‘Research Aware’
Research Skills & Methods Series

Literature searching for systematic reviews

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Overview of the session

- What is a systematic search?
- Planning the search
- Conducting the search
- Reference management
- Documenting the search

What is a systematic search?

- A “comprehensive” literature search:
    - “a search not restricted to the English language”
    - “where Cochrane CENTRAL or at least two other electronic databases have been searched (such as MEDLINE or Embase)”
    - “at least one of the following search methods has been used to identify unpublished trials: searches for i) conference abstracts; ii) theses, iii) trials registers, iv) contact with experts in the field”

Egger M, Juni P, Bartlett C, Holenstein F, Sterne J. Health Technology Assessment. 2003;7(1):1-76.

What is a systematic search?

- An essential element of the methods used to conduct a systematic review
- A comprehensive search for studies following a structured process
- More than a search of bibliographic databases

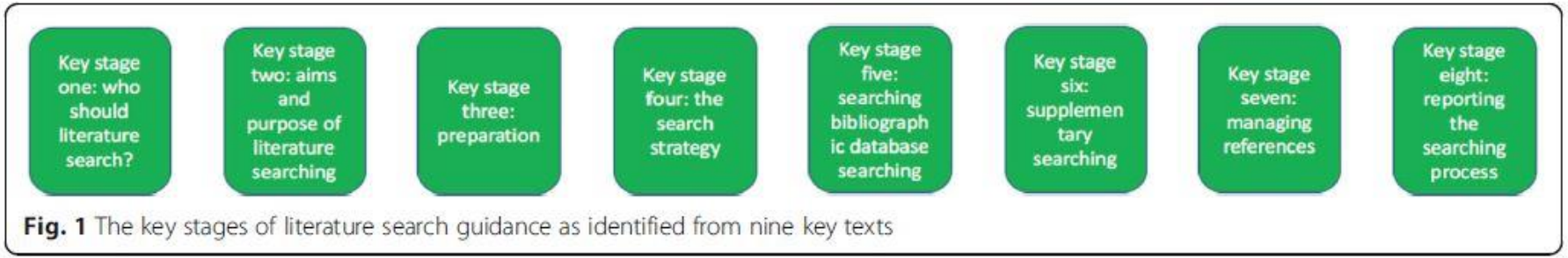

Fig. 1 The key stages of literature search guidance as identified from nine key texts

Fig.1 Cooper et al. BMC Medical Research Methodology (2018) 18:85
https://doi.org/10.1186/s12874-018-0545-3

Planning your search

Key stages 1-4

1. Who should conduct the literature search?
   - In an ideal world…..

2. Aims & purpose of the literature search
   - To identify the evidence base
   - Minimise bias
   - Transparent, reproducible

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Planning your search

Key stages 1-4

3. Preparation
    - Scope out your topic
    - Define your research question (e.g. PICO)

4. Search strategy
- Which of the PICO elements should be included in a search strategy?

Planning your search

Key stages 1-4

Usually:

- **P**opulation
- **I**ntervention
- ~~**C**omparison~~
- ~~**O**utcome~~
- **S**tudy design

Planning your search

Key stages 1-4

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Create a list of terms for each of your concepts

Population	Intervention	Study design
e.g. acute asthma Asthma Acute asthma Asthma attack Wheeze Wheezing	e.g. Inhaled magnesium Magnesium Magnesium sulphate Magnesium Sulfate MgSO4	Randomised trials Use a study design filter

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Planning your search
Key stages 1-4

Selecting terms: index terms

- MeSH
  - **Me**dical **S**ubject **H**eadings
  - A controlled index language
  - MeSH terms are assigned to a record by a trained indexer who has read the full paper

- Other databases will have their own index terms, e.g. Emtree in EMBASE

Planning your search

Key stages 1-4

Selecting terms: text words

- Try to think of as many synonyms as possible e.g. asthma, wheeze
- Use truncation e.g. **wheez$** will find wheeze, wheezing, wheezes
- When searching for drugs, you can include terms generic drug name (e.g. salbutamol), and the trade name (e.g. Ventolin)

Planning your search

Key stages 1-4

Selecting terms: validated search filters

- A search filter is a set of search terms that has been designed to identify reports of a particular type of research, eg. RCTs
- It will have been tested, and may have been validated against a ‘gold standard’ set of records
- It will enhance the precision of your results (less references to look through)
- It may be integrated into the database you are searching (e.g. Pubmed Clinical Queries)

