



University of
South Australia

International Centre for
Allied Health Evidence

CAHE

A member of the Sansom Institute

A Short course in searching the literature

A basic introduction to developing a search strategy, database hints, and executing a search.

The International Centre for Allied Health Evidence

A member of the Sansom Institute.

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Contents

What is a systematic review?	3
Planning your search.	5
Formulate the question.....	6
Define the concepts and develop keywords.	12
Choose the databases.	15
Conduct the search.....	17
Evaluate the results.	23
Refine if needed.	23
Save, save, save!.....	25

Tables

Table 1. Search development formats	7
---	---

Figures

Figure 1. Planning your search	5
--------------------------------------	---

What is a systematic review?

According to the Cochrane collaboration handbook (chapter 1.2.2;

http://handbook.cochrane.org/chapter_1/1_2_2_what_is_a_systematic_review.htm),

“A systematic review attempts to collate all empirical evidence that fits pre-specified eligibility criteria in order to answer a specific research question. It uses explicit, systematic methods that are selected with a view to minimizing bias, thus providing more reliable findings from which conclusions can be drawn and decisions made (Antman 1992, Oxman 1993). The key characteristics of a systematic review are:

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

Very nice....but what does that all mean to you?

Let's break it down a little.

- **A systematic review attempts to collate *all the empirical evidence* that fits within *pre-defined criteria* to answer a *specific research question*.**

Note the italicised words;

1. ***all the empirical evidence*** - unless you have an infinite budget, with unlimited resources and unlimited time, you have to be realistic; collating *all* the empirical evidence *should be* your ideal, however, you need to accept that your search, even if conducted correctly, may miss a few papers that will be relevant to the topic.
2. ***Pre-defined criteria*** and ***specific research question*** - make sure you have a very clear question you want to answer and that you know exactly what types of studies you are

interested in. This means deciding on research design, populations, outcomes, timeframes, comparators etc. *before* you start to search for papers!

➤ **The key characteristics of a systematic review are:**

- **a clearly stated set of objectives with pre-defined eligibility criteria for studies;**
 - covered in point 2 above
- **an explicit, reproducible methodology;**
 - another researcher should be able to reproduce your search, and results, based on the information you supply in your methods section
- **a systematic search that attempts to identify all studies that would meet the eligibility criteria;**
 - covered in point 1 above
- **an assessment of the validity of the findings of the included studies, for example through the assessment of risk of bias;**
 - without the assessment of risk of bias, you, and your readers, cannot assess the value and creditability of your conclusions.
- **a systematic presentation, and synthesis, of the characteristics and findings of the included studies.**

So now you know what a systematic review is....how do you do it?

This booklet will cover the first three key characteristics listed above:

1. a clearly stated set of objectives with pre-defined eligibility criteria for studies;
2. an explicit, reproducible methodology;
3. a systematic search that attempts to identify all studies that would meet the eligibility criteria.



The last two characteristics mentioned in the definition are what distinguish between a systematic review and a literature review, or opinion paper. You should systematically search for literature for all of these paper designs, but how you deal with the research you find distinguishes what type of paper you will publish.

Planning your search.

Before you open a single database or type one keyword, you *must* plan your search. It doesn't matter if you are conducting a full systematic review or if you are conducting a systematic search for a literature review or a discussion paper, either way you need to have a clear question and a systematic plan of attack. Without this, your search is disjointed and therefore takes longer, you will miss important articles and your conclusions will be questioned by your peers as potentially biased.

