Systematic reviews

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Outline

• What is a systematic review?
• Introduction to Cochrane and EQUATOR
• How to do a systematic review?
  – Practical demonstration (Sheila Fisken)
• Presenting results
• Writing the paper

What is a systematic review?

• “an overview of primary studies which contains an explicit statement of objectives, materials, and methods and has been conducted according to explicit and reproducible methodology”

Greenhalgh, BMJ 1997; 315:672

What is a systematic review?

• clearly stated set of objectives with pre-defined eligibility criteria for studies
• explicit, reproducible methodology
• a systematic search that attempts to identify all studies that would meet the eligibility criteria
• assessment of the validity of the findings of the included studies, for example through the assessment of risk of bias
• systematic presentation, and synthesis, of the characteristics and findings of the included studies

http://www.cochrane-handbook.org/

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http://www.cochrane-handbook.org/????Does yours do this???????
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The search is only one small part!

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Systematic literature review?

- A systematic review attempts to identify ALL data (including unpublished) related to research question
  - Very important for RCTs (randomised controlled trials) where all trials should contribute to overall effect size
  - Perhaps less important for non-RCTs
- A systematic literature review is of published literature, attempts to identify ALL PUBLISHED data
  - Probably adequate for non-RCTs

What is a meta-analysis?

- “a mathematical synthesis of the results of two or more primary studies that addressed the same hypothesis in the same way”
- i.e. A specific type of systematic review

Why are reviews needed?

- Massive numbers of publications
- Both print, and electronic media
- Diverse languages
- Different countries
- Primary studies can appear contradictory
- Psychology and social sciences predated medical systematic reviews (1930s)

Why are systematic reviews needed?

- Literature/narrative/critical review
  - Often not replicable/updated
  - May be biased by prior beliefs
  - May be commissioned due to published opinion
  - Often miss small but important effects
  - Different reviewers reached different conclusions
  - Affected by subspecialty of reviewer
  - Little attempt to discuss heterogeneity
Why are systematic reviews needed?

- Benefits of therapy not brought into clinical practice
  - e.g. Clot-busters/beta blockers for heart attacks
  - SR would have identified benefit in mid-1970s
  - Not in clinical practice till 1990s
- Inadequate summaries of current knowledge
  - Omitted mention of effective treatment, or suggested only as part of trials

Antman et al, JAMA 1992;268:240-248

Why are systematic reviews needed?

- As part of student dissertation/PG thesis
- To secure grant funding for research
- To propose future research agenda
- To establish clinical or cost-effectiveness
- To establish feasibility of an intervention
- To allow information to be assimilated quickly and easily
- To reduce delay of research to clinical implementation

Note this is as substantial a piece of work as original research

Why are systematic reviews needed?

- Mostly
  - A substantive question
  - Several primary studies
  - Uncertainty
- Can be of
  - RCTs (randomised controlled trials) of intervention (vaccine, drug, behaviour)
    - e.g. MMR, clot busters, exercise after stroke
  - Observational studies
    - e.g. Birth weight and IQ, IQ and mortality, WMH and morbidity/mortality

‘Hierarchy of evidence’

But each study only as good as its design and implementation

RCTs or observational studies

- RCTs
  - ‘gold standard’ for interventions
  - Minimise bias
  - Exposed/unexposed groups are comparable

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RCTs or observational studies

- Observational studies
  - The majority of studies
  - When RCTs are not ethical/feasible/done
  - Need clarity about design?filter by method
  - What search techniques are appropriate?
  - Specific data extraction/quality assessment tools
  - Concern about bias, confounding
  - Difficult to combine different study designs

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How to do a systematic review?

1. Define a question
2. Search the literature
3. Assess the studies
4. Combine the results
5. Put the findings in context

Introduction to Cochrane

- Archie Cochrane (1909-88)
  - British epidemiologist
  - Advocated RCTs to inform healthcare practice
- Cochrane collaboration
  - Established 1993
  - Cochrane Reviews (>4,000)
  - Identify, appraise and synthesise research-based evidence and present it in accessible format; regularly updated
  - Focus on interventions, but useful resource

http://www.cochrane-handbook.org

Introduction to PROSPERO

- Advantages of registering reviews
  - http://www.plosmedicine.org/article/info%3Adoi%2F10.1371%2Fjournal.pmed.1001009

http://www.crd.york.ac.uk/prospero/

How to do a systematic review?

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How to do a systematic review?

1. Define a question
2. Search the literature (next session)
3. Assess the studies
4. Combine the results
5. Put the findings in context

How to do a systematic review?

1. Define a question
2. Search the literature
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How to do a systematic review?
1. Define a question
2. Search the literature
3. Assess the studies
4. Combine the results
   - Narrative synthesis
   - Meta-analysis (session 3)
5. Put the findings in context

Introduction to EQUATOR
• Enhancing the QUAlity and Transparency Of health Research
• Started March 2006
• Grew from guideline development groups (including CONSORT)
• Aim to:
  – Provide resources and education enabling the improvement of health research reporting
  – Monitor progress in the improvement of health research reporting

http://www.equator-network.org/

Presenting results: SR
• Use the 27-point PRISMA checklist
• Use the PRISMA flow diagram

Writing the paper
• Follow conventional structure
• Be clear and comprehensive
• Should be reproducible
• Check with target journal (length?)
• Very useful guide by Prof Joanna Wardlaw (SBIRC):
• Range of resources at http://www.equator-network.org/library/guidance-on-scientific-writing/
Resources

- http://www.cochrane-handbook.org/
- http://www.equator-network.org/
  - CONSORT http://www.consort-statement.org/
  - STARD http://www.stard-statement.org/
  - PRISMA http://www.prisma-statement.org/index.htm
- http://www.sign.ac.uk/guidelines/fulltext/50/section6.html

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