. Highly cited items published 5 or more years ago may be appropriate. Requires further research
No guidance exists for when citation searches should be conducted (CRD, 2009; Lefebvre et al., 2020)	Review team should decide whether to conduct citation searches following preliminary scoping search, at same time as subject searches or as a final process once all included results from subject searches are identified
No guidance exists for how many targets should be selected for citation searches. (CRD, 2009; Lefebvre et al., 2020)	Number of target citations is resource dependent and probably best determined as proportionate to overall search resource rather than by arbitrary rules. Diffuse terminology and literature (and hence poor performance of subject searches) should also be factored in. Empirical research required

(Combier et al., 2013b; Roussot et al., 2015) associated with the source citation by Combier et al. (2013a) could have been retrieved by citation searching in all languages for the reconfiguration topic. WOS has greater flexibility in this respect, offering options for including all languages or limiting to one or more specific languages.

Limitations of the study

Commentators have previously observed that the evidence base for study identification, in the context of systematic reviews is largely pragmatic and constructed around serendipitous single case study experiments (Booth, 2018). This study is no different and therefore makes only tentative suggestions in connection with its value and contribution. The featured systematic review topic is located within health services and delivery research and, therefore, may not be representative of clinical topics or those associated with health technology assessment. On the other hand, it represents a complex topic where citation searching may be particularly indicated, given the difficulties related to subject indexing, the different study designs, and the variety of research questions in the relevant literature. The featured review acknowledges these challenges by identifying both direct

evidence (reconfiguration studies) and indirect evidence (association of time/distance with outcomes) as variously relevant to the review problem. Pragmatically, this study focuses resources on citation searching for the 12 reconfiguration studies, potentially of most value to the review commissioners, rather than conducting citation searches for all 44 studies included in the review. Nevertheless, we evaluated the impact of the citation search results across both direct and indirect evidence. The value of this approach is revealed by the fact that the citation searches identified three unique studies, all relating to indirect, not direct, evidence.

Evaluation of supplementary searching often proves challenging as the value of such techniques is assessed against the yield from the subject search of multiple databases. In other words, the better the retrieval from the subject search the less valuable the supplementary searches will appear. So, for example, a highly cited study on the value of supplementary approaches reported that only 30% of sources were obtained from database and hand searches pre-specified by the protocol (Greenhalgh & Peacock, 2005). In contrast, 55% were identified by 'snowballing' (e.g. pursuing references of references), and 24% by personal knowledge or personal contacts. In this case, the low yield from database sources makes the value of 'snowballing' appear disproportionately high. It is unusual to encounter circumstances under which the subject search is not the main search strategy. However, at least one study report suggests circumstances where supplementary searching might be preferred to subject-based searching, for example, this was found to be the case during a systematic review to evaluate the health benefits of environmental enhancement and conservation activities (Cooper et al., 2018). Evidence is needed to help information specialists to judge how to assign a fixed time for the entire study identification phase and then a corresponding proportion of that time specifically for citation searching. The number of citations pursued would therefore be time limited, not allocated by date of publication or numbers of citations. These latter two considerations would only determine the priority of individual citations to search for, not their inclusion in citation searching per se.

The other practical consideration is how to identify citations as targets for searching and when this should be undertaken. In this study as many as nine included (reconfiguration or time/distance) studies were identified by a preliminary scoping search. Only four of these would have been identified from citation searching. Twelve (direct) reconfiguration studies were required in order to identify three additional indirect studies for inclusion. However, none of these extra included studies were reconfiguration studies. The supplementary searching therefore only populated the indirect evidence, not the direct evidence. Our review was unusual in taking this split approach, making any conclusions tentative and specific to our review approach. Thus, if a similar systematic review has sufficient direct evidence then the review does not need to rely on the indirect evidence which is weaker and thus makes any findings less conclusive. This makes the added value of the citation searching questionable in this case study as the aim was to find additional reconfiguration evidence. Of course, citation searching does not require that only studies that are actually included in the final review are used as targets for citation searching. However, use of citations that are included from the indirect evidence, or not included at all, makes selection of targets for citation searching more arbitrary and less transparent. This study focuses on evaluating citation searching of core included studies, not the value of citation searching in general. This provides a defensible and explicit rationale for how we selected targets for citation searching and ensures that actual numbers of citation searches (12 vs. 44 target citations) are realistic and feasible within the context of a rapid review. For a systematic review where time and methods would allow it would probably be appropriate to search the citations of all included studies.

