Systematic Reviews:
Nuts and Bolts

Hardin Library Reference
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Contact your library liaison for assistance
Objectives and Agenda

Provide resources to aid in planning and preparing a systematic review project

Increase awareness of services to support your project

This session intended to be first in series
1. Training on conducting effective database searching, identifying sources, and/or using EndNote for citation management
2. Review of already completed search strategies for accuracy and
3. Collaboration to build effective search strategies*
4. Extensive assistance with development of protocol, design of search strategies, assistance with removing duplicates, managing citations, documenting process- including contribution to methods section write-up **

*= for this level of service, an acknowledgement is expected.  
**= Co-authorship is sometimes appropriate (refer to ICMJE authorship criteria).
Definitions

A systematic review is an attempt to locate and summarize all available evidence for a specific question in order to guide decisions and practices. The Cochrane Collaboration identifies the following key characteristics of a systematic review:

- Contains clearly stated set of objectives with clearly defined eligibility criteria
- Uses a reproducible methodology that aims to minimize bias
- Includes a systematic search to identify all related studies
- Includes an assessment of the validity of the findings
- Includes a systematic presentation and synthesis of the findings
Some systematic reviews will include meta-analysis, the use of statistical methods to combine results of independent studies. Combining small studies may better estimate effects and pooling results may also help settle discrepancies that arise when conflicting results are produced.

Additional reasons for conducting meta-analysis are listed in section 9.1.3 of the Cochrane Handbook.
<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Narrative Review</th>
<th>Systematic Review</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clinical question</td>
<td>Seldom reported or addresses several general questions</td>
<td>Focused question, specifying population, intervention or exposure, and outcome</td>
</tr>
<tr>
<td>Search for studies</td>
<td>Search not reported and often not comprehensive</td>
<td>Exhaustive search including multiple databases + grey literature sources</td>
</tr>
<tr>
<td>Selection of studies</td>
<td>Often biased sample of studies-criteria often not detailed</td>
<td>Explicit inclusion and exclusion criteria established in advance</td>
</tr>
<tr>
<td>Evaluation of studies</td>
<td>Seldom reported</td>
<td>Methodologic quality is assessed</td>
</tr>
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</table>
Guidelines and Standards

Key organizations that provide guidance with links to their online material:

Institute of Medicine
Cochrane Collaboration
Agency for Healthcare Research and Quality
University of York Centre for Reviews and Dissemination
Joanna Briggs Institute
Guidelines and Standards

In addition, there are standards for reporting, developed by an international group dedicated to improving the quality of published systematic reviews.

This initiative began in 1996 and was revised in 2009, resulting in The PRISMA Statement (Preferred Reporting Items of Systematic Reviews and Meta-Analysis). Guidance includes the PRISMA flow diagram and the PRISMA checklist.
Is there a need?

It may take months to determine a topic that meets criteria, such as...

- Of interest to researcher
- Has available studies to review (usually 3-5 minimum)
- Has not already been published or in process

Advice for preliminary searching:
1. Use Cochrane Library to see if review completed or in process
2. Search literature databases using review or systematic review filter
3. Check Prospero to identify registered reviews
4. Search major databases using clinical trials and research filters and collect potential usable citations
5. Consult your librarian for help
Assembling a team (3 or more) with sufficient expertise, time, and ability to work together is important.

Gaining familiarity with software (citation management, statistical) prior to beginning the project is advised.
The entire project may take up to a year or potentially longer, depending on topic.

<table>
<thead>
<tr>
<th>Month</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 – 2</td>
<td>Preparation of protocol.</td>
</tr>
<tr>
<td>3 – 8</td>
<td>Searches for published and unpublished studies.</td>
</tr>
<tr>
<td>2 – 3</td>
<td>Pilot test of eligibility criteria.</td>
</tr>
<tr>
<td>3 – 8</td>
<td>Inclusion assessments.</td>
</tr>
<tr>
<td>3</td>
<td>Pilot test of ‘Risk of bias’ assessment.</td>
</tr>
<tr>
<td>3 – 10</td>
<td>Validity assessments.</td>
</tr>
<tr>
<td>3</td>
<td>Pilot test of data collection.</td>
</tr>
<tr>
<td>3 – 10</td>
<td>Data collection.</td>
</tr>
<tr>
<td>3 – 10</td>
<td>Data entry.</td>
</tr>
<tr>
<td>5 – 11</td>
<td>Follow up of missing information.</td>
</tr>
<tr>
<td>8 – 10</td>
<td>Analysis.</td>
</tr>
<tr>
<td>1 – 11</td>
<td>Preparation of review report.</td>
</tr>
<tr>
<td>12</td>
<td>Keeping the review up-to-date.</td>
</tr>
</tbody>
</table>