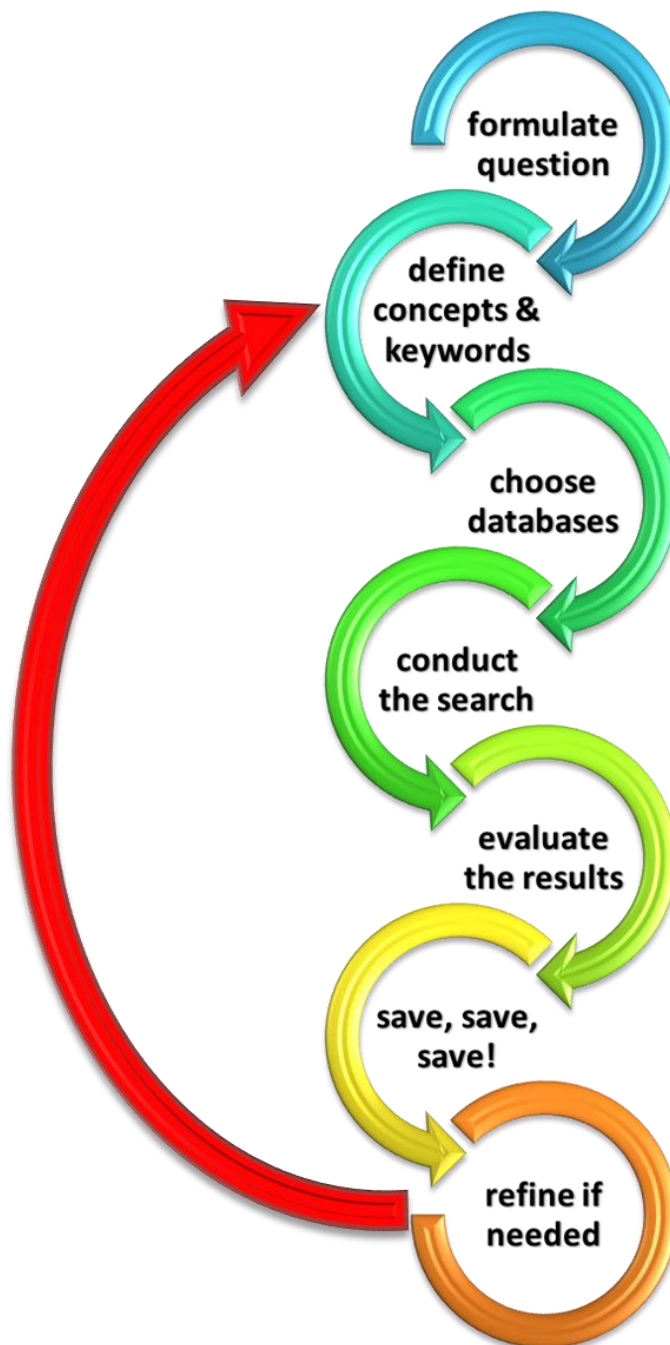


Figure 1. Planning your search

Formulate the question.

The first and most important step in developing a search strategy is to formulate a clear question. What do you want to know? Who are you interested in? Where and when are you interested in? What treatment type? Are there alternatives to that treatment? Are you interested in those as well, or do you want to exclude them? You need to have a clear and focused question to ensure you get the most specific evidence with the least effort.

A way to help you define your question is to develop a PICO (or a PICOT/PIPOH or one of the other formats used to turn a clinical question into a workable search structure. See the table below for details on the different formats available in Allied Health research).



A search question that is too broad is not likely to find any useful articles, for example: “how do you treat low back pain?” is a very broad question, in Medline, the combination of ‘treatment’ and ‘back pain’ returns 13963 articles, this is a ‘needle in the haystack’ scenario. However, “What is the evidence for the effectiveness of massage therapy in adults with non-specific low back pain?” is a

much more focused question; this uses a specific population, intervention and outcome, and as it is an effectiveness question, we know that it will also have comparators (what treatments are compared against massage therapy in the studies found).

This is our PICO:

P: adults with low back pain

I: massage therapy

C: any other physical therapy or control group/sham treatment

O: reduction in low back pain

A search based on this PICO in Medline returns 31 articles.

The PICO format is most commonly used in health research, however there are multiple formats available (see the table below), each will answer an effectiveness or intervention style question, but each will help you focus in a different area. The appropriateness of each format will depend on the specific research question and on the type of studies that are suitable for addressing the review question.

Table 1. Search development formats

ECLIPSE	<p>Example Question: <i>How can the discharge procedure from the hospital to the community for people with head injuries be improved?</i></p> <p>E (expectations): about improvement or innovation or information What have other people done? <i>e.g. improve the discharge procedure from the hospital to the community where rehabilitation will continue.</i></p> <p>C (client group): at who is the service aimed? <i>e.g. people with head injuries</i></p> <p>L (location): where is the service sited? <i>e.g. Community</i></p> <p>I (Impact): what is the change in the service which is being looked for? What would constitute success? How is this being measured? Similar to outcomes in PICO-format <i>e.g. continuity of care; patient satisfaction; sense of communication between professionals</i></p> <p>P (profession): who delivered the service? <i>e.g. hospital nurses, community staff, social services</i></p> <p>S (service): type of service being investigated <i>e.g. community rehabilitation service</i></p> <p>Wildridge & Bell (2002) Health Info Libr J. 19(2): 113-5.</p>
PECOT	<p>Example question: <i>Is acupuncture, compared with hypnosis, a successful intervention to use to stop teenagers smoking?</i></p> <p>P (population): the demography of the population (age, gender, race) the problem of the population (condition or diagnosis or symptoms) <i>e.g. teenagers</i></p> <p>E (exposure): who delivered the exposure (intervention/treatment) how the exposure was delivered (frequency, dosage) where the exposure was delivered (hospital, community centre) what the exposure was (massage, splinting, exercises) <i>e.g. acupuncture</i></p> <p>C (comparator): comparison intervention (specific: weight bearing exercise) alternative interventions (broad: any other treatment) control (nothing) <i>e.g. hypnosis</i></p> <p>O (outcome): change in symptoms of the population reason for using the exposure <i>e.g. smoking behaviour</i></p> <p>T (time period): short term, long term, not specified, actual time specified (i.e. 6 months, 2 years)</p>

