Literature Searching For Systematic Reviews

When considering undertaking a systematic review, it should first be determined that a good quality review of the topic of interest does not already exist. If one does exist, is it in need of updating or of poor quality? If so, consider whether an update to the existing systematic review is in order, or whether a new systematic review should be done. Also try to determine that there is not a systematic review currently under way for the topic of interest.

The time required to develop an optimal search strategy is often underestimated. Searching is a very complex and time-consuming process. This section aims to provide guidance for those undertaking a literature search for a systematic review.

√ Obstacles to consider:
- Many databases available
  - Each covers different types of information and subject areas
  - Each has its own unique organization
    - Subject headings, indexing, limits are all different
  - See EBM Databases, Useful Resources for EBM Literature Searching, and Adverse Effects and Patient Safety Resources for suggested databases and resources
- Conference proceedings
  - Many access points available to locate conference proceedings
    - Databases
    - Websites
  - See EBM Databases and Useful Resources for EBM Literature Searching for suggested access points to conference proceedings
- Clinical trials registers
  - Scattered, no consolidated listing
    - WHO (World Health Organization) has created the International Clinical Trials Registry Platform (ICTRP) Search Portal to help address this issue
  - May be specialized e.g. Cancer
  - See Trials Registers for suggested access points to clinical trials registers
- Grey Literature (aka Fugitive literature)
  - See the Grey Literature Subject Guide available from The University of British Columbia Library: Subject Resources for Searching for Grey Literature
  - See Useful Resources for EBM Literature Searching and Adverse Effects and Patient Safety Resources for suggested databases and resources for grey literature
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- Non-English language studies
  - Access
  - Translation

- Determination of relevant key journals in topic area to hand search

- TIME
  - to develop an optimal search strategy
  - to conduct a comprehensive search to identify relevant studies

✓ Searching Steps
- Formulate a focused question in PICOS format

- Identify:
  - Appropriate electronic databases
  - Key journals for hand searching
  - Grey literature resources
    - Societies and organizations that might publish in topic area
    - Conferences seminal to topic area
      - Identify where abstracts are published

- Review all reference lists and bibliographies of included studies for relevant studies that were not picked up through electronic search

- Contact authors as appropriate for more details of their work or to inquire if additional unpublished studies are available

- If the topic of interest involves pharmaceuticals or medical devices, consider contacting the individual companies and manufacturers for unpublished studies held in their private databases

✓ Start with a scoping search based on the focused PICOS question
- This helps determine the extent of the primary clinical research literature

- Select a few seminal articles that answer the PICOS question
  - Analyze these articles for relevant keywords
  - Analyze database records for indexing
    - Each database may use different indexing terms and controlled vocabulary (thesaurus)
      - A controlled vocabulary such as Medical Subject Headings (MeSH), provides a consistent way to retrieve articles
        - Note: MeSH is often incorrectly referred to as Medline Subject Headings
    - In PubMed or MEDLINE, examine the complete reference for each article and note the MeSH (Medical Subject Headings) assigned to each article
      - See examples of the same article with MeSH subject headings assigned in PubMed and MEDLINE databases
Develop search strategy

- It is highly desirable to consult with and involve a medical librarian or information professional as effective searching is a complex skill.
  - Work together, reviewer and librarian, to develop an optimal search strategy

- One method to design an effective combination of search terms is to break the focused PICOS question into concepts or 'facets'. e.g. population, interventions, outcomes, and study designs
  - **Note**: it is often NOT necessary to include ALL the facets in the final search strategy

  - For each 'facet' identify the terms (text or keywords) that best represent that 'facet'
    - Draw up a list for each term, considering all possible synonyms and spelling variants
      - Don’t forget to include common spelling mistakes!
    - Use controlled vocabulary (thesaurus) terms and subject headings combined with the previously identified text or keywords

  - Combine the terms within each 'facet' using Boolean "OR"
    - **Boolean ‘OR’**
      - The OR operator retrieves all works that contain any or all of the search terms it separates. This type of search retrieves more results than if you searched for one of the terms on its own.
    - **Boolean ‘AND’**
      - The AND operator retrieves all works that contain the search terms it separates. However, this type of search normally retrieves fewer results than if you searched for one of the terms on its own.
    - See Ovid Quick Reference Cards
      - Basic
      - Advanced

  - Search for each concept or 'facet' separately and then combine. By creating separate concept sections, it is much easier to modify your strategy and reuse sections in different combinations.

