Searching the literature for studies for a systematic review. Part 2: Resources for searching the medical literature

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Identifying search terms is only 1 part of developing a search strategy. Equally important is the selection of appropriate databases for the search (Table). Databases used for searching the literature may include the content of peer-reviewed journal articles, dissertations, meeting abstracts, trials registries, and other works. Databases vary depending on subject coverage, indexed content, date coverage, and other features. There is much overlap between them, and information science research is starting to look at the problem of "oversearching."[1] It may be that the number of resources searched is less important than searching the chosen resources thoroughly and effectively. Developing a search strategy is an iterative process: the terms that are used should be modified based on what has already been retrieved.[2] After a certain stage, each additional search query returns fewer references that are relevant. Consequently, there comes a point where the rewards of further searching may not be worth the effort required to identify additional references.

PRIMARY RESOURCES

MEDLINE is a database within the online resource PubMed, which is provided by the United States National Library of Medicine. It is a primary source of biomedical information. It includes literature published from 1950 to the present. Currently, citations from more than 5200 journals from around the world in ~40 languages are included; more than 813,500 citations were added to MEDLINE in 2017.[3] The PubMed version of MEDLINE is available free of charge, and it is also often available via paid subscription services such as Ovid and Silverplatter.

Embase, produced by Elsevier, offers journal coverage from 1947 to the present with more than 32 million records, including MEDLINE titles. More than 2900 indexed journals are unique to Embase. More than 1.5 million records are added every year. Embase also includes 2.4 million conference abstracts.[4] It is available by subscription only at Embase.com as well as on several other platforms, including Ovid. It is of limited use for systematic reviews in dentistry and oral health because Elsevier does not index dental journals. Most of the dental journals in the Embase database have been added via MEDLINE, and therefore they include the same content.

The Cochrane Central Register of Controlled Trials (CENTRAL) is a resource developed by Cochrane and is available via the Cochrane Library. Access is on a subscription basis, but some users are able to access it free of charge. It is composed of randomized controlled trials and quasirandomized controlled trials, with a limited number of controlled before-and-after studies and interrupted-time-series studies. The clinical trials are sourced from PubMed, Embase, Clinicaltrials.gov, Koreamed, and the specialized registries maintained by individual Cochrane review groups.[5] Cochrane Oral Health has contributed more than 30,000 clinical trials to CENTRAL. This is a very useful resource for authors of reviews of interventions if they are looking only to include clinical trials.

Searches of MEDLINE, Embase, and CENTRAL are mandatory for a Cochrane intervention review.

SECONDARY RESOURCES

Subject-specific databases can be useful to add to the resources to search. The biggest database exclusively for oral health is the Dentistry and Oral Sciences Source. It covers all areas relating to dentistry, including dental public health, endodontics, facial pain and surgery, odontology, oral and maxillofacial pathology/surgery/

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Table. Resources for searching the literature

Resource	*Internet address*
MEDLINE PubMed	https://www.ncbi.nlm.nih.gov/pubmed
MEDLINE Ovid	http://www.ovid.com/site/catalog/databases/901.jsp
Embase	https://www.elsevier.com/solutions/embase-biomedical-research
Cochrane Controlled Register of Trials (CENTRAL)	https://www.cochranelibrary.com/central
Dentistry and Oral Sciences Source	https://health.ebsco.com/products/dentistry-oral-sciences-source
Cumulative Index of Nursing and Allied Health Literature (CINAHL)	https://www.ebscohost.com/nursing/products/cinahl-databases/cinahl-complete
Latin American and Caribbean Health Sciences Literature Resource (LILACS)	http://lilacs.bvsalud.org/en/
Chinese Knowledge Infrastructure	http://oversea.cnki.net/kns55/
Clinicaltrials.gov	https://clinicaltrials.gov
World Health Organization databases	
International Clinical Trials Registry Platform	http://apps.who.int/trialsearch/
Regional databases	http://www.who.int/library/country/regional/en/

radiology, orthodontology, pediatric dentistry, periodontology, and prosthodontics. The database is updated weekly on the EBSCOHealth platform.[6] Access is by subscription only, but it may be available via a local medical or university library. The Cumulative Index for Nursing and Allied Health (CINAHL) is a database dedicated to nursing topics, but there is some overlap with dental health journals, and it may be worth searching for topics relating to patient care or pain. This database is another that is available through the service provider EBSCO on a subscription-only basis.[7]

If a review is to be truly comprehensive, then literature not in the English language should be considered for inclusion. One of the largest non–English-language databases is the Latin American and Caribbean Health Sciences Literature Resource (LILACS), which provides access to references from journals published in South and Central America. It can be searched in English, Spanish, and Portuguese. Other non–English-language sources include the Chinese National Knowledge Infrastructure (www.cnki.net) and the various databases provided through the World Health Organization. The latter include resources for the Eastern Mediterranean (www.emro.who.int/his/vhsl), and Africa (indexmedicus.afro.who.int).[8]

If clinical trials are the main study design included in the review, it is important to ensure that any ongoing trials are found and documented, because a future iteration of the review may be able to extract results or you may be able to contact the authors. According to the AllTrials campaign, one-half of clinical trials have never published any results, and trials with positive results were twice as likely to be published.[9] Trial registries, where a trial may be recorded even if it has not ever been published in a journal, are therefore an important resource. Searches of the United States National Institutes of Health Trials Registry (clinicaltrials.gov) and the World Health Organization's International Clinical Trials Registry Platform (ICTRP) are mandatory for Cochrane intervention reviews. Clinicaltrials.gov is a database provided by the United States National Library of Medicine of privately and publicly funded clinical studies conducted globally, and coverage includes 204 countries and more than 280,000 studies.[10] ICTRP is not a trial registry in itself, but a portal through which to search other trials registries. Registries covered include Australia and New Zealand Clinical Trials Registry, the Chinese Clinical Trial Registry, the German Clinical Trials Registry, the Iranian Registry of Clinical Trials, and the Netherlands National Trials Registry.[11]

CHOOSING A SERVICE PROVIDER

Some of the resources that might be searched are available from more than 1 service provider. For example, Embase is available at Embase.com but also via the Ovid service provider. MEDLINE is available via PubMed but also via the subscription services EBSCO and Ovid. The PubMed version is free of charge, but the subscription-based services offer many useful features and a more sophisticated searching interface. Links to the full text of articles are also often included. In most cases where there is access to both the free version and the subscription version, the subscription version is usually superior and should be used in preference to the free version. A medical librarian or subject specialist will be able to offer advice on which services are available at a university or hospital library. The choice of service provider influences the search strategy, because each requires the search to be formulated or entered in a

different way. As the search is documented, the choice of service provider should be recorded so that the search strategy can be replicated.

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