Systematic Reviews: Database Selection, Search Strategies & Reference Management

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Objectives

- What is a systematic review?
- Where can I find guides/standards for creating a systematic review?
- What software tools can help me develop a systematic review?
- What’s the best way to start my literature review?
Objectives

- How do I locate hard-to-find “grey literature”
- How should I document my database searches?
- What are the best references/PDFs/bibliography management applications and why?
- Know where to go for help!
What is a systematic review?

- “A systematic review is a review of a clearly formulated question that uses systematic and explicit methods to identify, select, and critically appraise relevant research, and to collect and analyze data from the studies that are included in the review.”
- “Statistical methods (meta-analysis) may or may not be used to analyze and summarize the results of the included studies.”
- “Meta-analysis refers to the use of statistical techniques in a systematic review to integrate the results of included studies.”

Systematic vs narrative reviews

- Narrative reviews are summaries of research
  - Lack explicit descriptions of systematic methods
  - Evidence is often incomplete
  - Relevance and validity of studies often not explicit
  - Tend to provide a wider view of a topic by a subject “expert”
  - Difficult or impossible to replicate

“The Cochrane Collaboration: What is a systematic review?”
Systematic reviews require...

- Comprehensive and well-formulated **Searches**
- Careful **Assessment** of studies
- Careful **Synthesis** of relevant studies
More specifically...

- Clearly defined question
- Comprehensive search
- Explicit inclusion criteria
- Assessments of methodological quality
- Synthesis of data
- Summary of results
The raw material...

- Each included study is considered a “unit of analysis” with eligibility criteria determining inclusion.
Guides to reporting results...

- **CONSORT**
  - Consolidated Standards of Reporting Trials (RCTs)

- **PRISMA** (formerly QUORUM)
  - Preferred Reporting Items for Systematic Reviews and Meta-Analyses

- **EQUATOR**
  - Enhancing the Quality and Transparency Of Health Research. Involved in monitoring guidelines for research
Guides to assessing quality...

- **JADAD Scale**
  - Assessment of methodological rigor of a clinical trial

- **GRADE**
  - Grading of Recommendations Assessment, Development and Evaluation (evaluating evidence for sys reviews, practice guidelines)
Software

• Reference/PDF/bibliography tools
  • RefWorks $
  • EndNote $
  • Zotero Free
  • Mendeley Free
  • Papers $

• Systematic review tools
  • RevMan 5 Free
  • GradePro Free
  • Comprehensive Meta-Analysis (CMA) $
  • DistillerSR $
Developing an effective search

- Effective search strategies depend on a clearly articulated research question
One model for framing answerable clinical research questions is “PICO”

Example: “Among adults, what is the effect of Echinacea in preventing and/or treating the common cold?”
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- P = Patient = Common Cold/Adults
- I = Intervention = Echinacea
- C = Comparison = Placebo/No treatment
- O = Outcome = shorter disease course/no infection/occurrence of adverse effects/etc
Developing an effective search

- Take advantage of the search utilities of each database
- Identify variant terminology
- Consult with a research librarian to help you:
  - select
  - balance
Developing an effective search

- Establish a realistic timeline with the librarian!

- Systematic reviews should generally be thought of as *projects* as they’re not always simple 20 minute PubMed searches
Selecting databases

- Most disciplines have specialized databases

- Lane provides links to a subset of all Stanford databases, focusing primarily on biomedicine

- A more comprehensive list can be found on the Stanford University database website
Selecting “grey literature” resources

• Unpublished or hard-to-find studies, i.e., “grey literature” presents a challenge to the searcher

• Depending on the topic, the searcher may have to search:
  • Conference websites
  • Trial registries
  • Governmental research, e.g., National Technical Reports Library and RePORT
  • Google or Google Scholar
Database selection example: “Is gardening good for you?”

- Agriculture
  - CAB Abstracts
- Biomedicine:
  - PubMed
  - Cochrane Library
  - CINAHL (nursing and allied health)
  - Psycinfo
  - Toxnet
- Economics/Business
  - ABI/Inform
Database selection example: “Is gardening good for you?”

- Social Sciences:
  - ERIC (education)
  - Sociological Abstracts
- Multi-disciplinary databases
  - SCOPUS
  - Web of Science
- Grey literature
  - NTIS, Cochrane CTR, Clinicaltrials.gov
- Search engines
  - Google/Google Scholar
Fine-tuning your search strategies

- Searching is iterative
- Share searches
- Check retrieval with previously identified key articles,
- Auto-alerts for updates
Documenting search strategies

- List databases and vendor (if relevant); e.g., MEDLINE/OVID Technologies

- Note date-range searched and dates of last search, number of references retrieved, and exact search strategy(ies)

- Note limits by topic/language/publication-type limits (e.g., human/Eng/RCTs)
Documenting search strategies