Implications for practice

In summary, this study contributes interesting findings in relation to the specific case and, potentially, generalisable issues. These are summarised in Table 3.

Finally, we should acknowledge the utility of emerging tools such as *citation chaser* (https://www.eshackathon.org/software/citationchaser.html) which are exerting a disruptive, beneficial effect on the citation search process. For example, submission of a string of comma separated unique identification numbers (e.g., Digital Object Identifiers or PubMed identifiers) can be used to generate automatic lists of both cited (backward citations) and citing (forward citations) references and then to envisage the resulting citation network. Platform-based comparisons, such as this study, may well become superseded by evaluations of technical performance, coverage and functionality of such tools and their source data (e.g. Lens.org).

CONCLUSIONS

This case study investigated citation searches conducted on two databases, GS and WOS, for a rapid review that reviewed the evidence on the impact of reconfiguration

of urgent and emergency care facilities. Following an extensive search of 7 bibliographic databases, we used diverse supplementary search methods including citation searches and observed that all were required to locate the 44 included studies. For this review, citation searching on WOS was more efficient than GS, due to the greater functionality of limiting by language, ease of downloading results and general availability of abstracts. However, it should be noted that WOS requires a subscription.

Conducting the citation searches on GS identified the same additional studies but extra time was spent sifting the results for non-English language papers and locating abstracts. The added value of citation searching may be evidenced in less direct contributions; in determining when 'bibliographic sufficiency' of a core set of studies is reached, in acting as a "safety net" for studies missed from subject searches and, potentially, in modifying search strategies to subsequently retrieve missed items. Clearly, both formative (during the search process) and summative (in increasing the final set of retrieved/included studies) contributions should be included when evaluating citation searching, particularly given its typical role as a supplementary search approach, rather than an alternative strategy.

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REFERENCES

Acharya, A. B., Nyirenda, J. C., Higgs, G. B., Bloomfield, M. S., Cruz-Flores, S., Connor, L. T., Lee, J. M., & Leet, T. L. (2011). Distance from home to hospital and thrombolytic utilization for acute ischemic stroke. *Journal of Stroke and Cerebrovascular Diseases*, *20*, 295–301. https://doi.org/10.1016/j.jstrokecerebrovasdis.2009.12.009

Anderson, R., Booth, A., Eastwood, A., Rodgers, M., Shaw, L., Thompson Coon, J., Briscoe, S., Cantrell, A., Chambers, D., Goyder, E., Nunns, M., Preston, L., Raine, G., & Thomas, S. (2021). *Synthesis for health services and policy: Case studies in the scoping of reviews*. NIHR Journals Library.

Andersson, H. B., Seth, M., Gurm, H. S., & Bates, E. R. (2019). Prehospital transport times and outcomes after different reperfusion strategies for ST-elevation myocardial infarction. *American Journal of Cardiology*, *123*, 375–381. https://doi.org/10.1016/j.amjcard.2018.10.015

Avdic, D. (2016). Improving efficiency or impairing access? Health care consolidation and quality of care: Evidence from emergency hospital closures in Sweden. *Journal of Health Economics*, *48*, 44–60. https://doi.org/10.1016/j.jhealeco.2016.02.002

Balamurugan, A., Delongchamp, R., Im, L., Bates, J., & Mehta, J. L. (2016). Neighborhood and acute myocardial infarction mortality as related to the driving time to percutaneous coronary intervention-capable hospital. *Journal of the American Heart Association*, *5*, 16. https://doi.org/10.1161/jaha.115.002378

Balamurugan, A., Phillips, M., Selig, J. P., Felix, H., & Ryan, K. (2018). Association between system factors and acute myocardial infarction mortality. *Southern Medical Journal*, *111*, 556–564. https://doi.org/10.14423/smj.0000000000000853

Berlin, C., Panczak, R., Hasler, R., Zwahlen, M., & Swiss National Cohort Study Group. (2016). Do acute myocardial infarction and stroke mortality vary by distance to hospitals in Switzerland? Results from the Swiss National Cohort Study. *British Medical Journal Open*, *6*, e013090. https://doi.org/10.1136/bmjopen-2016-013090