	<i>e.g. short term</i>
PICO	<p>Example Question: <i>How well does a random urine protein to creatinine ratio diagnose proteinuria versus a 24-hour urine collection for protein?</i></p> <p>P (population): the demography of the population (age, gender, race) the problem of the population (condition or diagnosis or symptoms) <i>e.g. people with diabetes</i></p> <p>I (intervention): what is the treatment under investigation <i>e.g. random urine protein to creatinine ratio</i></p> <p>C (comparator): comparison of intervention (specific: weight bearing exercise) alternative interventions (broad: any other treatment) control (nothing) <i>e.g. 24-hour urine collection for protein</i></p> <p>O (outcome): change in symptoms of the population reason for using the exposure <i>e.g. diagnosis of proteinuria</i></p>
PIPOH	<p>Example question: <i>What policies, programs or service delivery models are currently in place for providing educational support to children and young people with chronic mental and physical health issues?</i></p> <p>P (population): the demography of the population (age, gender, race) the problem of the population (condition or diagnosis or symptoms) <i>e.g. Pre-school and school aged children and young people with mental or physical health issues</i></p> <p>I (intervention): what is the intervention under investigation? <i>e.g. Evidence based, effective policies, programs or service delivery models that provide support or facilitate engagement in education or learning</i></p> <p>P (profession): who delivered the intervention? <i>e.g. Any professional dealing with education or learning based policies, programs or service delivery models</i></p> <p>O (outcome): change in symptoms of the population reason for using the exposure <i>e.g. learning, engagement in education, and academic or educational experience/performance, school re-entry/reintegration</i></p> <p>H (health care setting): where the intervention was delivered (hospital, community center) <i>e.g. Any setting or context</i></p>
SPICE	<p>Example Question: <i>what is the impact of an increase in the level of cost-sharing on access to health services for the chronically ill in European countries?</i></p> <p>S (setting): what is the context of the question? <i>e.g. European countries</i></p> <p>P (perspective): who are the users/potential users of the outcomes? <i>e.g. chronically ill</i></p> <p>I (intervention): what is being done to them? <i>e.g. increased cost-sharing</i></p> <p>C (comparison): what are the alternatives? <i>e.g. no increase</i></p> <p>E (evaluation): how will you measure if the intervention is successful? <i>e.g. access to health services</i></p>

You can use the formats in table 1 to help you develop your clear clinical question, as well as using them to define the boundaries of your question. This helps you define the concepts and develop the inclusion and exclusion criteria you will apply to your results (see evaluate results for more information on inclusion and exclusion criteria).

For example; you want to know if splinting a patient with carpal tunnel is an effective treatment option.

Clinical question: For adults with carpal tunnel syndrome (**P**), what is the effect of splinting (**I**) on pain or night symptoms (**O**) compared with no splinting (**C**)?

P- Population:

Age	-	Adults 18+
Gender	-	Both
Condition	-	Carpal tunnel syndrome
Co-morbidity	-	Exclude other neuropathy
Diagnosis	-	>1 symptoms
Severity	-	All groups
Duration	-	No limits

I - Intervention exclusions:

CT Surgery

Corticosteroid injection

Manipulation

Exercises

Yoga

Vitamin B12

Oral medication

Massage

Modified tasks/equipment/activity

C – Comparison:

No treatment

Placebo

CT Surgery

Corticosteroid injection

Manipulation

Exercises, yoga

Vitamins, oral medication

Massage

Modified tasks/ equipment/activity

O – Outcome:

Primary

pain measured by any method

nocturnal symptoms measured by any method

Symptoms measured at >12 weeks

Secondary

Functional status

Objective assessments

Improvement in nerve conduction studies of all types

At this stage, you will also want to decide what type of evidence you want;

- Qualitative or quantitative, or both?
- Secondary research (systematic reviews and meta-analyses) or primary studies (RCT's, CCT's, observational studies, etc.)
- A specific date range. You need to be able to justify why you have a date cut off. i.e.:
 - You want the latest research in a popular research area = last 10 years
 - A new type of therapy/treatment was developed that became the gold standard = date it first became available
 - You are updating a systematic review = date listed as the search cut off in the old review

Activity

Using the skills discussed in the book so far, have a go at developing PICO headings and a clinical question based on the following scenarios:

1. Your workplace wants to know what evidence there is for the use of specific abdominal exercises in acute low back pain.
2. You want to know if computer based cognitive rehabilitation can improve cognitive function after a stroke

Define the concepts and develop keywords.

Once you have your question, write it down and keep it close! It's very easy to get sidetracked by related but irrelevant information, and lose sight of your main aim; it helps to have your question/aim in front of you for those times when you start to get distracted or lost.

Once you have a clear question you can break it down into the main concepts. From there you can develop key words noting any differences in spellings, find any technical or scientific names required, and ensuring you use all possible acronyms or synonyms. You may also have to keep in mind that names change; i.e.: in the mid 1970's the name Down's syndrome was coined, before this the condition was called Mongolism. If you are looking for papers on early discoveries in Down's syndrome you will not find them unless you include Mongolism in your search terms. You may need to consult a variety of sources for this including dictionaries, thesauri, encyclopedias, and other reference collections. It can be helpful to look at other systematic review methodologies with the same concepts to see what key words they used; this is a good way to ensure you haven't missed anything important.

Concept	Key words
1: Carpal tunnel	carpal tunnel, carpal tunnel syndrome, CTS median mononeuropathy, repetitive motion, repetitive motion disorder, repetitive motion injury, Tinel sign, Phalen's sign, repetitive strain disorder, repetitive strain injury, RSI
2: Splinting	splinting, splint, splints, brace, bracing, reinforce, reinforcement, reinforcing, support, strap, strapping

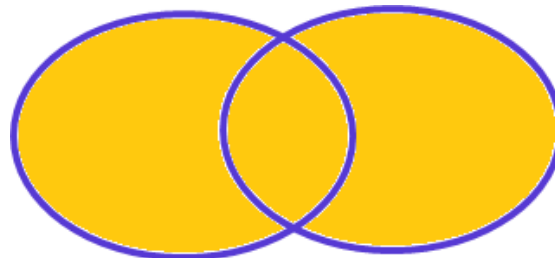
Databases will search for the term you have typed in, including any spelling mistakes! Also, authors will often use different words to label the same thing, as with the carpal tunnel syndrome example above; this is why it is so important to think of as many alternative terms as possible, and to do some preliminary reading in the area!