DATABASE/VENDOR:
OVID MEDLINE

DATE:
2000 – 2012; last searched February 29, 2012

LANGUAGE:
English

Total:
222

Strategy:
Exact search strategy. Should be replicable

Documenting search strategies

DATABASE/VENDOR:
American Heart Association, Abstracts From Scientific Sessions 2009, search of AHA Abstracts Online

DATE:
2000 – 2012; last searched February 29, 2012

LANGUAGE:
English

Total:
444

Strategy:
Exact search strategy. Should be replicable

Documenting search strategies

- List individuals or organizations contacted
- List “gray literature” sources
- Document other search strategies (e.g., scanning bibliographies of articles)
**Search flow-chart**

- **Total Identified (n=1200):**
  - Database 1: 1000
  - Database 2: 40
  - Database 3: 160

- **Excluded (n=1000):**
  - Reason 1: 800
  - Reason 2: 200

- **Articles requiring title/abstract review (n=1200):**

- **Excluded (n=180):**
  - Reason 1: 100
  - Reason 2: 80

- **Articles requiring full-text review (n=200):**

- **Data Extraction (n=20):**

* Based on the [2009 PRISMA flow diagram](#)
Managing References/PDFs/Bibliographies: Some considerations...

- Collaborating
- Web-based vs desktop
- PDF downloading and linking
- Creating groups and adding searchable fields
- Exportability
- What tools are available...?
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<td>Yes w/ plug-in</td>
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* [https://www.stanford.edu/group/bookstore/SUprices/software.html](https://www.stanford.edu/group/bookstore/SUprices/software.html) Contact Glen Jones w/ questions: 650 329-1217 ext 371

** Mendeley auto-download for free, publically accessible journals, not yet for proxied institutional subscriptions

*** Mendeley duplicate detection works if metadata for reference is consistent: variations in a reference can throw it off
Example: “Among adults, what is the effect of Echinacea in preventing and/or treating the common cold?”

- Identify basic search parameters and limits
  - English
  - Randomized controlled trials
  - 2006 to present

- Select databases
  - PubMed, Cochrane Library, SCOPUS, CINAHL, EMBASE*, Clinicaltrials.gov

*Much of the content of EMBASE is included in SCOPUS
Example: “Among adults, what is the effect of Echinacea in preventing and/or treating the common cold?”

- Identify variant terminology
- Save searches
Example: “Among adults, what is the effect of Echinacea in preventing and/or treating the common cold?”

- Share “My NCBI” searches with team members
  - Did ALL previously identified relevant articles (if any) appear in the search? No? Find out why!
  - Did articles identified in bibliographies appear in the search? No? Find out why!
  - Do team members have suggestions for expanding/restricting search based on additional terms?
Example: “Among adults, what is the effect of Echinacea in preventing and/or treating the common cold?”

- Once the search has been vetted, a “My NCBI” auto-alert should be set up

- Choose an appropriate reference/PDF management application, e.g. EndNote, and import the retrieved references from PubMed
Example: “Among adults, what is the effect of Echinacea in preventing and/or treating the common cold?”

- Adapt the PubMed searches to other databases, registries and search engines
- Import references and delete duplicates
- Keep track of search dates, ranges, number of references retrieved, and strategies
LIVE DEMO! “Among adults, what is the effect of Echinacea in preventing and/or treating the common cold?”

- PubMed search
  - My NCBI: commoncoldech/commoncoldech
  - Search is vetted and approved

- EndNote
  - Download references into EndNote
  - Create “group sets” and “groups”
  - Access and download PDFs for relevant articles (configure EndNote with [http://sfx.stanford.edu/local](http://sfx.stanford.edu/local))
LIVE DEMO! “Among adults, what is the effect of Echinacea in preventing and/or treating the common cold?”

- SCOPUS search

- Google Scholar search
  - Using Zotero to capture references and then export to EndNote
Echinacea and Common Cold: Searching Flow-chart

Total Identified (n=25)
- PubMed: 25
- SCOPUS: 0
- Google Scholar: 0

Excluded (n=10)
- children: 8
- Non-English: 2

Articles requiring title/abstract review (n=23)

Excluded (n=10)
- additional, competing illness: 10

Articles requiring full-text review (n=13)

Data Extraction (n=3)

Two Reviewers

* Based on the 2009 PRISMA flow diagram
Echinacea and Common Cold: Search strategy documentation

- List databases and vendor (if relevant); e.g., MEDLINE/OVID Technologies
- Note date range searched and dates of last search
- Note language/publication-type limits
- Include total references retrieved
- Include exact search strategy

Database/Vendor: PubMed/NCBI
DATE: 2006-2011/last searched August 2011
LANGUAGE: English
PUBLICATION TYPES: Randomized controlled trials
Total: 25

Additional resources

- Cochrane Handbook for Systematic Reviews of Interventions
Questions?
Contact info

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