Bethel, A., & Rogers, M. (2019). Choosing the right databases and search techniques. In P. Levay & J. Craven (Eds.), *Systematic searching: Practical ideas for improving search results* (pp. 73–94). Facet Publishing. https://doi.org/10.29085/9781783303755.005

Beyer, F. R., & Wright, K. (2013). Can we prioritise which databases to search? A case study using a systematic review of frozen shoulder management. *Health Information & Libraries Journal*, *30*(1), 49–58. https://doi.org/10.1111/hir.12009

Booth, A. (2010). How much searching is enough? Comprehensive versus optimal retrieval for technology assessments. *International Journal of Technology Assessment in Health Care*, *26*(4), 431–435. https://doi.org/10.1017/s0266462310000966

Booth, A. (2016). Searching for qualitative research for inclusion in systematic reviews: A structured methodological review. *Systematic Reviews*, *5*(1), 74. https://doi.org/10.1186/s13643-016-0249-x

Booth, A. (2018). State of the art, state of the science? *Research Synthesis Methods*, *9*(4), 615–618. https://doi.org/10.1002/jrsm.1324

Booth, A., Mshelia, S., Analo, C. V., & Nyakang'o, S. B. (2019). Qualitative evidence syntheses: Assessing the relative contributions of multi-context and single-context reviews. *Journal of Advanced Nursing*, *75*(12), 3812–3822. https://doi.org/10.1111/jan.14186

Booth, A., Wright, J., & Briscoe, S. (2018). Scoping and searching to support realist approaches. In N. Emmel, J. Greenhalgh, A. Manzano, M. Monaghan, & S. Dalkin (Eds.), *Doing realist research*. Sage.

Briscoe, S., Bethel, A., & Rogers, M. (2020). Conduct and reporting of citation searching in Cochrane systematic reviews: A cross-sectional study. *Research Synthesis Methods*, *11*, 169–180. https://doi.org/10.1002/jrsm.1355

Bussières, S., Bégin, F., Leblanc, P.-A., Tanguay, A., Paradis, J.-M., Hébert, D., & Fleet, R. (2018). Clinical adverse events in prehospital patients with ST-elevation myocardial infarction transported to a percutaneous coronary intervention centre by basic life support paramedics in a rural region. *Canadian Journal of Emergency Medicine*, *20*, 857–864. https://doi.org/10.1017/cem.2018.383

Campbell, F., Weeks, L., Booth, A., Kaunelis, D., & Smith, A. (2019). A scoping review found increasing examples of rapid qualitative evidence syntheses and no methodological guidance. *Journal of Clinical Epidemiology*, *115*, 160–171. https://doi.org/10.1016/j.jclinepi.2019.05.032

Centre for Reviews & Dissemination (CRD). (2009). *Systematic reviews: CRD's guidance for undertaking reviews in health care* (p. 2009). University of York.

Chambers, D., Booth, A., Rodgers, M., Preston, L., Dalton, J., Goyder, E., Thomas, S., Parker, G., Street, A., & Eastwood, A. (2021). Evidence to support delivery of effective health services: A responsive programme of rapid evidence synthesis. *Evidence & Policy: A Journal of Research, Debate and Practice*, *17*(1), 173–187. https://doi.org/10.1332/174426419x15468574223221

Chambers, D., Cantrell, A., Baxter, S., Turner, J., & Booth, A. (2020). Effects of increased distance to urgent and emergency care facilities resulting from health services reconfiguration: A systematic review. *Health Services and Delivery Research*, *8*(31). https://doi.org/10.3310/hsdr08310

Combier, E., Charreire, H., Le Vaillant, M., Michaut, F., Ferdynus, C., Amat-Roze, J. M., Gouyon, J.-B., Quantin, C., & Zeitlin, J. (2013a). Perinatal health inequalities and accessibility of maternity services in a rural French region: Closing maternity units in Burgundy. *Health & Place*, *24*, 225–233. https://doi.org/10.1016/j.healthplace.2013.09.006

Combier, E., Charreire, H., Le Vaillant, M., Michaut, F., Ferdynus, C., Amat-Roze, J. M., Gouyon, J.-B., Quantin, C., & Zeitlin, J. (2013b). Temps d'accès aux maternités Bourguignonnes et indicateurs de santé périnatale. *Journal de Gestion et d'Économie Médicales*, *31*(6), 348–368. https://doi.org/10.3917/jgem.136.0348

Cooper, C. (2019) *Improving literature searching in systematic reviews: The application of tailored literature searching compared to 'the conventional approach* [Doctoral dissertation]. University of Exeter.

