Webinar 3
Systematic Literature Review: What you Need to Know

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Date: Thursday May 29, 2014
Time: Noon- 1:00PM (EST)
Introduction

Why systematic reviews?
Main characteristics & limitations
Types of literature reviews & Cochrane Reviews
Planning a systematic review & the systematic review process
Review protocol
Study identification
Data extraction
Quality assessment
Reporting strategies
Data synthesis & data analysis
Bias
Why systematic reviews?

- Approach to critical appraisal of documents
- Efficient way to access a body of research
- Explores differences between studies (Mayhew, 2014)
- More reliable basis for decision making (Mayhew, 2014)
- A clear structure for easier navigation & interpretation
- Consistent approach to see what was done & not done

Source: Booth et al., 2012; Mayhew, 2014.
Key Features

- Identifies what is currently known about one topic
- Clear research question answerable through the literature
- Objectives for the review
- Pre-defined eligibility criteria
- Based on a review protocol or plan
- Methodology is systematic, transparent, reproducible
- Assessment of validity & reliability of included studies
- Systematic synthesis & analysis
- Documentation of all steps and results

Sources: Aveyard, 2010; Booth et al., 2012; Cochrane Collaboration, 2005; Fink, 1989; Jesson et al., 2011.
Main Characteristics

• **Transparency** – all methods and rationale are recorded and reported

• **Auditability** – careful documentation of the steps taken & supporting evidence

• **Reproducibility** – extent that the review methods can be followed producing the same results

Sources: Aveyard, 2010; Booth et al., 2012; Fink, 1989; Jesson et al., 2011.
Types of Literature Reviews

**Narrative:** traditional review, not reproducible, usually not exhaustive, not transparent, no accountability

**Systematic Reviews:**

**Scoping:** preliminary assessment of the available research
- prior to a systematic review, no quality assessment, identifies gaps & what is available

**Mapping:** broad overview of existing research, identifies gaps, summary quality & quantity assessment
- to decide future areas for research or systematic reviews

**Meta-Analysis:** statistical technique to combine quantitative results
- studies are homogeneous, results & outcomes compatible

**Cochrane Review:** systematic reviews of primary research in health care and health policy

Source: Arksey & O’Malley, 2005; Booth et al., 2012; Jesson et al., 2011.
Cochrane Reviews

**Cochrane Reviews**: “help people make well-informed decisions about healthcare” (Martin, 2014).

- maintain and promote “the accessibility of systematic reviews of the effects of health care interventions” (Martin, 2014).
- comprehensive search of all potentially relevant studies
- internationally recognized as the highest standard in evidence-based health care – gold standard
- types: healthcare interventions (efficacy, effectiveness), diagnostic test accuracy, methodology, prognosis (Mayhew, 2014)
- updated every 2 years, so treatment decisions are based on up-to-date, reliable evidence
- do not allow duplicate reviews on the same topic

Limitations

• process can be lengthy, at least 1 year, usually more

• requires at least 2 researchers, librarian or information scientist, content experts, methodologists, consumers, translators, peer reviewers (other expertise needed)

• Cochrane reviews – at least 4 authors: Cochrane experienced author is first author, & need an academic, statistician, methodologist (Mayhew, 2014)

• cost

Source: Arksey & O’Malley, 2005; Booth et al., 2012; Cochrane Collaboration, 2013; Mayhew, 2014.
Systematic Review Process

1. Map the field through a scoping review
2. Plan & write the Review Protocol
3. Comprehensive search
4. Data extraction strategy & tool
5. Quality assessment – procedures, checklists
6. Synthesis of extracted evidence
7. Data analysis
8. Write up & dissemination

Source: Aveyard, 2010; Jesson et al., 2011.
Planning a Systematic Review

• How systematic does the search need to be to fulfill the purpose?
• How comprehensive will the search be?
• How will you focus the research question? Will you use a framework? e.g., PICOC?
• Defining the scope: who? what? how? when?
• Key citations (“PEARLS”) in your area (published in last 5-10 years) (Booth et al., 2012)

Source: Aveyard, 2010; Booth et al., 2012; Jesson et al., 2011.
Planning a Systematic Review

- What databases will you search? Other search techniques?
- Brainstorm search terms, identify thesaurus terms, free-text terms, combine search terms using operators (and, or, not)
- Will there be a formal process for data extraction? What data will you extract? Quality assessment?
- How thorough will synthesis & analysis be?