  - Combine all the 'facets' needed for your search strategy using Boolean “AND”
    - **Boolean ‘OR’** within the 'facet'; **Boolean ‘AND’** to combine the 'facets'

  - Finally combine with appropriate study design(s) and limits

- Use your set of key or seminal articles to test your search strategy in each database
  - **Test your search strategy**
    - Does your strategy find all your articles?
- If not, keep adjusting the strategy until as many articles as possible are found, based on the content of the database
  o Use the concept or 'facet' groups of terms and discard or keep depending on whether or not relevant studies have been identified

- **NOTE: this is a very iterative, but essential process along the way to an optimal search strategy!**

- For a systematic review to be comprehensive (time and resources permitting), sensitivity is favoured over specificity in order to maximize the number of relevant articles retrieved.

  **NOTE:** It is not unusual to retrieve large numbers of references from each electronic database to be considered for inclusion in the systematic review.

  o There may be thousands of articles to screen, so consider a two-phase screening process
    - The first pass will be to scan title and abstract only for possible relevance
    - The second pass will be a more detailed screening of abstracts and article content
      - Sensitivity: emphasis will be the most relevant articles, but will probably include some less relevant ones
      - Specificity: emphasis will be mostly relevant articles, but will probably omit some

- Tailor the search strategy for **each** database

- Note unique specifics about database
Syntax and available fields will vary, depending upon the database / interface being used. Limits (e.g. years, population age, publication types, etc.) will vary, depending upon the database / interface.

- Consider using search filters for some concepts such as study design, adverse events, safety, or toxicity.
  - Search filters are pre-tested strategies that have been designed to identify the desired concept from the vast amounts of literature indexed in the electronic databases.
  - Like other concept sections of a search strategy, filters need to be tailored for each database.
  - Resources for search filters include:
    - InterTASC Information Specialists' Sub-Group Search Filter Resource
    - The Scottish Intercollegiate Guidelines Network (SIGN) website for Search Filters for study designs
    - The Cochrane Handbook for Systematic Reviews of Interventions
  - NOTE: consult with your medical librarian for appropriate filters

Electronic databases

- There are many potentially useful electronic databases. Some are more general such as MEDLINE, while others are more relevant to specific topics such as complementary and alternative medicine or toxicology.
  - Consult with a medical librarian or information professional to help identify relevant electronic databases.

- Generally MEDLINE, EMBASE, the Cochrane Database of Systematic Reviews (CDSR), Cochrane Central Register of Controlled Trials (CCTR), Database of Abstracts of Reviews of Effectiveness (DARE), PubMed, Web of Science and/or Scopus, and an interdisciplinary database such as Academic Search Premier or Pascal will be included in every systematic review.

- Relevant specialty databases should also be included such as ERIC, PsycINFO, AMED, International Pharmaceutical Abstracts (IPA), or others to search more specialized literature.

- Databases for conference proceedings and papers such as OCLC’s ProceedingsFirst, or Conference Papers should also be included as well as databases for dissertations and theses.

- It is important to be comprehensive in the choice of electronic databases as well, as there is not a single electronic database that is comprehensive enough to cover all subjects and publication formats (journals, books, proceedings, etc.).

- Tip: The clinical queries page in PubMed provides customized searches for studies based on etiology, diagnosis, prognosis, or treatment of a particular disease.
  - Clinical Queries, can be used to locate a few relevant articles on a topic, however they are not sufficiently developed to be useful for the comprehensive searching required for a systematic review.
They are **not** intended to provide a comprehensive literature search. They **are** intended to provide a few good articles to help clinicians make informed health care decisions.

