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Systematic reviews & meta-analyses

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**Publication details**

Systematic Reviews & Meta-Analyses

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Seminar Outline

- A brief introduction
  - What is a systematic review?
  - Why systematic reviews?
- Stage 1: Preparing a review protocol
- Stage 2: Locating the studies
- Stage 3: Critical appraisal
  - Study relevance
  - Study quality
- Stage 4: Extracting the data
- Stage 5: Analyses & interpretation
What is a Systematic Review?

- Overview of data-based studies
  - explicit methodology
    » objective
    » search strategy
    » study inclusion or exclusion
    » study quality assessment
    » information extraction
    » analyses
  - reproducible
Why Systematic Reviews?

- Ensures a clear question
- Maximises study location
- Minimises bias
- Maximises reliability of conclusions
- Increases utilisation of small data sets
Preparing a Protocol (1)

- Have a clear question
  » target group?
  » intervention(s)?
  » outcomes of interest?

- Define your search strategy
  » where to search?
  » period to search?
Preparing a Protocol (2)

- Decide on inclusion/exclusion criteria
  » target group?
  » intervention(s)?
  » outcomes of interest?

- Decide critical appraisal criteria
  » study design
  » methodological quality
Preparing a Protocol (3)

- Define data extraction procedures
  » data to be extracted?
  » who to extract?
  » how to extract?
  » piloting process?
  » missing data?

- Decide how to summarise results
  » meta-analysis?
  » sub-group analyses?
Locating the Studies (1)

What do we do at the Centre?

- Identify key words
- Electronic databases (online searches)
- References
- Talking to others
- Cochrane Collaboration
- Review articles
- Libraries
- Hand search journals
Locating the Studies (2)

The ideal steps:

- Develop comprehensive search strategy
- Identify key words and use variations
- Use multiple sources to locate studies
  - Collaborative Review Group trial registers
  - Checking reference lists
  - Electronic databases
  - Personal communications
  - Hand searching
  - “Grey literature”
Locating the Studies (3)

- Document the search strategy
- Keep track of the studies
- Remember it is an evolving process that develops as more studies are found
Critical Appraisal (1)
What do we do at the Centre?

- Sort by
  - study design
  - lit review aims
  - topic
  - sample size
- Exclusion/inclusion criteria by content area, focus of paper, aims -- independent coder on sample of abstracts
- Read --> summarise relevant points
- Read and group into key areas
Critical Appraisal (2)
- Exclusion/Inclusion

What is the Ideal?

- Identify studies that meet predetermined exclusion/inclusion criteria
  - type of people (age, gender, race, ed etc)
  - setting
  - type of outcome
  - design type
  - intervention
Critical Appraisal (3)
- Internal Validity
What is the Ideal?

Limiting the bias

- Selection bias
  - true randomisation occurred
  - allocations not known until point of allocation
  - clear description of robust procedure
  - conceal assignment of treatment from participant provider, evaluator etc
Critical Appraisal (4)
- Internal Validity

What is the Ideal?

Limiting the bias (cont’d)

- **Performance bias**
  - systematic differences in care provided to comparison groups other than intervention of interest
  - those providing and receiving care are blind to the intervention of interest

- **Attrition bias**
  - systematic differences between groups in losses of participants from the study
Critical Appraisal (5)
- Internal Validity

What is the Ideal?

Limiting the bias (cont’d)

- Detection bias
  - Systematic differences in outcomes assessment
  - Have outcome assessors been blinded
  - Need to be careful if multiple outcomes assessed, may need to define primary outcomes
Critical Appraisal (6) - Making a Decision

- Rate overall assessment of internal validity by coding system
- Quality scales
  - but no gold standard
  - often confuse validity with quality
  - less transparent
- No evidence that use of quality scales adds extra strength to critical appraisal than checking for internal validity
Extracting the Data (1)

What do we do at the Centre?

- Set criteria/characteristics
- Process into a table with relevant headings
- Using a coding system, mark whether each paper meets the set criteria
Extracting the Data (2)

The ideal steps:

- Design a data collection form (table)
  - Info about study references and reviewers
  - Study characteristics:
    » Methods
    » Participants
    » Interventions
    » Outcome measures and results
Extracting the Data (3)

- Set up coding format and instructions for coders
- Pilot test form to identify data that are not needed or are missing
- Check reliability of data collection (eg, double coding)
Below are a list of materials that you may find useful when contemplating a systematic literature review – it includes materials from today’s seminar, as well as existing Resource Centre materials.

<table>
<thead>
<tr>
<th>Resource Title</th>
<th>Useful at Which Stage of Review Process</th>
<th>Where to find it</th>
</tr>
</thead>
<tbody>
<tr>
<td>• “Papers that summarise other papers” by Greenhalgh</td>
<td>Planning: no</td>
<td>Locating: no</td>
</tr>
<tr>
<td>• “Bias in location &amp; selection of studies” by Egger &amp; Smith</td>
<td>Planning: no</td>
<td>Locating: no</td>
</tr>
<tr>
<td>• “Beyond the grand mean” by Egger, Smith &amp; Phillips</td>
<td>Planning: no</td>
<td>Locating: no</td>
</tr>
<tr>
<td>• “bias in meta-analysis detected by a simple, graphical test” by Egger, Smith, Schneider &amp; Minder</td>
<td>Planning: no</td>
<td>Locating: no</td>
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