Planning your search

Key stages 1-4

Cochrane Highly sensitive Search Strategy to identify reports of RCTs

1. randomized controlled trial.pt.
2. controlled clinical trial.pt.
3. randomized.ab.
4. placebo.ab.
5. drug therapy.fs.
6. randomly.ab.
7. trial.ab.
8. groups.ab.
9. 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8
10. exp animals/ not humans.sh.
11. 9 not 10

.pt. = publication type
.ab. = abstract
.fs. = floating subheading

Line 9 brings together the individual search terms
Line 10 defines animal studies
Line 11 excludes animal studies from the search results

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Planning your search

Key stages 1-4

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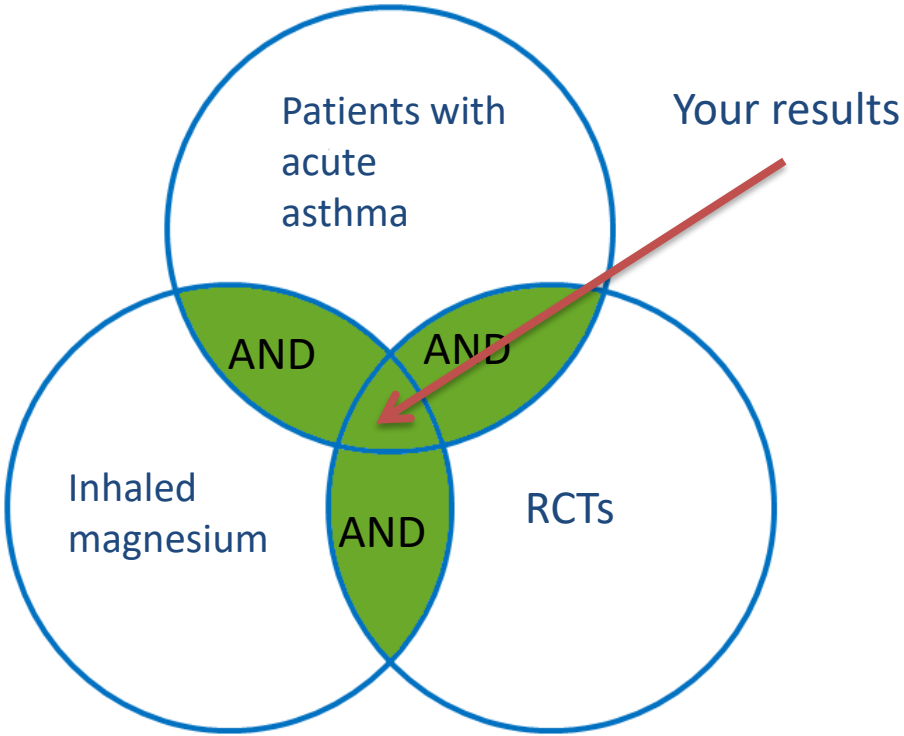
Boolean operators

- Combine search terms for a concept with **OR** (asthma OR wheeze)
- Combine concepts with **AND** ('population search terms' **AND** 'intervention search terms')
- Avoid the use of **NOT**, as this may result in missing relevant material



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Planning your search

Key stages 1-4

Example search strategy for:
Database: MEDLINE
Platform: Ovid SP

1. exp Asthma/
2. Respiratory Sounds/
3. asthma$.tw.
4. wheez$.tw.
5. or/1-4
6. Magnesium Sulfate/
7. magnesium$.tw.
8. MgSO$.tw.
9. or/6-8
10. (controlled clinical trial or randomized controlled trial).pt.
11. (randomized or randomised).ab,ti.
12. placebo.ab,ti.
13. dt.fs.
14. randomly.ab,ti.
15. trial.ab,ti.
16. groups.ab,ti.
17. or/10-16
18. Animals/
19. Humans/
20. 18 not (18 and 19)
21. 17 not 20
22. 5 and 9 and 21

Combines population terms

Combines intervention terms

Study design terms

Final results

Conducting your search

Key stage 5-6

5. Bibliographic databases
    - Sources
        - General health/medical: CENTRAL; MEDLINE, Embase
        - Subject specific: CINAHL; PsycINFO
    - Platforms
        - Ovid; EBSCO; Web of Science
    - Syntax
        - Can differ between platforms
    - Chooses the sources that are appropriate to your question & purpose, and realistic for your timescale