Cooper, C., Booth, Britten, N., & Garside, R. (2017). A comparison of results of empirical studies of supplementary search techniques and recommendations in review methodology handbooks: A methodological review. *Systematic Reviews*, *6*(1), 234. https://doi.org/10.1186/s13643-017-0625-1

Cooper, C., Lovell, R., Husk, K., Booth, A., & Garside, R. (2018). Supplementary search methods were more effective and offered better value than bibliographic database searching: A case study from public health and environmental enhancement. *Research Synthesis Methods*, *9*(2), 195–223. https://doi.org/10.1002/jrsm.1286

Di Domenicantonio, R., Cappai, G., Sciattella, P., Belleudi, V., Di Martino, M., Agabiti, N., Mataloni, F., Ricci, R., Perucci, C. A., Davoli, M., & Fusco, D. (2016). The tradeoff between travel time from home to hospital and door to balloon time in determining mortality among STEMI patients undergoing PCI. *PLoS One*, *11*(6), e0158336. https://doi.org/10.1371/journal.pone.015833621

Dummer, T., & Parker, L. (2004). Hospital accessibility and infant death risk. *Archives of Diseases in Childhood*, *89*(3), 232–234. https://doi.org/10.1136/adc.2003.030924

Durkin, M., McElroy, J., Guan, H., Bigelow, W., & Brazelton, T. (2005). Geographic analysis of traffic injury in Wisconsin: Impact on case fatality of distance to level I/II trauma care. *Wisconsin Medical Journal*, *104*, 26–31.

Egger, M., Juni, P., Bartlett, C., Holenstein, F., & Sterne, J. (2003). How important are comprehensive literature searches and the assessment of trial quality in systematic reviews? Empirical study. *Health Technology Assessment (Winchester, England)*, *7*, 1–76.

El Sayed, M., Mitchell, P. M., White, L. F., Rubin-Smith, J. E., Maciejko, T. M., Obendorfer, D. T., Ulrich, A. S., Dyer, S., & Olshaker, J. S. (2012). Impact of an emergency department closure on the local emergency medical services system. *Prehospital Emergency Care: Official Journal of the National Association of EMS Physicians and the National Association of State EMS Directors*, *16*, 198–203. https://doi.org/10.3109/10903127.2011.640418

Engjom, H. M., Morken, N.-H., Hoydahl, E., Norheim, O. F., & Klungsoyr, K. (2017). Increased risk of peripartum perinatal mortality in unplanned births outside an institution: A retrospective population-based study. *American Journal of Obstetrics and Gynecology*, *217*(2), 210.e1–210.e12. https://doi.org/10.1016/j.ajog.2017.03.033

Featherstone, P., Eberth, J. M., Nitcheva, D., & Liu, J. (2016). Geographic accessibility to health services and neonatal mortality among very-low birthweight infants in South Carolina. *Maternal and Child Health Journal*, *20*, 2382–2391. https://doi.org/10.1007/s10995-016-2065-2

Fone, D. L., Christie, S., & Lester, N. (2006). Comparison of perceived and modelled geographical access to accident and emergency departments: A cross-sectional analysis from the Caerphilly Health and Social Needs Study. *International Journal of Health Geographics*, *5*, 16. https://doi.org/10.1186/1476-072X-5-16

Gomez, D., Berube, M., Xiong, W., Ahmed, N., Haas, B., Schuurman, N., & Nathens, A. B. (2010). Identifying targets for potential interventions to reduce rural trauma deaths: A population-based analysis. *Journal of Trauma—Injury Infection and Critical Care*, *69*, 633–639. https://doi.org/10.1097/TA.0b013e3181b8ef81

Gonzalez, R. P., Cummings, G. R., Phelan, H. A., Mulekar, M. S., & Rodning, C. B. (2009). Does increased emergency medical services prehospital time affect patient mortality in rural motor vehicle crashes? A statewide analysis. *American Journal of Surgery*, *197*, 30–34. https://doi.org/10.1016/j.amjsurg.2007.11.018

Goossen, K., Tenckhoff, S., Probst, P., Grummich, K., Mihaljevic, A. L., Buechler, M. W., & Diener, M. K. (2018). Optimal literature search for systematic reviews in surgery. *Langenbeck's Archives of Surgery*, *403*(1), 119–129.