- **Tutorials:**
  - **PubMed**
    - [PubMed Online Training](#)
    - [PubMed Basics Brochure](#)
      - Covers basic features of NLM's PubMed
    - [PubMed My NCBI Brochure](#)
      - Covers the basic features of the My NCBI feature of NLM's PubMed including registering, saving searches and filters.
    - [Searching PubMed with MeSH [PDF]](#)
      - A pamphlet highlighting major aspects of the MeSH controlled vocabulary
  - [Ovid Online Tutorials](#)
  - [Ovid Training Guides](#)

- **Tip Sheets**
  - [Tip Sheet for transferring references from OVID databases](#) (University of Alberta)
  - [Creating Ovid Personal Accounts and Saving/Executing Search Histories](#) (University of Alberta)
  - [Ovid Auto Alerts](#) (University of Alberta)
  - [Searching Tips – MEDLINE & CINAHL](#) (Duke University Medical Center Library)

- **Other literature resources to consider searching**
  - Clinical trials registers
    - See [Trials Registers](#) for a partial
  - Grey Literature (aka Fugitive literature)
    - Each comprehensive literature search for a systematic review should include searching the websites of relevant professional organizations and societies for unpublished trials and studies.
    - **Note:** Grey literature needs to be evaluated in the same manner as any other resource you may consider using.
    - See:
      - An excellent Grey Literature Subject Guide is available from The University of British Columbia Library: [Subject Resources for Searching for Grey Literature](#)
      - [New York Academy of Medicine's Grey Literature Report](#)
      - [Health technology assessment on the net: a guide to internet sources of information](#), 8th Ed.
- Hand searching of the last 5 years of relevant key journals for abstracts and unpublished studies
  - See:
    - *Top 10 Pediatric and Emergency Medicine Journals* for the most highly impact factor ranked (ISI Journal Citation Report, 2006) journals in pediatrics and emergency medicine
    - Consider Open Access journals as many are not indexed in PubMed or MEDLINE
      - e.g. DOAJ – Directory of Open Access Journals
      - OAIster
      - OpenDOAR – Directory of Open Access Repositories

- Review of the reference lists and bibliographies of all included studies, as well as any reviews found

- Unpublished literature can also be located by contacting authors, subject experts, or centres of excellence.

  **Tip:** the manual searching and grey literature searching is an important step to not be overlooked, as not every journal is indexed in electronic databases, and for those journals that are indexed, not every article is indexed. This ensures a comprehensive search has been completed for the topic question.

- If the topic question involves pharmaceuticals or devices, also consider contacting the manufacturers and companies for any completed or ongoing trials and unpublished studies.

√ **Record your search history as you go along**
  - The systematic review process should be transparent and replicable. Document each search including:
    - Name of database
    - Name of your search strategy
    - Date run in the database
    - Limits (if any)
    - Results
    - Actual search strategy

√ **Export search results to preferred bibliographic or citation management software**
  - Tip: add name of database where records were found (use a global editing function present in most bibliographic management programs and actual date search was run)
    - Useful if you need to check a record
      - Merge all records together and remove duplicates
Bibliographic or citation management software systems

- These are citation management and formatting software that facilitate the collection and management of citations to articles, books, web pages and many other types of resources.

- They are often provided free to students, faculty and staff by academic institutions. Check with your medical librarian for access to bibliographic management systems offered through your home institution.

- General features include:
  - Electronically collect, organize and manage your references in a personal database
  - Easily and automatically format bibliographies, footnotes, in-text citations and images into almost any output style
  - Automatically link references to full-text articles, eliminating unwieldy storage of paper copy
  - Utilize advanced searching, global editing, sorting and duplicate record management
  - Automatically preview formatted references
  - Edit output styles, import filters and connection files
  - Collect and manage images (e.g., charts, photographs, tables, etc.) in a personal database (EndNote)

- **RefWorks**
  - **Advantages:**
    - Access your RefWorks account from anywhere you have access to the Internet.
    - Export records from databases to RefWorks
    - Use RefWork’s Write N Cite feature to insert references directly into MicroSoft Word, using the citation style of your choice.
    - Most institutions that provide access to RefWorks have a direct link to allow access to the electronic version of journal articles
    - RefWorks simplifies collaborative projects, by allowing everyone in the group access to the same RefWorks database, regardless of where they access RefWorks.
    - RefShare, another way to collaboratively use RefWorks
    - You do not need to worry about updates and new versions