Conducting your search

Key stage 5-6

6. Supplementary search methods
    - Trials registries
        - ClinicalTrials.gov
        - WHO International Clinical Trials Registry Platform (ICTRP)
    - ‘Grey’ literature
        - E.g. Conference abstracts; theses;
    - Reference checking
        - Manual, or with citation indexes

Managing references

Key stage 7

- Use reference management software e.g. Endnote, Refworks, Zotero
  - Download all your results from each database
  - Import each results file
  - De-duplicate your results

- Consider using a screening tool to assess the references if you have a large set of results

Managing references

Key stage 7

Rayyan QCRI

https://rayyan.qcri.org/welcome

Documenting the search

Key stage 8

Record of all your search activities:

- The databases you have searched
- The full search strategy used in each database
- The dates covered by the search
- The date each search was conducted
- The number of references from each database
- The total number of references after de-duplication

Documenting the search

Key stage 8

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Search record template

Review search record					
Main search					
Searcher:					
Lead author:					
Review code:					
Database	**Years searched**	**Date of search**	**References before de-duplication**	**References after de-duplication**	**comments**
Airways Register (via the CRS)					
CENTRAL via CRS Web					
MEDLINE (Ovid)					
EMBASE (Ovid)					
CINAHL (EBSCO)					
PSYCINFO (Ovid)					
Clinicaltrial.gov					
WHO trials portal					
Total			0	0	
Date search complete:					
Date sent to lead author:					
Next search due:					

Cochrane Airways

Available to download from: https://airways.cochrane.org/reference-management

Documenting the search

Key stage 8

Report your search in the published systematic review:

- Detailed description of sources, dates and limits
- All search strategies in full, usually in an appendix/supplementary file
- Number of results and a PRISMA flow diagram
- **Follow the PRISMA guidelines:**

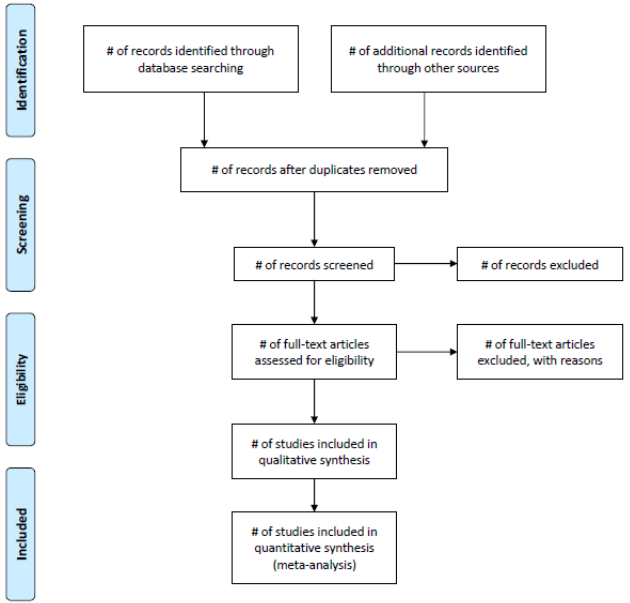

Figure from: Moher D, Liberati A, Tetzlaff J, Altman DG, The PRISMA Group (2009). Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement. PLoS Med 6(7): e1000097. doi:10.1371/journal.pmed1000097

Further guidance

Cooper C, Booth A, Varley-Campbell J, Britten N, Garside R. Defining the process to literature searching in systematic reviews: a literature review of guidance and supporting studies. *BMC Medical Research Methodology*. 2018 Aug 14;18(1):85. doi:10.1186/s12874-018-0545-3

Lefebvre C, Manheimer E, Glanville J. Chapter 6: Searching for studies. *Cochrane Handbook for Systematic Reviews of Interventions* Version 5.1.0 (updated March 2011). www.cochrane-handbook.org. **[due for an update this year]**

Further guidance

Moher D, Liberati A, Tetzlaff J, Altman DG, The PRISMA Group (2009). *P*referred *R*eporting *I*tems for *S*ystematic Reviews and *M*eta-*A*nalyses: The PRISMA Statement. *PLoS Medicine* 6(6): e1000097. doi:10.1371/journal.pmed1000097

InterTASC search filter resource http://www.york.ac.uk/inst/crd/intertasc/