Introduction: Searching in Health Science databases
Programme:

- Research questions and PICO or PEO
- Search protocol
- Search techniques and -strategies
- Boolean operators
- Which databases?
- Subject terms and subject codes
- Evaluation of search results
- Save the search and tips and tricks
- Example on a literature search in PubMed and Embase
The research question must be structured and focused in such a way, that it is possible to conduct a literature search. It must be precise and accurate. This is significant for the progress of the search process.

You can start with a "Scoping search": meaning scanning and exposing the subject, e.g. have other been working on this or has anybody written about it?

A structured research question makes it possible to divide the search into blocks and afterwards conduct a systematic literature search.

(Higgins; Cochrane Handbook, 2008)
The research question

Ask only one question and focus on exactly which answer you are looking for.

E.g. What is the effect on treatment for pain with Naproxen among patients with rheumatoid arthritis?

Some models may help you on asking a focused research question,
• **PICO** is for intervention studies, and clinical research questions.
• **PEO** is for qualitative research questions.

More on these model:  
https://www.sdu.dk/en/bibliotek/forskere/systematiske+reviews
The PICO model

**E.g.** What is the effect on treatment for pain with Naproxen among patients with rheumatoid arthritis?

**Patient/Population/Problem**  
*Patients with rheumatoid arthritis*

**Intervention**  
*Naproxen as treatment*

**Comparison**  
*Placebo or other pain treatments*

**Outcome**  
*The patients are without pain*

(Booth et al. 2000; Schardt et al. 2007, O´Sullivan, 2013)
The PEO model

**E.g.** How does patients with rheumatoid arthritis experience the pain treatment?

**Patient/Population/Problem**
*Patients with rheumatoid arthritis with pain*

**Exposure**
*(how patients experience the pain treatment)*

**Outcome**
*(The nurses or physicians will know how to treat the patient, and deal with their mental condition as well)*

(Khan, 2003)
As a part of the literature search it is advisable to compile a **search protocol**.

The protocol is a structured outline on the collection of literature and information.

The search protocol must provide for the consistency in connection with a follow-up search or a replication of the search.

In connection with systematic reviews, there must be a search protocol and it can e.g. be registered in PROSPERO: [http://www.crd.york.ac.uk/PROSPERO/](http://www.crd.york.ac.uk/PROSPERO/).
The search protocol should contain:

• Background and issues or a case
• The focused research question
• Inclusion- and exclusion criteria's
• Information sources, (databases, webpages etc.)
• Search strategies and –results for each information source. What have you searched for and how? Limits on study types etc.
• Documentation on your search and in such a detail that it is reproducible.
• On literature studies: screening and selection, and in the end analysis of the literature. (e.g. by using Covidence).

(Higgins, 2008)
Search techniques and search strategies

Quick searching / quick and dirty
Easy and quick method
Few words e.g. rheumatoid arthritis AND Naproxen
Rarely the best, complete strategy (… but maybe an introduction to a more specific search)

Chain searching
Key documents and/or bibliographic data from this:
• in literature previously found (which references is used, method known as Pearl growing or Snowballing)
• or by citation index (who cited this key document)

Block searching
The search is divided in blocks with key elements.
Dividing the research question in blocks.

Combinations within and between the blocks with **Boolean operators** **AND** **OR** **NOT**

(Harter, 1986)
What is the effect on treatment for pain with Naproxen among patients with rheumatoid arthritis?

The example divided in blocks:

<table>
<thead>
<tr>
<th>Block 1 Patients med RA</th>
<th>Block 2 Naproxen</th>
<th>Block 3 Pain treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rheumatoid arthritis</td>
<td>Naproxen</td>
<td>Pain(s)</td>
</tr>
<tr>
<td>Rheumatoid nodule</td>
<td>Naprosyn</td>
<td>Ache(s)</td>
</tr>
<tr>
<td></td>
<td>Anaprox</td>
<td>Pain management</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Suffering</td>
</tr>
</tbody>
</table>
Example:
(rheumatoid arthritis OR rheumatoid nodule) AND (naproxen OR naprosyn OR anaprox) AND (pain OR ache OR pain management OR suffering)

The parenthesis enables you to control the sequence of the commands, on contemporary use of AND and OR

In PubMed AND and OR is written in capital letters.
From research question to the literature search

When the **focused research question** has been expressed (e.g. with PICO or other models), you may transfer the key elements to a **block search**.