  - **Disadvantages:**
    - Web-based, so you need Internet access to be able to use this bibliographic management program

- [RefWorks login Center](#)

- Tutorials:
  - [RefWorks Tutorial Basics](#)
  - [RefWorks User Quick Start Guide](#)
  - [RefWorks Users Guide](#) (University of Alberta)
- **EndNote**
  - Advantages:
    - Palm compatible with OS 4.0 – 5.x
    - Link references to full-text articles or other material on the Web
    - Drag and drop pdf and other files onto a reference for auto-linking and storage with the references
    - Track images including charts, figures and equations with a caption, keywords and more
  - Disadvantages:
    - Requires individual purchase by user; an educational discount may be available through your academic institution.
    - Only available on the computer where it is installed depending on license and version of EndNote
      - EndNote can be put on a network to share libraries across mixed platforms
  - [Download a Free Trial copy of EndNote](#)
  - Tutorials:
    - EndNote X1

- **Reference Manager**
  - Advantages:
    - Palm compatible with OS 4.0 – 5.x
    - Reference Manager databases can be made available in a Web environment for yourself and others to access
    - Reference Manager is the only true multi-user network program in this category allowing multiple users to read and write to the same database down to the field level within the same bibliographic record.
      - Depends on license and version of Reference Manager
  - Disadvantages:
    - Requires individual purchase by user; an educational discount may be available through your academic institution.
    - Only available on the computer where it is installed.
      - Depending on license and version of Reference Manager alternate configurations are possible
  - [Download a Free Trial copy of Reference Manager](#)
  - Tutorials:
    - Reference Manager 11 Basics
    - Introduction to Reference Manager (Imperial London College)

√ **Important note on bibliographic citation management systems:**
  - Citations can easily be transferred from one bibliographic citation management system to another. See your medical librarian for guidance. There is no need to be concerned about losing your work, no matter which program you choose.
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√ RefWorks and systematic reviews
  - See tutorials for general usage of RefWorks
    • RefWorks Tutorial Basics
    • RefWorks User Quick Start Guide
    • RefWorks Users Guide (University of Alberta)
  - RefWorks can be utilized for your entire systematic review
    ▪ See Screening in RefWorks documents to follow
    ▪ Article Retrieval in RefWorks documents to follow
    ▪ RefWorks to RevMan documents to follow
  - RevMan
    ▪ RevMan is the Cochrane Collaboration’s program for preparing and maintaining Cochrane reviews
      • RevMan information
      • RevMan documentation
      • RevMan download

√ Citation Style Guides
  - International Committee of Medical Journal Editors (ICMJE)
    ▪ Writing and Editing for Biomedical Publication
    ▪ International Committee of Medical Journal Editors Uniform Requirements for Manuscripts Submitted to Biomedical Journals: Sample References
  - Vancouver Style
    ▪ References/Bibliography Vancouver Style "How-to" Guide (The University of Queensland,Australia)
  - Recommended Formats for Bibliographic Citation, Supplement: Internet Formats (National Library of Medicine)
  - Cochrane Style Resource

√ On the lighter side...
  - Redelmeier DA, Shuchman M, Shumak SL. How to read clinical journals: IX. Sounding like you've read the literature when you haven't read a thing. CMAJ 1998;159(12):1488-9.
  - Shumak SL, Redelmeier DA. How to read clinical journals: X. How to react when your colleagues haven't read a thing. CMAJ 2000;163(12):1570-2.
  - Redelmeier DA, Shumak SL. How to read clinical journals: XI. Everything you always wanted to know about editorials (but were afraid to ask). CMAJ 2003;169(12):1323-5.
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McKibbon, Ann; Eady, Angela; and Marks, Susan. PDQ evidence-based principles and practice. Hamilton, ON: BC Decker Inc., 1999.


References:

- Grey Literature


  Moher D, Pham B, Lawson, ML, Klassen TP. The inclusion of reports of randomized trials published in languages other than English in systematic reviews. Health Technology Assessment. 7(41): 1-90. 2003.