How to Conduct a Systematic Search

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https://libraryguides.mcgill.ca/epib-619
Learning outcomes

- Identify the goal of systematic searching
- Find relevant article databases to search
- Identify subject headings (MeSH) and textwords for a PubMed search
- Apply search techniques in PubMed
- Identify the issues in translating a search to Embase
- Use library EndNote resources to support export and deduplication of records
“Systematic reviews of interventions require a thorough, objective and reproducible search of a range of sources to identify as many relevant studies as possible (within resource limits).”

High sensitivity (often with painfully low precision)
Well documented

For guidance on selecting article databases as well as other steps of the process, please see

**Systematic Reviews, Scoping Reviews, and Other Knowledge Syntheses**

http://libraryguides.mcgill.ca/knowledge-syntheses/home

**Other sources of info on databases:**

- **Library subject guides**
  http://www.mcgill.ca/library/find/subjects

- **Cochrane reviews/other knowledge syntheses: What did they search?**
What to do before initiating a review

Make sure nobody has already done a good, recent synthesis on your topic

- Perform exploratory searches to get a feel for the literature or to refine your question if needed
How to find articles: Process

1. Develop a focused research question
2. Select databases (do not rely on only one)
3. Develop a full search strategy for one database
4. Run search
5. Export references to EndNote
6. Document (see PRISMA checklist)
7. Adapt the original search strategy to the next database and repeat 4 through 7
Break your question down into defined/operationalized search concepts

- Make sure you have clearly defined your concepts; inclusion/exclusion criteria help
- For example, if you are only interested in studies conducted in a primary care setting, primary care could be a search concept
- Not all the concepts in your research question will necessarily be used in your search
Example of a research question

▶ Does male circumcision prevent HIV infection in sexually active heterosexual men?
▶ Inclusion criterion: randomized controlled trials
Heterosexual males

Circumcision

Prevention of HIV (infection)

Randomized controlled trials
Identify concept sets to include

<table>
<thead>
<tr>
<th>Concept #1: Circumcision</th>
<th>Concept #2: HIV Infection</th>
<th>Concept #3: RCT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subject Headings</td>
<td>AND</td>
<td>AND</td>
</tr>
<tr>
<td>Text Words</td>
<td>OR</td>
<td>OR</td>
</tr>
</tbody>
</table>
Exercise: Identify search concepts

Using your research question, identify the concepts to include in your search strategy; write them at the top of the columns in the worksheet.
A systematic search is made up of 2 parts

- In PubMed: MeSH, aka subject headings, aka controlled vocabulary
- Keywords/Textwords

Both are needed to build a sensitive search
What is MeSH?
Why bother with MeSH?

Cancer(s)...
Cancerous
Tumo(u)r(s)...
Metastases...
Neoplastic...

“Neoplasms”[MeSH]
Subject headings are hierarchically structured

Indexers assign the most precise heading available

e.g., An article about breast cancer will be indexed with the subject heading “Breast Neoplasms”, but “Neoplasms”[MeSH] will by default pick up articles indexed with narrower subject headings under it in the vocabulary tree.
Use the MeSH Database, available via the dropdown menu next to the search box in PubMed

Look at records of relevant articles

Look at other systematic reviews
Use the MeSH Database

<table>
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<tr>
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</tr>
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<td>OR</td>
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<td>OR</td>
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<td>OR</td>
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</tbody>
</table>
Use relevant articles you have already found to help identify additional search terms

- E.g., plug the title of a relevant article into PubMed to find the article’s MEDLINE record (if available) and then “harvest” the record for search terms (subject headings, textwords – more on textwords coming up in later slides)

- Example of relevant article with a (new) MeSH term: https://www.ncbi.nlm.nih.gov/pubmed/17321310
Examine search strategies for individual concepts as documented in published systematic reviews

- Note of caution: They’re not always well done/easy to follow
- Cochrane reviews are usually very well documented and often very useful – but use caution there too, compare a few
Exercise: Identify search concepts

Using your own question and worksheet, identify MeSH terms for each concept
Identify textwords for each concept

Why textwords if we have identified subject headings?

1. Not all citations have subject headings, e.g., [PubMed - in process], [PubMed-not-MEDLINE]
2. Not all concepts have subject headings
3. Indexers are only human (they make mistakes) and automated algorithms are imperfect
4. Not all databases use subject headings
Identify textwords for each concept

- **P**: Heterosexual males
- **I**: Circumcision
- **C**: Prevention of HIV (infection)

Randomized controlled trials
<table>
<thead>
<tr>
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<th>Concept #3: RCT</th>
</tr>
</thead>
<tbody>
<tr>
<td>“Circumcision, male”[mesh]</td>
<td>“Hiv infections”[mesh]</td>
<td>AND</td>
</tr>
<tr>
<td>“HIV”[mesh]</td>
<td></td>
<td>AND</td>
</tr>
<tr>
<td>Circumcision</td>
<td>HIV</td>
<td></td>
</tr>
<tr>
<td>Circumcisions...</td>
<td>Human immunodeficiency virus...</td>
<td>We’ll cover this later</td>
</tr>
<tr>
<td></td>
<td>AIDS</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Acquired immunodeficiency syndrome...</td>
<td></td>
</tr>
</tbody>
</table>
Referring to the concepts you have identified in your research question, identify a few textwords that may be used in the literature to capture your concepts

- e.g., the concept of primary care may be captured through the use of terms like primary health care, primary healthcare, family medicine, family doctor(s), family physician(s), general practice, general practitioner(s), community clinic(s), ambulatory care, etc.
How do we combine our keywords/textwords together with the MeSH terms?