Usually you only search for "P" (patients/population) and "I" (interventions), if PICO has been used.

For each block you must choose all relevant words, synonyms, antonyms (e.g. fertility/infertility), or other relevant medical terms.

Find more search terms by using dictionaries e.g."klinisk ordbog", check relevant articles, look at "entry terms" in PubMed and "Used for" in Embase.
The selection of databases depends on the subject and intended extent of the literature search.

<table>
<thead>
<tr>
<th>Databases</th>
<th>Content</th>
<th>Subject index</th>
</tr>
</thead>
<tbody>
<tr>
<td>PubMed (NLM)</td>
<td>Journals on all health scientific subjects (PubMed includes Medline)</td>
<td>MeSH</td>
</tr>
<tr>
<td>Medline (Ovid)</td>
<td>Medline (approx. 5600 journals in PubMed indexed with MeSH-terms) could be used separately</td>
<td>MeSH</td>
</tr>
<tr>
<td>Embase (Ovid)</td>
<td>More European journals than PubMed. Health scientific subjects, especially pharmacology. Embase includes Medline.</td>
<td>EmTree</td>
</tr>
<tr>
<td>Cinahl (EBSCO)</td>
<td>Nurse scientific journals, and physiotherapy, occupational therapy and radiography.</td>
<td>Cinahl-Headings</td>
</tr>
<tr>
<td>Cochrane Library</td>
<td>A collection on databases, including CENTRAL containing randomized clinical trials (RCT)</td>
<td>MeSH</td>
</tr>
<tr>
<td>(Wiley)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PsycInfo (Ovid)</td>
<td>Psychological database developed by APA (American Psychological Association)</td>
<td>Psyc. Index terms</td>
</tr>
<tr>
<td>Scopus (Elsevier)</td>
<td>Abstract and citation database with peer-reviewed literature within medical science and social science. Contains journals, books and conference proceedings. Especially suitable for qualitative studies</td>
<td>None</td>
</tr>
</tbody>
</table>

Other, see: [https://sdu-dk-en.libguides.com/databases](https://sdu-dk-en.libguides.com/databases)
Subject terms and subject coding

Subject codes e.g. MeSH (Medical Subject Headings) in PubMed (Medline) and Cochrane Library. EmTree in Embase and Cinahl headings in Cinahl.

A subject code is connected to the articles to describe containment, which might not be in title-abstract-keywords.

The number of subject codes for each article varies between the databases:
PubMed (Medline): 10 – 30; Embase: often more than PubMed.

When looking up subject codes, you might find more search terms or synonyms you can include in your search.
In the MeSH database (e.g., in PubMed) it is relevant to look at the "Entry terms", you might find some synonyms. This is a look-up on **Naproxen**.

**Naproxen**

An anti-inflammatory agent with analgesic and antipyretic properties. Both the acid and its sodium salt are used in the treatment of rheumatoid arthritis and other rheumatic or musculoskeletal disorders, dysmenorrhea, and acute gout.

Year introduced: 1978 (1975)

Pubmed search builder options

**Subheadings:**

- administration and dosage
- adverse effects
- analogs and derivatives
- analysis
- antagonists and inhibitors
- billed
- cerebrospinal fluid
- chemical synthesis
- chemistry
- contraception
- contraindications
- economics
- etiology
- history
- immunology
- infection and purifying
- metabolism
- organization and administration
- pharmacokinetics
- pharmacology
- physiology
- poisoning
- poisoning
- radiation effects
- standards
- therapeutic use
- toxicity
- urine

**Restrict to MeSH Major Topic:**

Do not include MeSH terms found below this term in the MeSH hierarchy.

Tree Numbers(s): D02: 456.426.559.847.658.472.500, D04: 615.638.472.450

MeSH Unique ID: D005096

Registry Number: S7Y7682ATQ
In EmTree (Embase) it is relevant to look at "Used for", you might find some synonyms.