Greenhalgh, T., & Peacock, R. (2005). Effectiveness and efficiency of search methods in systematic reviews of complex evidence: Audit of primary sources. *British Medical Journal*, *331*(7524), 1064–1065. https://doi.org/10.1136/bmj.38636.593461.68

Grzybowski, S., Stoll, K., & Kornelsen, J. (2011). Distance matters: A population based study examining access to maternity services for rural women. *BioMed Central Health Services Research*, *11*, 147. https://doi.org/10.1186/1472-6963-11-147

Hansen, K. S., Enemark, U., & Foldspang, A. (2011). Health services use associated with emergency department closure. *Journal of Health Services Research & Policy*, *16*, 161–166. https://doi.org/10.1258/jhsrp.2010.010100

Hartling, L., Featherstone, R., Nuspl, M., Shave, K., Dryden, D. M., & Vandermeer, B. (2016). The contribution of databases to the results of systematic reviews: A cross-sectional study. *BMC Medical Research Methodology*, *16*(1), 127. https://doi.org/10.1186/s12874-016-0232-1

Hinde, S., & Spackman, E. (2015). Bidirectional citation searching to completion: An exploration of literature searching methods. *PharmacoEconomics*, *33*(1), 5–11. https://doi.org/10.1007/s40273-014-0205-3

Hsia, R. Y., Kanzaria, H. K., Srebotnjak, T., Maselli, J., Mcculloch, C., & Auerbach, A. D. (2012). Is emergency department closure resulting in increased distance to the nearest emergency department associated with increased inpatient mortality? *Annals of Emergency Medicine*, *60*(707–715), E4. https://doi.org/10.1016/j.annemergmed.2012.08.025

Hsia, R. Y., Srebotnjak, T., Maselli, J., Crandall, M., Mcculloch, C., & Kellermann, A. L. (2014). The Association of Trauma Center Closures with increased inpatient mortality for injured patients. *Journal of Trauma and Acute Care Surgery*, *76*, 1048–1054. https://doi.org/10.1097/TA.0000000000000166

Jarman, M. P., Curriero, F. C., Haut, E. R., Porter, K. P., & Castillo, R. C. (2018). Associations of distance to trauma care, community income, and neighborhood median age with rates of injury mortality. *Journal of the American Medical Association Surgery*, *153*, 535–543. https://doi.org/10.1001/jamasurg.2017.6133

Knowles, E., Shephard, N., Stone, T., Bishop-Edwards, L., Hirst, E., Abouzeid, L., Mason, S., & Nicholl, J. (2018). Closing five emergency departments in England between 2009 and 2011: The closed controlled interrupted time-series analysis. *Health Services and Delivery Research*, *6*(27). https://doi.org/10.3310/hsdr06270

Koch, P. M., Kunz, A., Ebinger, M., Geisler, F., Rozanski, M., Waldschmidt, C., Weber, J. E., Wendt, M., Winter, B., Zieschang, K., Bollweg, K., Kaczmarek, S., Endres, M., & Audebert, H. J. (2016). Influence of distance to scene on time to thrombolysis in a specialized stroke ambulance. *Stroke*, *47*, 2136–2140. https://doi.org/10.1161/strokeaha.116.013057

Langabeer, J. R., 2nd, Smith, D. T., Cardenas-Turanzas, M., Leonard, B. L., Segrest, W., Krell, C., Owan, T., Eisenhauer, M. D., & Gerard, D. (2016). Impact of a rural regional myocardial infarction system of care in Wyoming. *Journal of the American Heart Association*, *5*, 20. https://doi.org/10.1161/jaha.116.003392

