Searching and selecting primary studies

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What makes a good systematic review search?

- Systematic approach
  - Clear research question (PICOT)
  - Comprehensive literature search
  - Free of bias (publication bias, language bias)
  - Documentation of search strategies
  - As up-to-date as possible
Whatever we do, we are guaranteed to miss studies!

Steps involved...

Define a focused 4-part review question (Patient, Intervention, Comparison and Outcome)

<table>
<thead>
<tr>
<th>Steps</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Publish, Index, Web of Science, Ovid CENTRAL, and subject-specific databases; Contact authors, experts, competitors, citation tracking.</td>
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</tr>
<tr>
<td>2. Use filters for specific study designs (e.g., PubMed Clinical Queries filters, and Cochrane filter for RCTs).</td>
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<tr>
<td>3. Review guidelines on systematic reviews, and prepare a protocol.</td>
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<tr>
<td>4. Identify appropriate databases and sources of studies.</td>
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<tr>
<td>5. Run searches on all relevant databases and sources.</td>
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<tr>
<td>6. Save all citations (title/abstracts) in a reference manager.</td>
<td></td>
</tr>
<tr>
<td>7. Document search strategies that were employed.</td>
<td></td>
</tr>
<tr>
<td>8. These citations are ready for first screen (N).</td>
<td></td>
</tr>
<tr>
<td>9. Reviewer 1 screens all titles/abstracts and makes selections for second screen.</td>
<td></td>
</tr>
<tr>
<td>10. Reviewer 2 screens all titles/abstracts and makes selections for second screen.</td>
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</tr>
<tr>
<td>11. Reviewers meet and resolve disagreements on citations they do not agree on.</td>
<td></td>
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<tr>
<td>12. The final number (N) selected after this process is ready for second screen review of full text articles.</td>
<td></td>
</tr>
<tr>
<td>13. Get full texts of all articles identified for second screen (N).</td>
<td></td>
</tr>
<tr>
<td>14.Articles considered eligible after full text review (by two reviewers) in the final set of studies for inclusion (n).</td>
<td></td>
</tr>
<tr>
<td>15. Studies included in the final analysis (n).</td>
<td></td>
</tr>
<tr>
<td>16. Each article gets a unique ID number.</td>
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</tbody>
</table>

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Sources to search

- Electronic databases:
  - General: Cochrane CENTRAL, PubMed, Embase, etc.
  - Subject-specific: AIDSLINE, CANCERLIT, PsycInfo, ERIC, etc.
- Reference lists of included studies
- References lists of earlier reviews, commentaries
  - CDSR, DARE, PubMed search with filters for systematic reviews
- Personal communication with experts and authors
- Contacting drug/device companies
- Handsearching of key, high-yield journals
- Grey literature
  - Dissertation abstracts, reports, conference proceedings, etc.
- Sources of ongoing trials
  - Trial registers, drug companies, contacting experts

A suggested COSI strategy...

- PubMed
- Embase
- Cochrane CENTRAL
- Bibliography of included studies and relevant reviews
- Write to experts
- Handsearch key journals
- Other general databases
- Subject-specific databases

Legend:
- CO:
  - Quicker
  - More precise
  - Best results
- Standard:
  - More grey literature
  - Somewhat slower
  - Probable results
- Ideal:
  - Somewhat slower
  - Probable results

Conference proceedings
Grey literature
Unpublished literature
Contact companies
Ongoing trials
Cochrane Library

- Cochrane Database of Systematic Reviews
  - contains more than 4000 systematic reviews and more than 1900 protocols
- Controlled Trials Register (Central)
  - contains citations to more than 600,000 clinical trials identified by Cochrane collaboration
- DARE (Database of Reviews of Effectiveness)
  - >6000 systematic reviews

CDSR has an impact factor of 5.182 for 2008 and is ranked 12th in the “Medicine, General & Internal” category

http://www3.interscience.wiley.com/cgi-bin/mrwhome/106568753/HOME
**Medline/PubMed**

- Includes 19 million citations and abstracts from more than 4300 journals, extends back to 1948
- PubMed version is very current with new data being added weekly
- Old Medline extends from 1958-1965
- Print Index Medicus extends back to 1879
- Strong North American focus (52% of journals are from US)

**Embase**

- EMBASE.com is a biomedical and pharmacological bibliographic database
- It contains over 19 million indexed records from 7,000+ peer reviewed journals, covering 1947 to date, with more than 600,000 additions annually.
- Strong coverage of the drug literature
- Overlap with Medline averages 34% but can vary from 10%-70% depending on topic
- Approximately 30% of journals indexed are North America
To tame the beast