Source: Booth et al., 2012; Jesson et al., 2011.
Writing a Review Question

- identify the topic - focused, not too narrow
- address one key question only, state as a question, refine as needed
- answerable using the literature
- realistic within your time frame
- clear & unambiguous
- interested & motivated about the topic
- write up the development of the research question - how you arrived at the topic & how you refined it into a specific question, what factors influenced you in this process?

Source: Aveyard, 2010; Bettany-Saltikov, 2010.
Search Strategy: Stages

1. **Scoping search**: initial search on selected core electronic databases
   - determine databases to use, modify key terms per database
   - familiarize self with topic & volume of material
   - identify existing reviews, relevant primary studies
   - document search strategies

2. **Conduct search**: use key search terms, free-text terms, thesaurus terms, Boolean logic operators (and, or, not, & and not)
   - include unpublished/grey literature search
   - appropriateness of methodological filters
   - document modification of search strategy

Source: Booth et al., 2012.
Search Strategy: Stages

3. Consider other sources
   – search reference lists & bibliographies of all papers
   – identify key citations & conduct citation searches
   – consider hand searching relevant journals

4. Verification
   – check indexing of relevant papers that were missed
   – revise search strategy & document
   – contact with experts to see if relevant papers were missed

5. Documentation: record details
   – sources, strategies, revision of search strategies
   – number of references found for each source & method of searching
   – revision of research question, if necessary (i.e., volume)

Source: Booth et al., 2012; Jesson et al., 2011.
Document Selection Process

- **Title** scan/sift: examine, judge relevance, keep/discard?
- **Abstract** scan/sift: examine, judge relevance, keep/discard?
- **Full-text** scan/sift: examine, judge relevance, keep/discard?
- Record reasons for exclusion at each stage
- Put into reference management software (e.g., EndNote, RevMan)

Sources: Booth et al., 2012; Mayhew, 2014.
## Inclusion & Exclusion Criteria

<table>
<thead>
<tr>
<th>Inclusion Criteria</th>
<th>Exclusion Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relevance: Inclusion of variations on key terms pertaining to the topic</td>
<td>Relevance: Did not include these variations on key terms</td>
</tr>
<tr>
<td>Outcome measure(s): Compared subjects on any of the following outcome categories:</td>
<td>Outcome measure(s): did not compare subjects on any of the following categories:</td>
</tr>
<tr>
<td>(list)</td>
<td></td>
</tr>
<tr>
<td>Language: English</td>
<td>Language: other than English</td>
</tr>
<tr>
<td>Sources: types of articles included, e.g., cross-sectional using surveys or</td>
<td>Sources: types of articles NOT included, e.g., letters to the editor, short editorial, comments</td>
</tr>
<tr>
<td>administrative data, reports, reviews, commentaries</td>
<td></td>
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</tbody>
</table>

Source: Booth et al., 2012.
Webinar Series: Leveraging Data to Make Better Decisions - Part 2

PRISMA 2009 Flow Diagram

1. Identification
   - Records identified through database searching (n = )
   - Additional records identified through other sources (n = )

2. Screening
   - Records after duplicates removed (n = )
     - Records screened (n = )
       - Full-text articles assessed for eligibility (n = )
         - Full-text articles excluded, with reasons (n = )

3. Eligibility
   - Studies included in qualitative synthesis (n = )

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

Source: Moher et al., 2009.
Data Extraction

• What data will you extract?
• Data extraction tool: existing or your own?
• Record salient data from documents:
  – Publication details
  – Study details
  – Nature of the study
  – Results

Source: Booth et al., 2012; Fink, 1998; Jesson et al., 2011.
Data Extraction

- Quality: comment on study design, sample size & selection methods, methods, validity & reliability of measures, sources of bias, appropriateness of conclusions, resources used for critique
- Summary notes on article(s): include or exclude from review, reasons studies are excluded
- Record process

Source: Booth et al., 2012; Fink, 1998; Jesson et al., 2011.
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Data Extraction Tool

<table>
<thead>
<tr>
<th>Publication details</th>
<th>Study details</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Last names of authors</td>
<td>1. Study type</td>
</tr>
<tr>
<td>2. Title</td>
<td>2. Study aims</td>
</tr>
<tr>
<td>3. Year published</td>
<td>3. Research question(s)</td>
</tr>
<tr>
<td>4. Volume, issue, page numbers</td>
<td>4. Location (country)</td>
</tr>
<tr>
<td>5. Journal</td>
<td>5. Setting, context</td>
</tr>
<tr>
<td>6. Professions involved: RNs, MD</td>
<td>6. Target population</td>
</tr>
<tr>
<td>7. Type of paper: empirical</td>
<td>7. Sample size</td>
</tr>
<tr>
<td>8. Data source: survey, interviews</td>
<td>8. Sampling methods/how recruited</td>
</tr>
<tr>
<td></td>
<td>9. Characteristics of participants</td>
</tr>
<tr>
<td></td>
<td>10. Theory/conceptual model</td>
</tr>
</tbody>
</table>

