Data extraction and quality appraisal and introduction to evidence synthesis

Louise Tanner
IHS Evidence Synthesis Group
Aims of this session....

**Data extraction:**
- Describe the purpose of data extraction
- Identify relevant information to extract from primary studies in order to address a review question

**Quality appraisal:**
- Describe the concept of bias and the main types of bias in a primary epidemiological studies
- Identify quality appraisal tools for different types of study
- Implement the Cochrane Risk of Bias tool on an RCT study

**Evidence synthesis**
- Explain the difference between narrative and quantitative synthesis of data in a systematic review
- Describe the order of reporting of information from primary studies in a narrative synthesis
- Identify an approach for narrative synthesis
Data extraction

‘Data extraction is the process by which researchers obtain the necessary information about study characteristics and findings from the included studies.’ (Centre for Reviews and Dissemination, University of York, 2009)
What data should be extracted?

• Be clear what information you want from the studies:
  • Study details
  • Data for your analysis

• Information will need to be collected relating to:
  • Methodology
  • Population
  • Interventions being compared
  • Outcomes evaluated

• Develop your data extraction form in relation to your review question. Pilot on a sample of included studies to ensure that all the relevant information is captured and that resources are not wasted on extracting data not required.
How much to extract?

- Level of judgement is required
  - Sufficient to describe studies
  - Sufficient to allow you to undertake the planned analysis
  - Sufficient so you do not need to return to the full text papers

- However
  - You need to limit unnecessary detail
Give consideration to....

- What effect measures you are you going to calculate
  - What data do you need to do this?
- How are you planning to group studies for the analysis?
  - By intervention?
  - By study design?
- What information do you need to extract to enable you to organise and analyse the way you want?
- Be consistent with your protocol
- You may require several data extraction forms, for primary studies and systematic reviews
- How many people will be involved in data extraction?
Data extraction software

- Word
- Excel
- Access
- EPPI reviewer
- COEVIDENCE
- REVMAN
- ????
Data extraction exercise

1) Discuss with the person sitting next to you what information would you extract to address the review question:

“which factors influence vulnerability to cold-related adverse health outcomes?”

2) Develop a data extraction tool and pilot using the article:

Risk of bias assessment

What is bias?
Systematic error or deviation from the truth = wrong association between intervention and outcome.

Types of bias:
• Selection bias
• Performance bias
• Detection bias
• Reporting bias
• Attrition bias
Tools for assessing risk of bias

• Cochrane risk of bias tool (RCTs): low, moderate or high risk of bias

• ROBINS-I (non-randomized, quantitative studies: quasi-experimental studies, cohort studies, case-control studies, cross-sectional studies)

• ROBIS (systematic reviews)

• Critical Appraisal Skills Programme (tools for various study designs, including qualitative)
Critical appraisal exercise

Complete the Cochrane Risk of Bias 2.0 tool for the article:

Narrative synthesis

Results from different studies need to be synthesised

All systematic reviews narrative synthesis.

- Tabulate study characteristics
- Arrange studies in groups
- Report the same information in the same order for each study
- Best available evidence approach
- Examination of moderator variables

A subset of reviews will include a meta-analysis
Narrative synthesis

ESRC framework for narrative synthesis

• Four stage approach

1) Developing a theory of how the intervention works, why and for whom: narrative or pictorial

2) Developing a preliminary synthesis of findings of included studies: describe patterns across studies in terms of both the direction and size of the effects reported.

3) Exploring relationships in the data: Identify any factors that might explain differences in direction and size of effect across the included studies; consider how and why interventions have or do not have an effect

4) Assessing the robustness of the synthesis: To provide an assessment of the strength of the evidence for:

• Drawing conclusions about the likely size and direction of effect

• Generalising conclusions on effect size to different population groups and/or contexts
Quantitative synthesis

- A subset of systematic reviews will include a meta-analysis
References


Cochrane Risk of Bias 2.0 tool https://sites.google.com/site/riskofbiastool//welcome/rob-2-0-tool


NICE Evidence Search https://www.evidence.nhs.uk/


PROSPERO http://www.crd.york.ac.uk/prospero/about.php?about=citerecord

Rayyan https://rayyan.qcri.org/


The Cochrane Library http://www.cochranelibrary.com/
Acknowledgements

This presentation was developed from material produced by various members of the Evidence Synthesis Team, Newcastle University (Dawn Craig, Fiona Beyer, Louise Tanner and Stephen Rice)