Lee, J., Abdel-Aty, M., Cai, Q., & Wang, L. (2018). Effects of emergency medical services times on traffic injury severity: A random effects ordered probit approach. *Traffic Injury Prevention*, *19*, 577–581. https://doi.org/10.1080/15389588.2018.1468889

Lefebvre, C., Glanville, J., Briscoe, S., Littlewood, A., Marshall, C., Metzendorf, M.-I., Noel-Storr, A., Rader, T., Shokraneh, F., Thomas, J., & Wieland, L. S. (2020). Chapter 4: Searching for and selecting studies. In J. P. T. Higgins, J. Thomas, J. Chandler, M. Cumpston, T. Li, M. J. Page, & V. A. Welch (Eds.), *Cochrane handbook for systematic reviews of interventions*. Version 6.1 (updated September 2020). Cochrane. www.training.cochrane.org/handbook

Lefebvre, C., Glanville, J., Briscoe, S., Littlewood, A., Marshall, C., Metzendorf, M.-I., Noel-Storr, A., Rader, T., Shokraneh, F., Thomas, J., & Wieland, L. S. (2021). Technical supplement to Chapter 4: Searching for and selecting studies. In J. P. T. Higgins, J. Thomas, J. Chandler, M. S. Cumpston, T. Li, M. J. Page, & V. A. Welch (Eds.), *Cochrane handbook for systematic reviews of interventions*. Version 6.2 (updated February 2021). Cochrane. www.training.cochrane.org/handbook

Lerner, E. B., Billittier, A. J., Dorn, J. M., & Wu, Y. W. (2003). Is total out-of-hospital time a significant predictor of trauma patient mortality? *Academic Emergency Medicine*, *10*, 949–954. https://doi.org/10.1111/j.1553-2712.2003.tb00650.x

Letrud, K., & Hernes, S. (2019). Affirmative citation bias in scientific myth debunking: A three-in-one case study. *PLoS One*, *14*(9), e0222213. https://doi.org/10.1371/journal.pone.0222213

Leyden, J. M., Chong, W. K., Kleinig, T., Lee, A., Field, J. B., & Jannes, J. (2011). A population-based study of thrombolysis for acute stroke in South Australia. *Medical Journal of Australia*, *194*, 111–115. https://doi.org/10.5694/j.1326-5377.2011.tb04191.x

Linder, S. K., Kamath, G. R., Pratt, G. F., Saraykar, S. S., & Volk, R. J. (2015). Citation searches are more sensitive than keyword searches to identify studies using specific measurement instruments. *Journal of Clinical Epidemiology*, *68*(4), 412–417. https://doi.org/10.1016/j.jclinepi.2014.10.008

Martín-Martín, A., Orduna-Malea, E., Thelwall, M., & López-Cózar, E. D. (2018). Google Scholar, Web of Science, and Scopus: A systematic comparison of citations in 252 subject categories. *Journal of Informetrics*, *12*(4), 1160–1177. https://doi.org/10.1016/j.joi.2018.09.002

McCoy, C. E., Menchine, M., Sampson, S., Anderson, C., & Kahn, C. (2013). Emergency medical services out-of-hospital scene and transport times and their association with mortality in trauma patients presenting to an urban level I trauma center. *Annals of Emergency Medicine*, *61*, 167–174. https://doi.org/10.1016/j.annemergmed.2012.08.026

Murata, A., & Matsuda, S. (2013). Association between ambulance distance to hospitals and mortality from acute diseases in Japan: National database analysis. *Journal of Public Health Management and Practice*, *19*, E23–E28. https://doi.org/10.1097/phh.0b013e31828b7150

Mustonen, K., Kantonen, J., & Kauppila, T. (2017). The effect on the patient flow in local health care services after closing a suburban primary care emergency department: A controlled longitudinal follow-up study. *Scandinavian Journal of Trauma, Resuscitation and Emergency Medicine*, *25*, 116. https://doi.org/10.1186/s13049-017-0460-3

Nicholl, J., West, J., Goodacre, S., & Turner, J. (2007). The relationship between distance to hospital and patient mortality in emergencies: An observational study. *Emergency Medical Journal*, *24*, 665–668. https://doi.org/10.1136/emj.2007.047654