Source: Booth et al., 2012; Fink, 1998; Jesson et al., 2011.
## Data Extraction Tool

<table>
<thead>
<tr>
<th>Nature of the study</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Study date and duration</td>
<td>1. Outcome measures used</td>
</tr>
<tr>
<td>2. Data collection methods</td>
<td>2. Details of outcomes/findings</td>
</tr>
<tr>
<td>3. Who collected the data</td>
<td>3. Strengths of study</td>
</tr>
<tr>
<td>4. Study design: cohort, correlational</td>
<td>4. Limitations of the study</td>
</tr>
<tr>
<td>5. Measurement: variables, instruments, reliability &amp; validity</td>
<td>5. Author’s conclusions</td>
</tr>
<tr>
<td>6. Data analysis: methods used, SPSS, thematic analysis</td>
<td>6. Quality: comment on design, sample size &amp; selection methods, sources of bias, include resource used for critique</td>
</tr>
<tr>
<td>7. Aim of intervention</td>
<td>7. Author’s conclusions</td>
</tr>
<tr>
<td>8. Data analysis appropriate for study?</td>
<td>8. Reviewer’s comments: indicate if include study or not, with rationale for exclusion</td>
</tr>
</tbody>
</table>
Quality Assessment

Validity - internal validity - can the results be believed?
  - external validity - generalizability of results?
  - sources of bias, confounding

Reliability – are the results trustworthy?
  - possible effects of chance
  - statistical & practical significance

Study flaws or weaknesses

What has been done well?

Applicability – are the results useful for practice?

Hierarchy of evidence – study designs

Critical appraisal – at least 2 team members assess the same studies
  - achieving consensus is easier with checklists

Source: Booth et al., 2012; Jesson et al., 2011.
### Quality Assessment

**Questions to ask yourself about the articles (examples)**

1. What is the problem?
2. What is the research purpose? research question?
3. What are the central concepts/variables?
4. Is there a theory or conceptual framework?
5. Are most references recent (< 10 years)?
6. Are experts cited as sources?
7. What is the research approach? Quantitative, qualitative, mixed
8. What is the research design? Experimental, quasi- or non-experimental
9. Quantitative designs: internal & external validity
10. Qualitative designs: rigour
11. Consider sources of bias: selection, participation, measurement, performance

Source: Booth et al., 2012; Jesson et al., 2011.
Synthesis Strategy

• Plan how to deal with the included studies
• Decide on the documentation approach
• Select the starting paper & rationale
• Decide on the approach for subsequent papers
• Pattern recognition
• Conduct cross-case comparisons (tabulation)
• Focus on 3 components of synthesis – pursuing a line of argument, examining consistencies, identifying the disconfirming case

Source: Booth et al., 2012.
Analyzing the Findings

- Test or confirm the review findings
- Triangulation of findings
- Weighting of evidence synthesis – categorize studies by strength
- Review negative evidence & consider rival explanations
- Subgroup analysis
- Aggregate view – meta-analysis
- Identify gaps in literature
- Consider:
  - over-generalization – examine outliers, extreme results
  - reviewer effects – influence study selection, outcomes
  - the implications of the review – contribution & recommendations
  - limitations – recognizing threats to validity in your review

Source: Booth et al., 2012; Miles & Huberman, 1994.
Bias

- Citation bias
- Database bias
- Funding bias
- Grey literature bias
- Language bias
- Multiple publication bias
- Outcome reporting bias
- Publication bias
- Study quality bias
- Language of publication bias
- Auditability bias

Main Messages

• Need a team with various expertise
• Clear research question
• Answerable through literature
• Systematic, transparent, reproducible, & auditable
• Motivated & interested in the topic
• Funding – cost
• Amount of time needed to complete review
• Assumption that an adequate base of primary research exists
Questions?

Please give us your feedback:


The PowerPoint slides will be available on www.nhsru.com later in the week.
References


Webinar Series:
Leveraging Data to Make Better Decisions - Part 2

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Upcoming Webinar Sessions

Webinar 4: June 27, 2014
Applications and Analysis of a Secondary Database