Searching using a string of terms (such as typing in your question) is not an effective search strategy in a research database. You need to think about how your keywords relate to one another, and use OR, AND or NOT as appropriate. These are called **"Boolean"** or **"Logical" Operators**. They allow you to connect words in a way that makes your search more specific.

Boolean Operators:

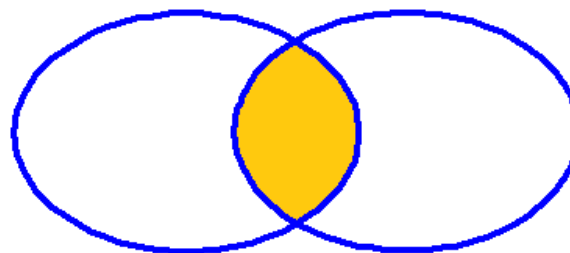
OR- When you combine keywords using **OR** your search will find items containing **either** one or both of your keywords:

Carpal tunnel syndrome **OR** RSI



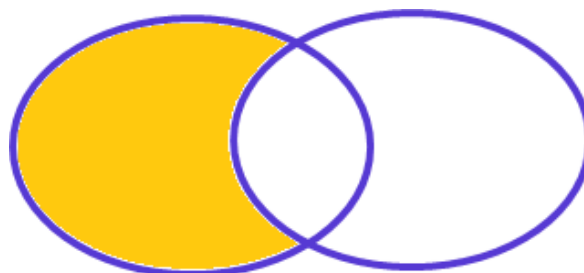
AND- When you combine keywords using **AND** your search will only find items containing **both** of your keywords:

Carpal tunnel syndrome **AND** splinting



When you combine keywords using **NOT** your search will only find items containing the first key word **but not the other:**

Carpal tunnel syndrome **NOT** wrist irritation



You need to be careful when using the **NOT** operator, it's best used for things that are clearly one or the other. i.e: male NOT female, child NOT adult. In the example given above; carpal tunnel **NOT** wrist irritation, you could miss an important article because they discuss wrist irritation as an early sign of carpal tunnel syndrome.

What this looks like for our carpal tunnel example:

Combine with (Boolean operators)	Wildcards and truncation (Cochrane)
OR	"carpal tunnel" or "carpal tunnel syndrome" or CTS or "median mononeuropathy" or "repetitive motion" or "repetitive motion disorder" or "repetitive motion injury" or "Tinel sign" or "Phalen's sign" or "repetitive strain disorder" or "repetitive strain injury" or RSI
OR	splint* or brace or reinforc* or support or strap*
AND	#1 AND #2

Based on the examples given above, you can see that key words within a concept (i.e.: carpal tunnel) are combined with the **OR** operator; you want **ALL** variations of that concept. Once you have combined all variations within a concept you can combine the concepts (i.e.: concept 1: carpal tunnel, concept 2: splinting) using the **AND** operator; this will give you only articles with **BOTH** concepts.

We will go into what the * means and why some keywords have double quotation marks in the 'conduct the search' section.

Choose the databases.

Once you have your question, have worked out your main concepts, the key words for these concepts and established how the concepts relate to each other, you need to choose which databases are most relevant to your topic.

There are a multitude of databases to choose from, although your choice will necessarily be based on which ones you have access to, as well as which ones are specific to your topic.

The following databases are free access, and contain evidence based healthcare articles from a variety of health professions. These articles come in many forms but include systematic reviews, Meta-analyses, clinical practice guidelines and clinical trials.

- Cochrane Library (Systematic reviews and review protocols)
<http://www.cochrane.org/>
- TRIP (Turning Research Into Practice- Evidence based healthcare database)
<http://www.tripdatabase.com/index.html>
- NIHS (National Institute for Health Research)
<http://www.crd.york.ac.uk/crdweb/>
- PubMed (biomedical literature from MEDLINE and other life science journals)
<http://www.ncbi.nlm.nih.gov/pubmed/>
- Bandolier (Evidence based healthcare database)
<http://www.medicine.ox.ac.uk/bandolier/>
- National Guideline Clearing House (resource for evidence-based clinical practice guidelines)
<http://www.guideline.gov/>
- Google scholar
<http://scholar.google.com.au/>

The following databases are free access, and contain evidence based healthcare articles from specific healthcare professions.

- OT Seeker (resources relevant to occupational therapy interventions)
<http://www.otseeker.com/>
- PEDro (The Physiotherapy Evidence Database)
<http://www.pedro.org.au/>
- SpeechBITE (Speech Pathology Database for Best Interventions and Treatment Efficacy)
<http://www.speechbite.com/>

The following databases are accessed through your institution (they have to purchase licenses to have access to these), and contain evidence based healthcare articles from a variety of health professions.

