Literature searching:
hints and tips for developing search strategies and running searches

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Presentation Outline

* Importance of literature searching
* Formulating the question/key concepts
* Identifying sources to search
* Developing search terms
* Search syntax
* Developing the search strategy
* Conducting the search and downloading the results
* Reporting search strategies in publications
Importance of literature searching

* Aim of a literature search is to bring together all available literature on a particular topic, often to answer a specific question.

* Important to retrieve as much as is possible all the relevant papers that exist on your topic.

* If relevant studies are not retrieved by your search strategy this could lead to bias in the conclusions of your research.

* Important to spend time developing a comprehensive set of search terms to ensure that papers are not missed.

The literature search underpins the research, particularly for systematic reviews, and so it is crucial to get it right from the start!
Methods/Tools such as those below can help with identifying the key search terms to be included in the search strategy:

* **PICO method**
  * Population/Patient  * Intervention or exposure  * Comparison  * Outcomes

* **SPIDER Tool** (adaptation of PICO for qualitative and mixed-methods research)
  * Sample  * Phenomenon of Interest  * Design  * Evaluation  * Research type

Identifying sources to search [1]

* Identify relevant bibliographic databases (often dependent upon what you have institutional access to)

**Key biomedical databases include:**

- BIOSIS
- PsychInfo
- ERIC
- Cochrane CENTRAL Register
- AHMED
- CINAHL
- Global Health
- Medline/Pubmed
- LILACS
- Cochrane Library
- HMIC
- Embase
Identifying sources to search [2]

You might also want to consider:

- Searching reference lists of included papers
- Grey literature databases e.g. OpenGrey
- Hand searching journals
- Searching clinical trial registers e.g. ISRCTN, WHO ICTRP, Clinical Trials.gov, pharmaceutical industry trial registers
- Contacting authors to identify additional unpublished work
- Conference abstracts/proceedings
Developing search terms [1]

* Bibliographic databases are all designed differently and therefore the way that you search them differs

* Search strategies should include a combination of both free-text and controlled vocabulary terms

* Controlled vocabularies include for example:
  
  NLM MeSH (Medical Subject Headings) used in a variety of databases including Pubmed, Medline, CINAHL
  
  Emtree used in Embase
  
  American Psychological Association's Thesaurus of Psychological Index Terms used in PsychInfo

* Important to spend time exploring the controlled vocabularies available for each database
Developing search terms [2]

Scope Note for: Venous Thrombosis

MeSH HEADING: VENOUS THROMBOSIS

SCOPE: The formation or presence of a blood clot (THROMBUS) within a vein.

NOTE: general: prefer specifics; coordinate IM with specific vein (IM)

YEAR of ENTRY: 99; use THROMBOPHLEBITIS 1963-98

PREVIOUS INDEXING: Thrombophlebitis (1963-1998)

REFERENCES:

Used For:
venous thromboses
thromboses deep vein
thromboses venous
thrombosis deep-vein
deep venous thrombosis
thrombosis deep-venous
deep-venous thrombosis
deep-venous thromboses
vein thromboses deep
phlebothromboses
venous thromboses deep
thrombosis deep vein
deep-vein thromboses
thrombosis deep venous
deep venous thromboses
thromboses deep-vein
thrombosis venous
thromboses deep venous
deep vein thrombosis
deep-vein thrombosis
venous thrombosis deep
vein thrombosis deep
deep vein thromboses
phlebothrombosis
thromboses deep-venous
venous thrombosis

Medline MeSH

EMBASE Emtree

Scope Note for: deep vein thrombosis

MAIN TERM: deep vein thrombosis

DATE OF ENTRY: 19740101

SCOPE NOTE:

Used For:
acute deep venous thrombosis
deep thrombophlebitis
dep venous thrombosis
deep venous thrombus
thrombosis, acute deep venous
### Developing search terms [3]

<table>
<thead>
<tr>
<th>MEDLINE - controlled vocabulary terms</th>
<th>Free-text terms</th>
<th>EMBASE - controlled vocabulary terms</th>
<th>Free-text terms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Venous Thrombosis Thrombophlebitis Thromboembolism Thrombosis</td>
<td>Thrombus Thrombotic Thrombolic Thromboembolism Thrombosis Thromboprophylaxis</td>
<td>Deep Vein Thrombosis Leg Thrombosis Thrombosis Microthrombus Post Thrombosis Syndrome Thrombus Vein Thrombosis Thromboembolism Thrombus</td>
<td>Thrombus Thrombotic Thrombolic Thromboembolism Thrombosis Thromboprophylaxis</td>
</tr>
<tr>
<td>Bandages</td>
<td>Stockings Hosiery Tights Socks</td>
<td>Bandage Bandages and dressings Compression therapy</td>
<td>Stockings Hosiery Tights Socks</td>
</tr>
</tbody>
</table>

Developing search terms [4]

* Importance of including:
  * US/UK spelling variants
  * abbreviations
  * synonyms
  * acronyms
  * phrases

* Useful to conduct scoping search

* Use key papers to help identify free-text terms and controlled vocabulary terms assigned by indexers for each database
Developing search terms [5]