This a look-up on **Naproxen**

<table>
<thead>
<tr>
<th><strong>Naproxen</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>[Used For]</strong></td>
</tr>
<tr>
<td>2-(1H-1,2,4-triazol-1-yl)-5-nitroaniline</td>
</tr>
<tr>
<td>2-naphthalensulfonic acid</td>
</tr>
<tr>
<td>acetonitrile</td>
</tr>
<tr>
<td>afflaxen</td>
</tr>
<tr>
<td>afflaxen</td>
</tr>
<tr>
<td>sigflex</td>
</tr>
<tr>
<td>agilven</td>
</tr>
<tr>
<td>atenv</td>
</tr>
<tr>
<td>alopexen</td>
</tr>
<tr>
<td>alprax</td>
</tr>
<tr>
<td>enaprox</td>
</tr>
<tr>
<td>enaprox dos</td>
</tr>
<tr>
<td>enexodén</td>
</tr>
<tr>
<td>iao-naproxen</td>
</tr>
<tr>
<td>apraxanax</td>
</tr>
<tr>
<td>apraxin</td>
</tr>
<tr>
<td>apraxanx</td>
</tr>
<tr>
<td>arlgan</td>
</tr>
<tr>
<td>arthen</td>
</tr>
<tr>
<td>arthowen</td>
</tr>
<tr>
<td>aver alfa</td>
</tr>
<tr>
<td>babel</td>
</tr>
<tr>
<td>bbronyl</td>
</tr>
<tr>
<td>bonyl</td>
</tr>
<tr>
<td>congex</td>
</tr>
<tr>
<td>crystal</td>
</tr>
<tr>
<td>daferanx</td>
</tr>
<tr>
<td>deprix</td>
</tr>
<tr>
<td>deprix entero</td>
</tr>
<tr>
<td>deflamix</td>
</tr>
</tbody>
</table>

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Subject terms AND free text searching

Remember: **subject terms** guarantees a specific search, but does not necessarily give you all the relevant literature.

A systematic search should contain both **subject terms** AND **free text terms** (free text refers too title, abstract, author keywords etc.)

PubMed ”translates” (if possible) automatically all search terms you type, into **subject codes/terms** from **MeSH**. Neither of the other relevant databases does that (e.g. Embase, Cinahl, PsycInfo).

In the other databases, you must look up every search terms in the **subject coding register**. Afterwards you can combine with the **free text terms**.
Evaluating search results

**Remember, the goal is not a specific number, but an excellent literature search!**
- High recall = finding "everything"
- High precision = the core literature

*Many or few* relevant reviews (or other) in the result.

Is the search result **very large**: use more blocks, search more specific, use limits/inclusion or exclusion criteria.

Is the search result **modest**: include more search terms, search for special/professional terms, use fewer blocks, remove limits.

Go a step back in your search process and more or better search terms. Read abstracts and keywords in relevant reviews.
Save your searches

Search history
Save your search history in e.g. Word
Save your search string:
• In My NCBI in PubMed
• Login and save functionalities in all databases
• Alerts - updates you on new reviews on your subject.

References
Save references in a reference management tool:
EndNote, Zotero or other – Build up a library on your subject.
Tips and tricks for literature searches

PubMed and other databases:
https://sdu-dk-en.libguides.com/databases

Reviews may be collected by the SDU Link or you can order these (if you do not have access).

Guidelines for some health science databases (PubMed, Embase, Cinahl, PsycInfo, Cochrane Library), and guidelines on advanced search techniques:
https://sdu-dk-en.libguides.com/HealthSciences/guides

The reference management toll **EndNote** can be installed from Blackboard/E-learn (SDU students) or Software Centre (SDU employees). OUH employees may use Kiwi.
What is the effect on treatment for pain with Naproxen among patients with rheumatoid arthritis?

PubMed

• Check the search details to see if PubMed has “translated” search terms into MeSH terms.

• Choice of filters (left side of the screen)
  • Use only “publication date” and / or languages (you will find this in “show additional filters)
  • Using other filters, search will only be performed in Medline (a part of PubMed) and latest articles will be lost!