- MEDLINE
<http://www.ebscohost.com/nursing/products/medline-databases>
- CINAHL
<http://www.ebscohost.com/cinahl/>
- PsychInfo
<http://www.apa.org/pubs/databases/psycinfo/index.aspx>
- Embase
<http://www.elsevier.com/online-tools/embase>

There are many more databases than those listed here, check with your institution as to which ones are available to you, and with your librarian as to which ones are most relevant to your topic.

Conduct the search.

Truncation symbols:

To run a search in a database, you use your key words and Boolean Operators as discussed above, but you may not need to type in every single word variation you have come up with. Most databases allow you to use a symbol to search for all words beginning with a particular base. These are called truncation symbols and may vary depending on the database software (?, *, \$) i.e.:

typing **learn*** into the Cochrane Library database would find **learn, learns, learner, learners, learning**

Another symbol, usually called a Wildcard, may be used to search for alternative spellings or forms (?, #, !) i.e.:

typing **organi?ation** into the Cochrane Library database would find both **organisation** and **organization**

typing **wom?n** into the Cochrane Library database would find both **women** or **woman**

Proximity operators:

Many databases (Ovid, EbscoHost, Cochrane and others) also have what is called a proximity operator, although some databases will include these in the section on Boolean Operators. A proximity operator is a word or phrase that allows you to search for key words within a specified number (n) of words of each other i.e.:

In the Cochrane Library **NEAR** will find key words that are within 6 words of each other in either direction;

i.e.: Typing cancer **NEAR** lung in the Cochrane library will find lung cancer, as well as cancer of the lung

In the Cochrane Library **NEAR/n** will find key words that are within 'n' words of each other in either direction where 'n' = the maximum number of words between search terms;

i.e.: Typing cancer **NEAR/3** lung in the Cochrane library will find lung cancer, as well as cancer of the lung

In the Cochrane Library **NEXT** will find key words that are next to each other in the direction specified;

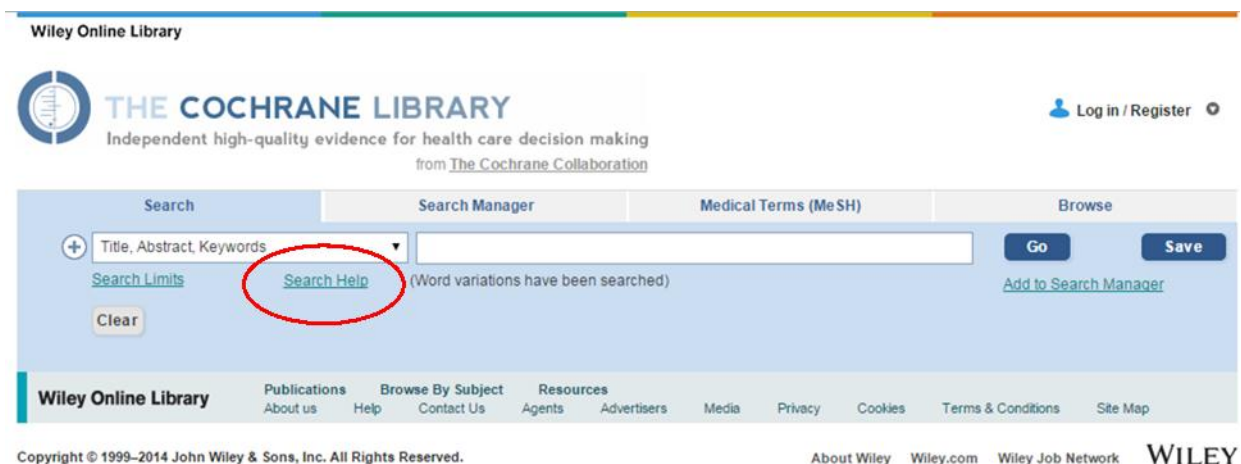
i.e.: Typing lung **NEXT** cancer will find lung cancer, but not cancer of the lung.

Search tips or search help

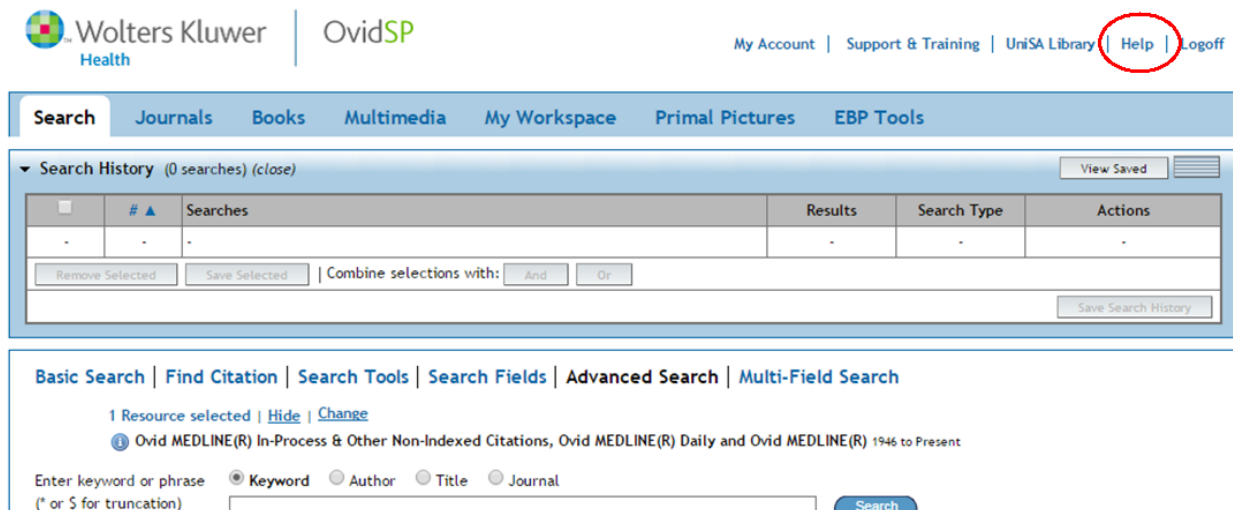
Each database has a searching tip or help section, this will have the information on which Wildcards, Boolean operators and/or proximity operators the database will support.