## Determining a Research Question

<table>
<thead>
<tr>
<th>P – Population</th>
<th>Which age groups, diseases/disorders, genders, etc. are of interest?</th>
</tr>
</thead>
<tbody>
<tr>
<td>I – Interventions</td>
<td>What are the specific treatments, diagnostic tests, etc?</td>
</tr>
<tr>
<td>C – Comparator</td>
<td>Is your intervention being compared to something? Placebo, gold standard, alternative treatment?</td>
</tr>
<tr>
<td>O – Outcomes</td>
<td>What is being assessed? This will greatly determine the validity and generalizability of the systematic review.</td>
</tr>
<tr>
<td>S – Study Designs</td>
<td>What types of studies will be included? Case reports, systematic reviews, cohorts?</td>
</tr>
</tbody>
</table>

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Example Research Question

In adults with chronic obstructive pulmonary disease (COPD), are inhalers with combined beta-antagonists and corticosteroids more effective at managing symptoms than inhaled corticosteroids alone?

- **P** – adults, COPD
- **I** – inhalers with combined beta-antagonists and corticosteroids
- **C** – inhalers with corticosteroids, alone
- **O** – resolution of symptoms
- **S** – RCTs, controlled clinical trials, etc.
Developing a Protocol

A detailed plan for your project

- For Cochrane reviews this is required
- For other reviews, this is optional but recommended
- Prospero is an international registry of protocols for systematic reviews in health and social care, managed by Centre for Review and Dissemination (CRD) and funded by the UK National Institute for Health Research (NIHR)
- Even if you do not register the protocol, writing up the plan will likely be of value
Methods: Searching

- To ensure maximum retrieval, sensitive searches are customary for systematic reviews
- Iterative process—term gathering is important
- The Institute of Medicine recommends working with a librarian or other information specialist to plan out your search strategy and to peer-review the final strategy used
- At least 3 bibliographic databases are advised
- Use of database filters are discouraged
- Web searching or search for grey literature advised by IOM and Cochrane
Methods: Searching

Resources for Searching:

- Literature databases—PubMed, CINAHL, Embase, PsycINFO…
- Reference Lists from relevant papers
- Citation databases for cited reference search (Scopus, Web of Science)
- Clinical Trial Registries (studies in progress)
- Other grey literature such as conference reports, dissertations, reports

More detail to be provided on how to construct database searches in 2nd class in this series
Methods: Screening

- Review and screen results from all database searches before viewing related citations and reference lists.
- Screening involves viewing the title and abstract of citations for potential relevance.
- Consider using EndNote or Endnote Basic to organize citations. This will allow you to identify duplicates easily.
- Screening can be done from citation manager, Excel, or another tool. Important to have independent reviewers.
- Keep track of numbers of citations: total yield, duplicates, included and excluded.
- Past initial screen, reasons for exclusion should also be recorded and will be need to be documented on flow diagram.
Methods: Reporting

Details about the search process

- Information sources used
  - For every database, include database, platform or provider
  - Start and end date for search of each database
- Who developed and conducted the searches
- Supplementary Approaches listed (hand-searching reference lists or journals, clinical trial registries, using “related citation feature” in PubMed, web search, individuals contacted…)
- Flow diagram recommended to document process of de-duping and exclusions

Search terms

- Present the full search strategy for at least one database, including limits used, such that it could be repeated
- Maintain archive of all search strategies
Methods: Reporting

Example of methods section written with assistance from librarian:

Search strategies were developed with the assistance of a health sciences librarian with expertise in searching for systematic reviews. Comprehensive search strategies, including index and keyword methods, were devised for the following databases: PubMed, CINAHL (EBSCO), EMBASE (Elsevier), SPORTDiscus (EBSCO) and Cochrane Central Register of Controlled Trials (Wiley). No database filters were used, in an effort to maximize sensitivity. Searches were conducted during October 2015, and results for each database can be found in the flow diagram (figure 1).