Ogilvie, D., Hamilton, V., Egan, M., & Petticrew, M. (2005). Systematic reviews of health effects of social interventions: 1. Finding the evidence: How far should you go? *Journal of Epidemiology & Community Health*, *59*(9), 804–808. https://doi.org/10.1136/jech.2005.034181

Page, M. J., Shamseer, L., Altman, D. G., Tetzlaff, J., Sampson, M., Tricco, A. C., Catalá-López, F., Li, L., Reid, E. K., Sarkis-Onofre, R., & Moher, D. (2016). Epidemiology and reporting characteristics of systematic reviews of biomedical research: A cross-sectional study. *PLoS Medicine*, *13*(5), e1002028. https://doi.org/10.1371/journal.pmed.1002028

Papaioannou, D., Sutton, A., Carroll, C., Booth, A., & Wong, R. (2010). Literature searching for social science systematic reviews: Consideration of a range of search techniques. *Health Information & Libraries Journal*, *27*(2), 114–122. https://doi.org/10.1111/j.1471-1842.2009.00863.x

Parker, L. (2000). Proximity to maternity services and stillbirth risk. *Archives of Diseases in Childhood Fetal and Neonatal Edition*, *82*, F167–F168. https://doi.org/10.1136/fn.82.2.f167

Pilkington, H., Blondel, B., Drewniak, N., & Zeitlin, J. (2014). Where does distance matter? Distance to the closest maternity unit and risk of foetal and neonatal mortality in France. *European Journal of Public Health*, *24*, 905–910. https://doi.org/10.1093/eurpub/ckt207

Postma, S., Dambrink, J. H., de Boer, M. J., Gosselink, A. T., Ottervanger, J. P., Koopmans, P. C., ten Berg, J., Suryapranata, H., & van 't Hof, A. (2014). The influence of residential distance on time to treatment in ST-elevation myocardial infarction patients. *Netherlands Heart Journal*, *22*, 513–519. https://doi.org/10.1007/s12471-014-0599-8

Ravelli, A., Jager, K., de Groot, M., Erwich, J., Rijninks-van Driel, G., Tromp, M., Eskes, M., Abu-Hanna, A., & Mol, B. W. (2011). Travel time from home to hospital and adverse perinatal outcomes in women at term in The Netherlands. *British Journal of Obstetrics and Gynaecology*, *118*, 457–465. https://doi.org/10.1111/j.1471-0528.2010.02816.x

Roberts, A., Blunt, I., & Bardsley, M. (2014). *Focus on: Distance from home to emergency care*. The Health Foundation and Nuffield Trust.

Roussot, A., Cottenet, J., Combier, E., Gadreau, M., Giroud, M., Béjot, Y., & Quantin, C. (2015). Distribution spatiale de la mortalité hospitalière par AVC en France, 2008–2011. *Journal de Gestion et d'Economie Medicales*, *33*(4), 301–320. https://doi.org/10.3917/jgem.154.0301

Rudge, G. M., Mohammed, M. A., Fillingham, S. C., Girling, A., Sidhu, K., & Stevens, A. J. (2013). The combined influence of distance and neighbourhood deprivation on emergency department attendance in a large English population: A retrospective database study. *PLoS One*, *8*(7), e67943. https://doi.org/10.1371/journal.pone.0067943

Shen, Y. C., & Hsia, R. Y. (2012). Does decreased access to emergency departments affect patient outcomes? Analysis of acute myocardial infarction population 1996–2005. *Health Services Research*, *47*, 188–210. https://doi.org/10.1111/j.1475-6773.2011.01319.x

Shen, Y. C., & Hsia, R. Y. (2016). Association between emergency department closure and treatment, access, and health outcomes among patients with acute myocardial infarction. *Circulation*, *134*, 1595–1597. https://doi.org/10.1161/circulationaha.116.025057

Song, F., Parekh, S., Hooper, L., Loke, Y. K., Ryder, J., Sutton, A. J., Hing, C., Kwok, C. S., Pang, C., & Harvey, I. (2010). Dissemination and publication of research findings: An updated review of related biases. *Health Technology Assessment*, *14*(8), 1–193. https://doi.org/10.3310/hta14080

Souza, V., & Strachan, D. (2005). Relationship between travel time to the nearest hospital and survival from ruptured aortic aneurysm: Record linkage study. *Journal of Public Health*, *27*, 165–170. https://doi.org/10.1093/pubmed/fdi001

Stansfield, C., Brunton, G., & Rees, R. (2014). Search wide, dig deep: Literature searching for qualitative research. An analysis of the publication formats and information sources used for four systematic reviews in public health. *Research Synthesis Methods*, *5*(2), 142–151.