These are usually found on the advanced search page:

The Cochrane library



OvidSP (home of CINAHL, Medline and others)



Wolters Kluwer Health | OvidSP

My Account | Support & Training | UniSA Library | **Help** | Logoff

Search | Journals | Books | Multimedia | My Workspace | Primal Pictures | EBP Tools

▼ Search History (0 searches) (close) View Saved

Searches	Results	Search Type	Actions
-	-	-	-

Remove Selected | Save Selected | Combine selections with: And Or

Save Search History

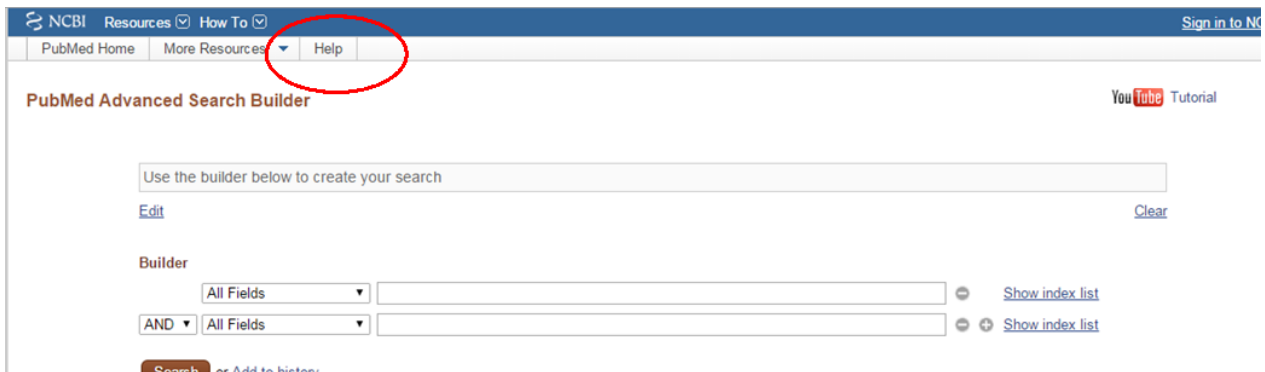
Basic Search | Find Citation | Search Tools | Search Fields | Advanced Search | Multi-Field Search

1 Resource selected | Hide | Change

ⓘ Ovid MEDLINE(R) In-Process & Other Non-Indexed Citations, Ovid MEDLINE(R) Daily and Ovid MEDLINE(R) 1946 to Present

Enter keyword or phrase (* or \$ for truncation) ☐ Keyword ☐ Author ☐ Title ☐ Journal

PubMed:



NCBI Resources How To Sign in to NCBI

PubMed Home More Resources **Help**

PubMed Advanced Search Builder YouTube Tutorial

Use the builder below to create your search

Edit Clear

Builder

All Fields Show index list

AND All Fields Show index list

Search or Add to history

The help sections are full of useful tips on searching that particular database.

Phrase searching:

If you want to search for repetitive strain injury, do you need to enclose it in double quotes (" "), or do two or more words in the same search box automatically become a phrase? i.e.:

In PubMed you need to enclose phrases in double quotes. Typing repetitive strain injury without the double quotes will retrieve any article containing repetitive and strain and injury....typing repetitive strain injury into the PubMed search bar returned 11442 papers, while "repetitive strain injury" only returned 152..... you can see how this could become a problem!

Below is an example search in the Cochrane Library:

In this example I have used the “Search Manager” tab to build the search using the keywords. Cochrane has a ‘search manager’, others, such as PubMed have ‘search histories’ which display the terms you have searched, and allow you to combine them reasonably easily, either with check boxes or by typing in the search number with the correct Boolean operator. Again, the search tips/help section in each database will cover this.

Wiley Online Library

THE COCHRANE LIBRARY
Independent high-quality evidence for health care decision making
from The Cochrane Collaboration

Log in / Register

Search Search Manager Medical

To search an exact word(s) use quotation marks, e.g. "hospital" finds hospital; hospital (no quotation marks) finds hospital and h

Add to top View fewer lines

[-] Edit [+]	#1	"carpal tunnel syndrome"	690
[-] Edit [+]	#2	"carpal tunnel"	782
[-] Edit [+]	#3	#1 or #2	782
[-] Edit [+]	#4	"carpal tunnel" or "carpal tunnel syndrome" or CTS or "median mononeuropathy" or "wrist pain" or "finger pain" or "hand pain" or "hand weakness" or "hand numbness" or "hand tingling" or "disease of hand" or "repetitive motion" or "repetitive motion disorder" or "repetitive motion injury" or "Tinel sign" or "Phalen's sign" or "repetitive strain disorder" or "repetitive strain injury" or RSI	1165
[-] Edit [+]	#5	splint* or brac* or reinforc* or support or strap*	260155
[-] Edit [+]	#6	#4 and #5	481
[-] Edit [+]	#7		N/A

Clear Strategy Search Help

Highlight orphan lines

You can type each search term into its own box, and combine them all at the end (#1 or #2.....and so on) or you can combine all key-words of a concept into one box..