Screenshots of actual published methods and figures:
Methods: Reporting

Example of figure for detailed search strategy reporting

<table>
<thead>
<tr>
<th>Database</th>
<th>Abbreviated search strategy (full results available on request or in appendix)</th>
<th>Result #’s (October 2015)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CINAHL</td>
<td>(MH &quot;Hamstring Muscles&quot; OR &quot;biceps femoris&quot; OR ...) AND (MH &quot;Tendon Injuries+&quot; OR MH &quot;Athletic Injuries+&quot; OR injur* OR rupture<em>OR ...) AND (MW &quot;TH&quot; OR &quot;RH&quot; OR &quot;SU&quot; OR MH &quot;Surgery, Operative +&quot; OR MH &quot;Physical Therapy+&quot; OR nonoperative OR non operative OR nonsurgical OR...) AND (MH &quot;Treatment Outcome+&quot; OR MH &quot;Recovery&quot; OR MH &quot;Functional Status&quot; OR quality of life&quot; OR outcome</em> OR...)</td>
<td>947</td>
</tr>
<tr>
<td>SportDiscus</td>
<td>(DE &quot;HAMSTRING muscle&quot; OR DE &quot;BICEPS femoris&quot; OR TX semitendinon* OR...) AND (DE &quot;HAMSTRING muscle&quot; OR DE &quot;BICEPS femoris&quot; OR TX semitendinon* OR...) AND (DE &quot;SURGERY&quot;[exploded] OR DE &quot;Physical Therapy&quot; [exploded] OR TX conservative OR...) AND (DE &quot;TREATMENT effectiveness&quot; OR DE&quot;Exercise&quot; [exploded] OR TX outcome* OR...)</td>
<td>1538</td>
</tr>
<tr>
<td>Embase</td>
<td>(&quot;biceps femoris muscle&quot;/exp OR 'hamstring'/exp OR 'semitendinos muscle'/exp OR hamstring*:ab,ti OR ...) AND (&quot;tendon rupture&quot;/exp OR 'avulsion injury'/exp OR 'sport injury'/exp OR avulsion*:ab,ti OR ...) AND (&quot;surgery&quot;:link OR 'therapy':link OR 'rehabilitation':link OR 'surgery'/exp OR 'physiotherapy'/exp OR surgical:ab,ti OR....) AND (&quot;self report&quot;/exp OR 'treatment outcome'/exp OR 'functional assessment'/exp OR....) NOT [medline]/lim</td>
<td>583</td>
</tr>
<tr>
<td>Cochrane</td>
<td>(ti,ab,kw &quot;ischial tuberosity&quot; OR ti,ab,kw hamstring OR ...) AND (MeSH Tendon injuries [exploded] OR MeSH Skeletal Muscle IN [exploded] OR ti,ab,kw avulsion* OR...) AND( MeSH Surgical Procedures, Operative [exploded] OR MeSH Physical Therapy Modalities [exploded] OR ti,ab,kw surgical OR...) AND MeSH Treatment Outcome [exploded] OR ti,ab,kw recover* OR outcome* OR....)</td>
<td>119</td>
</tr>
</tbody>
</table>

Figure 1  Search strategies with results for PubMed, CINAHL, EMBASE, SportDiscus and Cochrane databases.
Methods: Reporting

Example of flow diagram
Resources

Hardin Library guide for Systematic Reviews: [http://guides.lib.uiowa.edu/systematicreviews](http://guides.lib.uiowa.edu/systematicreviews)


Grey Literature Guide: [http://guides.lib.uiowa.edu/graylit](http://guides.lib.uiowa.edu/graylit)

Endnote guides
EN Basic: [http://www.lib.uiowa.edu/hardin/endnotebasic/](http://www.lib.uiowa.edu/hardin/endnotebasic/)
EN Desktop: [http://www.lib.uiowa.edu/hardin/endnote-x7/](http://www.lib.uiowa.edu/hardin/endnote-x7/)
Resources

e book from UI Libraries:

e book from UI Libraries:
http://site.ebrary.com/lib/uiowa/Doc?id=10495472