<table>
<thead>
<tr>
<th>Embase bibliographic record</th>
<th>Pubmed bibliographic record</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Accession Number</strong></td>
<td>16625594</td>
</tr>
<tr>
<td><strong>Authors</strong></td>
<td>Clarke M, Hopewell S, Juszczak E, Eisinga A, Kjeldstrom M.</td>
</tr>
<tr>
<td><strong>Institution</strong></td>
<td>(Clarke, Hopewell, Juszczak, Eisinga, Kjeldstrom) UK Cochrane Centre, Summertown Pavilion, Middlesex.</td>
</tr>
<tr>
<td><strong>Correspondence Address</strong></td>
<td>M. Clarke, UK Cochrane Centre, Summertown Pavilion, Middlesex, United Kingdom</td>
</tr>
<tr>
<td><strong>Country of Publication</strong></td>
<td>United Kingdom</td>
</tr>
<tr>
<td><strong>Title</strong></td>
<td><strong>Compression stockings</strong> for preventing deep vein thrombosis.</td>
</tr>
<tr>
<td><strong>Source</strong></td>
<td>Cochrane database of systematic reviews (Online). (2) (pp Cl</td>
</tr>
<tr>
<td><strong>Subject Headings</strong></td>
<td>aerospace medicine, *aircraft, *bandage, clinical trial, controlled clinical trial, edema / et [Etiology], human, meta analysis, randomized controlled trial, review, *travel, *vein thrombosis / pc [Prevention],</td>
</tr>
<tr>
<td></td>
<td>Publication Types, MeSH Terms</td>
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<tr>
<td></td>
<td>Publication Types</td>
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<tr>
<td></td>
<td>MeSH Terms</td>
</tr>
<tr>
<td></td>
<td>LinkOut - more resources</td>
</tr>
</tbody>
</table>

[Image of the Embase and Pubmed bibliographic records]
Search syntax [1]

* Each database uses different syntax for inputting and combining the search terms in the database

* Best to write out a separate search strategy for each database

Examples of database syntax for searching

<table>
<thead>
<tr>
<th>Database syntax</th>
<th>Pubmed</th>
<th>Embase (OVID)</th>
<th>CINAHL (EbscoHost)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Title/abstract</td>
<td>[tiab]</td>
<td>.ti,ab.</td>
<td>TI OR AB</td>
</tr>
<tr>
<td>Author</td>
<td>[au]</td>
<td>.au.</td>
<td>AU</td>
</tr>
<tr>
<td>Controlled vocabulary heading</td>
<td>[mesh]</td>
<td>/</td>
<td>MH</td>
</tr>
<tr>
<td>Date limit</td>
<td>[dp]</td>
<td>limit to yr=&quot;&quot;</td>
<td>DT</td>
</tr>
</tbody>
</table>
**Developing the search strategy [1]**

* Write the search strategy out line by line
* Decide what fields you want to search for free-text terms in
* Important to number each line as the line numbers will be used to combine all the search terms within the search strategy
* Check for typos, mistakes in combining terms or syntax problems
* Save a copy of the final search strategy – you will need this later when writing up
Developing the search strategy [2]

At this stage you might also want to think about:

* Applying limits such as date or language limits
* How you will combine the search terms
* Using a search filter to focus your search to retrieve particular study types including: adverse events; RCTs; diagnostic studies; guidelines; observational studies; prognosis; qualitative research; systematic reviews etc.
A list is available from the CRD website: https://sites.google.com/a/york.ac.uk/issg-search-filters-resource/home
Example search strategy


Controlled vocabulary headings

1. AEROSPACE MEDICINE/
2. TRAVEL/
3. AIRCRAFT/
4. AVIATION/
5. TRANSPORTATION/
6. (aviation or aviator$ or airline$ or aeroplane$ or aircraft$ or plane$ or flying or flight$ or travel$ or passenger$).ti,ab.
7. (long-haul or long haul or long-distance$ or long distance$ or non-stop or non stop or non-stop).ti,ab.
8. (economy class or coach class or economy seat$).ti,ab.
9. (sedentar$ or sitting or seated or inactiv$ or immobili$).ti,ab.
10. or/1-9
11. BANDAGES/
12. (stocking$ or hosiery or tights or sock$).ti,ab.
13. or/11-12
14. VENOUS THROMBOSIS/
15. THROMBOPHLEBITIS/
16. THROMBOEMBOLISM/
17. THROMBOSIS/
18. (thromboprophylax$ or thrombus or thrombotic or thrombolic or thromboemboli$ or thrombos$).ti,ab.
19. (blood flow stasis or vein stasis or venous stasis or blood clot$ or dvt).ti,ab.
20. or/14-19
21. 10 and (13 or 20)

Searching for free-text terms in the title or abstract fields

Terms combined with ‘and’ or ‘or’ to give final results set
Conducting the search & downloading the results

Things to consider:

* Run the search by copying and pasting each line separately into the database search box
* Check that each line of the search runs properly in the database
* If available save the search history in case you need to re-run it at a later date
* Save a copy of the exact search strategy that you run on each of the databases - you will need to report this in any publications
* Choose the correct output format when downloading the results
* Use the correct filter when importing to reference management software and make sure that all the results are imported correctly
When reporting the literature search you should generally include:

* Copy of the entire search strategy for each database
* Date that the search was conducted on each database
* The search platform used e.g. OVID or EbscoHost
* The exact version of the database e.g. Embase 1996 to 2014 Week 36
* The total number of results retrieved

Useful resources

* Cochrane guidelines for reporting literature searches in systematic reviews
* PRISMA guidelines
Key messages

* Invest time in planning the search, identifying terms and developing the search strategy

* Set aside enough time to run the search, download the results and import them into reference management software

* Ensure that you save the search strategy used for each database and record the search details and total results retrieved

* Remember that if important papers are not found by your search strategy and cannot therefore be included in your research then the results of your study may be invalid

* Speak to a librarian!
Thank you!

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