Using the truncation symbol means you don't have to type in every variation of the word

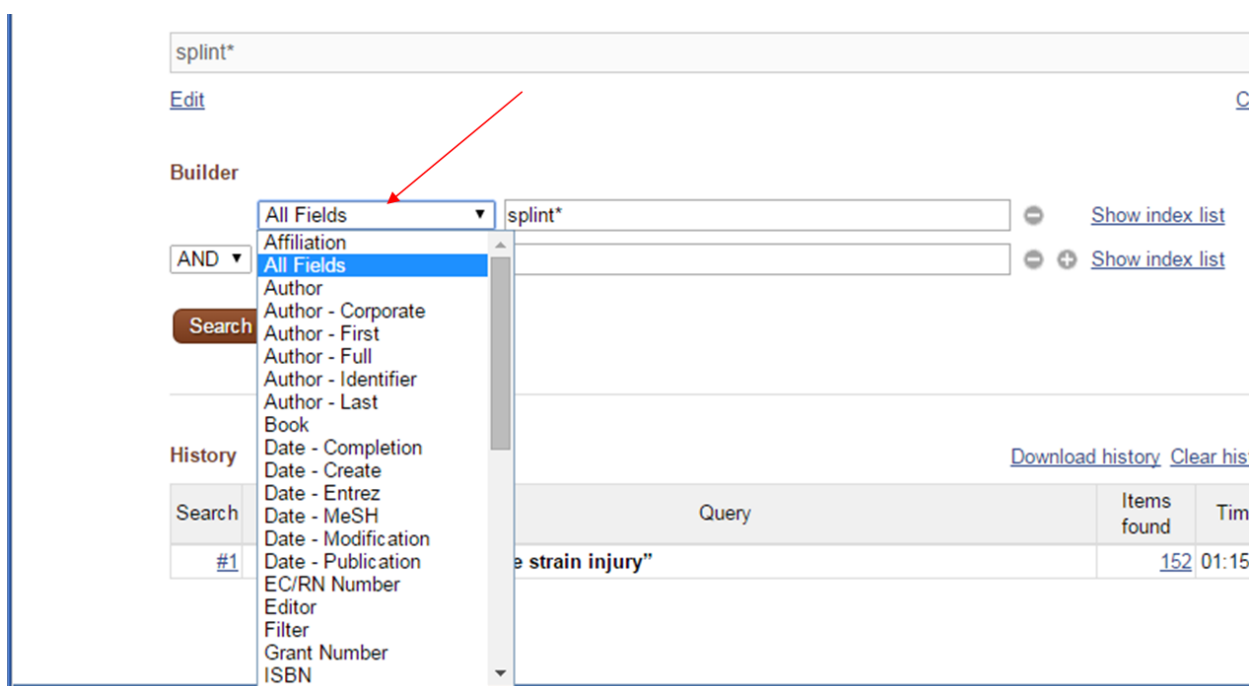
You can type each search term within a concept into its own box, and combine them all at the end (#1 or #2.....and so on) or you can combine all keywords of a concept into one box. You should get the same results with either method. It is better to use one box per concept (i.e.: all words relating to carpal tunnel) and then combine the results of the concepts (i.e.: search #6 in the example above). Just make sure you use the correct Boolean operator!

N.B.: there are many more advanced way of searching keywords, if you feel up to it, read through the searching tips or help sections on the databases you will use regularly or talk to an academic librarian for advanced searching tips.

Every database is different, so you need to check the search help section before you start the search. The more specific you can make your search now, when you are entering the terms (i.e.: using the correct phrase searching technique (double quotes or none?) and the proximity operators if they are available) the less work you will have to do when you come to the next step; evaluating the results. At the same time you want to make sure you are getting everything that is relevant to the topic, so using the truncation symbols means you should not miss too many relevant articles.

Search fields

Most databases will let you choose from different article fields to search for a keyword. i.e.: You can choose to only search the title of articles for your keywords, or you can search the abstract, or all text/ all fields of each article. It is always best to start out searching all fields/all text; you can always refine it later if you are getting overwhelmed with results.