- Learn the controlled vocabulary of each database
  - Learn to use MeSH or equivalent subject headings and textwords for most effective searching
- Learn to perform multiple overlapping searches and “cross” them using Boolean operators
- Learn to use limits and study design filters to focus the search
- Involve a librarian who is familiar with the database
Other electronic databases

- **General:**
  - Web of Science
  - Biosis
  - LILACS
  - DARE
  - Google Scholar

- **Subject-specific:**
  - CINAHL
  - PsycINFO
  - ERIC
  - CANCERLIT
  - TOXNET
  - AIDSLINE
Reference lists
- Check bibliographies of relevant articles
- Also check references from existing reviews & meta-analyses

Handsearching
- Not all journals are indexed in databases
- May be incorrectly indexed
- Journals may be indexed selectively
- Select one or more “high-yield” journals in your topic area and “handsearch” it

Personal communication
- Personal communication with colleagues
- Contact experts in subject area
- Contact pharmaceutical companies or CROs
  - Might be very useful for drug trials and diagnostic assays

Grey literature
- Hard to track down, much is unpublished
- Includes conference papers, dissertations, government reports, proceedings, technical reports, house journals, corporate documents, research reports
Documenting your search

Elements to be included in the systematic review and protocol:

<table>
<thead>
<tr>
<th>Sampling Strategy</th>
<th>Specify the sampling strategy:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>- Comprehensive: attempts to identify all relevant studies on the topic</td>
</tr>
<tr>
<td></td>
<td>- Selective: attempts to identify all relevant studies but only within specific limits</td>
</tr>
<tr>
<td></td>
<td>- Purposive: samples from specific subgroups, phases, periods</td>
</tr>
<tr>
<td>Type of Studies</td>
<td>Fully reported: describes actual study types or designs to be included (e.g., RCTs, cohort)</td>
</tr>
<tr>
<td></td>
<td>Partially reported: uses an “umbrella” category such as “qualitative studies” without specifying what that means</td>
</tr>
<tr>
<td>Approach</td>
<td>Describe all the approaches to locating studies (e.g., hand-searching, citation snowballing)</td>
</tr>
<tr>
<td>Range of Years</td>
<td>Include start and end dates for each resource including justification for the time period chosen. Be sure to indicate the dates the searches were conducted</td>
</tr>
<tr>
<td>Limits</td>
<td>Functional limits that are applied for logical reasons but do not alter the topic (e.g., age, sex, concepts, English)</td>
</tr>
<tr>
<td>Inclusions &amp; Exclusions</td>
<td>Conceptual limitations that modify the scope of the topic area (e.g., geographic location, setting)</td>
</tr>
<tr>
<td>Terms Used</td>
<td>Search string from one or ideally all of the databases searched. Use exact search string and operators (e.g., Boolean operators AND, OR, proximity operators, truncation)</td>
</tr>
<tr>
<td>Electronic Sources</td>
<td>Report all databases used, as well as search platforms to assist in replication (e.g., EBSCOhost, Ovid, OVID)</td>
</tr>
</tbody>
</table>

Lorie Kloda

PRISMA 2009 Flow Diagram

Identification

Records identified through database searching (n = )
Records after duplicates removed (n = )
Records screened (n = )
Records excluded (n = )
Full-text articles assessed for eligibility (n = )
Studies included in qualitative synthesis (n = )

Screening

Eligibility

Studies included in quantitative synthesis (meta-analysis) (n = )

Included

Additional records identified through other sources (n = )
**Searching PubMed**

- Overall search technique
  - ask the searchable 4-part question
  - formulate a search strategy in advance
  - use appropriate key words [MeSH terms]
  - do multiple separate searches for P,I,C,O
  - combine the search hits using Boolean operators [AND, OR, NOT]
  - use study design filters & limits to focus the search (if necessary)
Example

Question:
Among commercial sex workers, does the use of vaginally administered microbicides and spermicides reduce the risk of acquiring HIV infection, as compared to placebo?
Search strategy

Commercial sex workers

Microbicides

HIV

best hits!

Filter for RCTs (if required)

Search strategy: study design filters

PubMed Clinical Queries

- Search by Clinical Study Category
- Find Systematic Reviews
- Medical Subject Headings

Results of searches on these pages are limited to specific clinical research areas. For comprehensive searches, use PubMed directly.

Search by Clinical Study Category

- This search finds citations that correspond to a specific clinical study category. The search may be either broad and sensitive or narrow and specific. The search filters are based on the work of topics.

- Strategy
- Search
- Disease
- Procedure
- Clinical prediction guides

Find Systematic Reviews

For your topic(s) of interest, this search finds citations for systematic reviews, meta-analyses, reviews of clinical trials, evidence-based medicine (EBM) (overviews), development conferences, and guidelines.

Medical Subject Headings

This search finds citations and abstracts related to various topics in medical genetics. See the filter table below.

Search