More Search filters:
https://sdu-dk-en.libguides.com/HealthSciences/literaturesearching
Example in PubMed

Search results

1. Formulation and evaluation of ileo-colonic targeted matrix-mini-tablets of Naproxen for chronotherapeutic treatment of rheumatoid arthritis
   PMID: 25963770

2. Diverse ways of perturbing the human arachidonic acid metabolic network to control inflammation
   PMID: 26237215

3. A Case of Diverticular Perforation in a Young Patient with Rheumatoid Arthritis on Methotrexate
   PMID: 26044129

4. Ascerics and other incidental findings revealing undiagnosed systemic rheumatoid arthritis
   PMID: 25965583

5. Relative benefit risk comparing diclofenac to other traditional non-steroidal anti-inflammatory drugs and cycloxygenase-2 inhibitors in patients with osteoarthritis or rheumatoid arthritis: a network meta-analysis of randomized controlled trials
   PMID: 25963600

Search details

- arthritis, rheumatoid
- [MeSH Terms]
- OR ("arthritis[All Fields]") AND "rheumatoid arthritis[All Fields]"
- OR "rheumatoid arthritis[All Fields]"
- OR ("arthritis[All Fields]" AND "rheumatoid arthritis[All Fields]")
PubMed Advanced Search Builder

Use the builder below to create your search

Edit

Builder

<table>
<thead>
<tr>
<th>Field</th>
<th>Value</th>
<th>Add to builder</th>
<th>Query</th>
<th>Items found</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Fields</td>
<td>Search (((pain OR ache)) AND (Naproxen OR Naprosyn OR Anaprox)) AND (Rheumatoid arthritis OR Rheumatoid nodule)</td>
<td>Add</td>
<td>Search (((pain OR ache)) AND (Naproxen OR Naprosyn OR Anaprox)) AND (Rheumatoid arthritis OR Rheumatoid nodule)</td>
<td>195</td>
</tr>
<tr>
<td>#4</td>
<td>Search (pain OR ache)</td>
<td>Add</td>
<td>Search (pain OR ache)</td>
<td>736504</td>
</tr>
<tr>
<td>#3</td>
<td>Search Naproxen OR Naprosyn OR Anaprox</td>
<td>Add</td>
<td>Search Naproxen OR Naprosyn OR Anaprox</td>
<td>6271</td>
</tr>
<tr>
<td>#1</td>
<td>Search Rheumatoid arthritis OR Rheumatoid nodule</td>
<td>Add</td>
<td>Search Rheumatoid arthritis OR Rheumatoid nodule</td>
<td>136696</td>
</tr>
</tbody>
</table>
Tips for Embase

What is the effect on treatment for pain with Naproxen among patients with rheumatoid arthritis?

Embase-searching:
Embase differs from PubMed, in that way that you must search on one search term at a time in EMTree (e.g. on *rheumatoid arthritis*), and you must make some choices:

- Do you want to include all “subheadings” e.g. “diagnosis”, “Drug Therapy”, “Surgery” etc.
- If the search term is an EM Tree term, do you want to include the *keyword* as well (this is recommended).
Example in Embase

What is the effect on treatment for pain with Naproxen among patients with rheumatoid arthritis?

Embase-search:
## Search History (11)

<table>
<thead>
<tr>
<th>#</th>
<th>Searches</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Rheumatoid arthritis mp. or exp rheumatoid arthritis/</td>
<td>213805</td>
</tr>
<tr>
<td>2</td>
<td>Rheumatoid module.mp. or exp rheumatoid module/</td>
<td>1933</td>
</tr>
<tr>
<td>3</td>
<td>1 or 2</td>
<td>213863</td>
</tr>
<tr>
<td>4</td>
<td>exp naproxen/ or Naproxen mp</td>
<td>25286</td>
</tr>
<tr>
<td>5</td>
<td>Naprosyn.mp.</td>
<td>1402</td>
</tr>
<tr>
<td>6</td>
<td>Amaprox.mp.</td>
<td>321</td>
</tr>
<tr>
<td>7</td>
<td>4 or 5 or 6</td>
<td>25302</td>
</tr>
<tr>
<td>8</td>
<td>exp pain or pain.mp.</td>
<td>1414407</td>
</tr>
<tr>
<td>9</td>
<td>ache.mp.</td>
<td>18403</td>
</tr>
<tr>
<td>10</td>
<td>8 or 9</td>
<td>1400001</td>
</tr>
<tr>
<td>11</td>
<td>3 and 7 and 10</td>
<td>1323</td>
</tr>
</tbody>
</table>
References