Stevinson, C., & Lawlor, D. A. (2004). Searching multiple databases for systematic reviews: Added value or diminishing returns? *Complementary Therapies in Medicine*, *12*(4), 228–232. https://doi.org/10.1016/j.ctim.2004.09.003

Svensson, L., Karlsson, T., Nordlander, R., Wahlin, M., Zedigh, C., & Herlitz, J. (2003). Safety and delay time in prehospital thrombolysis of acute myocardial infarction in urban and rural areas in Sweden. *American Journal of Emergency Medicine*, *21*, 263–270. https://doi.org/10.1016/s07356757(03)00040-8

Wei, L., Lang, C. C., Sullivan, F. M., Boyle, P., Wang, J., & MacDonald, T. M. (2008). Impact on mortality following first acute myocardial infarction of distance between home and hospital: Cohort study. *Heart*, *94*, 1141–1146. https://doi.org/10.1136/hrt.2007.123612

Wright, K., Golder, S., & Rodriguez-Lopez, R. (2014). Citation searching: A systematic review case study of multiple risk behaviour interventions. *BMC Medical Research Methodology*, *14*(1), 73. https://doi.org/10.1186/1471-2288-14-73

Yaghoubian, A., Lewis, R., Putnam, B., & De Virgilio, C. (2008). Impact on patient outcomes after closure of an adjacent trauma center. *American Surgeon*, *74*, 930–934.

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APPENDIX A: CITATION SEARCH ANALYSIS

	Databases						Citation Search			
References	Medline	Embase	CINAHL	Cochrane Library	WOS	HMIC	WOS	Google Scholar	Reference list checking	Preliminary scoping searches
Acharya et al. (2011)	X	X (twice)								
Andersson et al. (2019)	X									
Avdic (2016)	X	X				X				
Balamurugan et al. (2016)	X	X								
Balamurugan et al. (2018)	X (twice)	X								
Berlin et al. (2016)	X				X					X
Bussieres et al. (2018)			X							
Combier et al. (2013a, 2013b)	X						X	X		
Di Domenicantonio et al. (2016)	X	X								
Dummer and Parker (2004)									X	
Durkin et al. (2005)		X								
El Sayed et al. (2012)	X				X					X
Engjom et al. (2017)							X	X		
Featherstone et al. (2016)							X	X		
Fone et al. (2006)										X
Gomez et al. (2010)		X (twice)								
Gonzalez et al. (2009)	X	X			X					
Grzybowski et al. (2011)									X	
Hansen et al. (2011)					X					
Hsia et al. (2012)	X	X			X		X	X		X
Hsia et al. (2014)		X					X	X		
Jarman et al. (2018)		X								
Knowles et al. (2018)								X		X
Koch et al. (2016)	X	X		X	X					
Langabeer et al. (2016)	X	X								
Lee et al. (2018)					X					
Lerner et al. (2003)	X									
Leyden et al. (2011)	X	X (twice)								
McCoy et al. (2013)					X					

(Continues)

References	Databases						Citation Search		Reference list checking	Preliminary scoping searches
	Medline	Embase	CINAHL	Cochrane Library	WOS	HMIC	WOS	Google Scholar		
Murata and Matsuda (2013)	X				X					
Mustonen et al. (2017)					X		X	X		X
Nicholl et al. (2007)	X	X								X
Parker (2000)									X	
Pilkington et al. (2014)							X	X		
Postma et al. (2014)	X	X								X
Ravelli et al. (2011)									X	
Roberts et al. (2014)						X (twice)				
Rudge et al. (2013)					X					
Shen and Hsia (2012)	X	X (twice)			X					
Shen and Hsia (2016)	X	X (twice)			X		X	X		
Souza and Strachan (2005)									X	
Svensson et al. (2003)	X				X					
Wei et al. (2008)	X	X								X
Yaghoubian et al. (2008)									X	