And then...

How do we combine our concepts?
Combine similar terms (MeSH, keywords) within a concept with OR:

- e.g.,
  - “primary health care”[mesh] OR “primary health care” OR “primary healthcare” OR “primary care” OR “family medicine” OR “family physician” OR “family physicians” OR “family doctor” OR “family doctors” OR “general practice” OR “general practitioner” OR “general practitioners” OR “community clinic” OR “community clinics”...
Combine different concepts with AND:

- E.g., (Circumcision concept set) AND (HIV infections concept set)
Run the final search: Procedure

• Start with your first concept
  – Search for the subject headings first
  – Then search text words
  – Combine these synonymous searches with OR using your search history

• Repeat for your second, third, and subsequent concepts

• Finally, combine result sets (ORed synonym sets) for your different concepts with AND
Run the Search
Demo
Limits that won’t negate benefit of textword searching:

1. **Date of publication**
   - only studies conducted between 2000 and present (should have a good reason for a date limit though)

2. **Publication language**
   - only materials written in English or French (try to cover as many languages as your team can read; consider finding team member with specific language skills if you notice many records in a particular language)

Avoid using limits which will cut out studies that have not been indexed, e.g. humans, age groups

- Use neat tricks like #x NOT (“animals”[mesh] NOT “humans”[mesh]) instead (see course guide for more)
RCT hedge/filter/search strategy

- Usually database/platform-specific
- Copy and paste versions for PubMed or Ovid MEDLINE or Ovid Embase from the course guide: http://libraryguides.mcgill.ca/epib-619/rct-filters
- e.g., this one is designed for PubMed:

  ((randomized controlled trial[pt]) OR (controlled clinical trial[pt]) OR (randomized[Title/Abstract] OR randomised[Title/Abstract]) OR (placebo[Title/Abstract]) OR (drug therapy[sh]) OR (randomly[Title/Abstract]) OR (trial[Title/Abstract]) OR (groups[Title/Abstract])) NOT (animals[mh] NOT humans[mh])
Example of a PubMed search

<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
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<tr>
<td>#17</td>
<td>Add</td>
<td>Search (English[Language] OR French[Language])</td>
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</tr>
<tr>
<td>#16</td>
<td>Add</td>
<td>Search (#14 AND #15)</td>
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</tr>
<tr>
<td>#13</td>
<td>Add</td>
<td>Search (#9 OR #10 OR #11 OR #12)</td>
<td></td>
</tr>
<tr>
<td>#12</td>
<td>Add</td>
<td>Search aids[Title/Abstract] OR acquired immunodeficiency syndrome*[Title/Abstract] OR acquired immuno deficiency syndrome*[Title/Abstract] OR acquired immune deficiency syndrome*[Title/Abstract] OR acquired immunedeficiency syndrome*[Title/Abstract]</td>
<td></td>
</tr>
<tr>
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</tr>
<tr>
<td>#7</td>
<td>Add</td>
<td>Search Circumcision*[Title/Abstract]</td>
<td></td>
</tr>
<tr>
<td>#6</td>
<td>Add</td>
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<td></td>
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</tbody>
</table>
Using some of all of the terms you have entered in your worksheet, develop a PubMed search

- Use the MeSH Database to add the MeSH terms to your search
- Use Title/Abstract as the fields for your keyword search
EPIB-619

Export records to EndNote
Exporting records

- See the course guide
- See the EndNote handout
Document your search
#7) Describe all information sources (e.g. databases with dates of coverage, contact with study authors to identify additional studies) in the search and **date last searched**.

#8) **Present full electronic search strategy** for at least one database, including any limits used, **such that it could be repeated**.

Save a copy your PubMed search

<table>
<thead>
<tr>
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<th>Add to builder</th>
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<th>Items found</th>
<th>Time</th>
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<td>#7</td>
<td>Add</td>
<td>Search Circumcis*[Title/Abstract]</td>
<td>5911</td>
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</tr>
<tr>
<td>#6</td>
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<td>4577</td>
<td>09:23:36</td>
</tr>
</tbody>
</table>
Search Embase on Ovid
Retain as much of your original strategy as possible

Recognize that subject headings will be different (or non-existent)

- Embase uses subject headings from a controlled vocabulary called EMTREE

Keep track of your search terms using a new worksheet
See SearchDocumentation.docx in DropBox or in course guide for a template of the type of information you should be recording per PRISMA guidelines.
De-duplicate EndNote records

https://www.flickr.com/photos/fortcollinschiropractor/6169824610
Removing duplicates from EndNote

See the course guide for information on exporting records to / removing duplicates from EndNote: http://libraryguides.mcgill.ca/epib-619/endnote
Document # of duplicates removed

For more information, visit www.prisma-statement.org.
Questions?

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Guides available to you

EPIB-619 Library Course Guide:

Health Sciences Research Basics:
http://libraryguides.mcgill.ca/healthscibasics

Systematic Reviews, Scoping Reviews, and Other Knowledge Syntheses:
http://libraryguides.mcgill.ca/knowledge-syntheses

Info on our Systematic Review Service:
https://www.mcgill.ca/library/services/systematic-review-service
Useful resources


Ovid Technologies, Inc. **OvidSP online training.** [http://www.ovid.com/site/support/training.jsp](http://www.ovid.com/site/support/training.jsp)
Additional references