splint*

Edit

Builder

All Fields

AND

Search

History

Search

#1

Affiliation

All Fields

Author

Author - Corporate

Author - First

Author - Full

Author - Identifier

Author - Last

Book

Date - Completion

Date - Create

Date - Entrez

Date - MeSH

Date - Modification

Date - Publication

EC/RN Number

Editor

Filter

Grant Number

ISBN

splint*

Show index list

Show index list

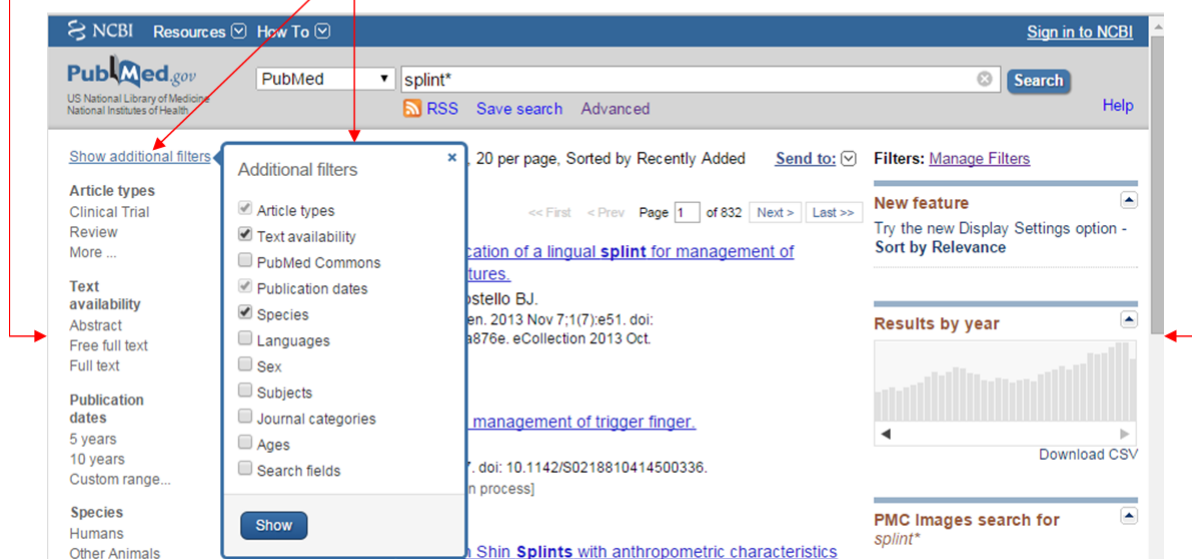
Download history Clear his

Query	Items found	Tim
e strain injury"	152	01:15

Limiters or filters

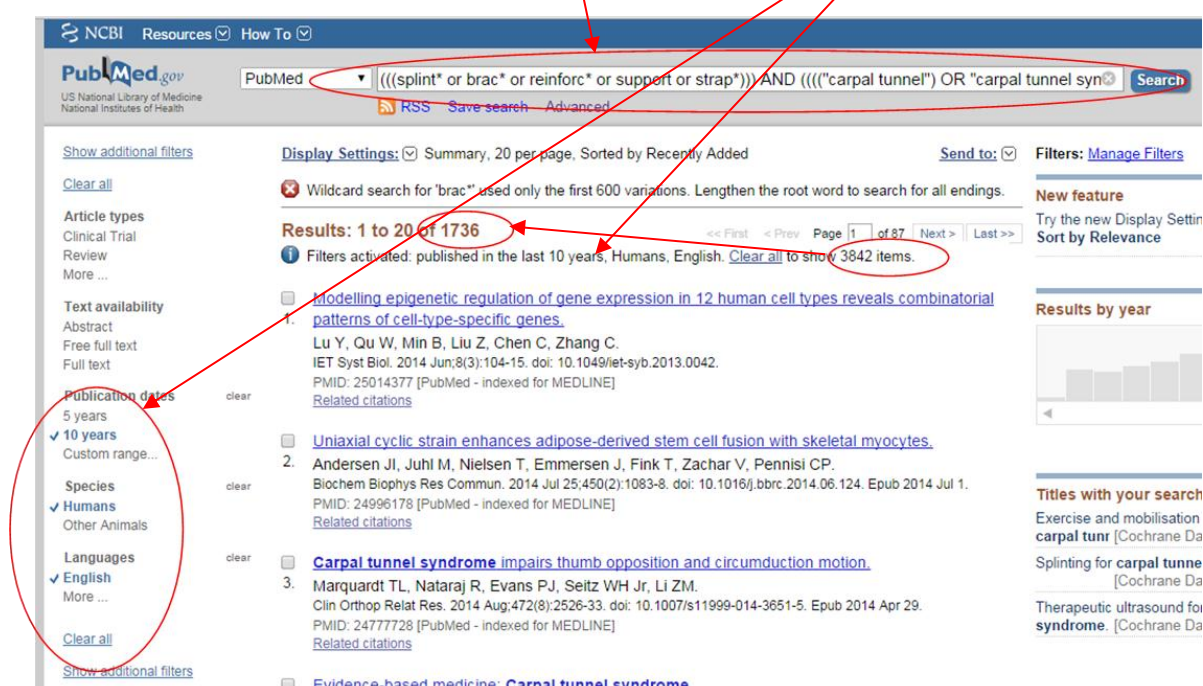
Most databases will also let you limit your results in some way. As with everything else we have covered so far, every database is different, and the search tips/help sections will guide you through what you are able to do for a specific database.

You can select which filters you want to use from the side bars. If the filter you want is not visible check the show additional filters link to see if the database supports it.



One thing that is the same in every database.....**apply any limiters at the very end!** Run each search term first, then combine your searches (using the correct Boolean operators) and *then* apply any limiters to the results of the final search.

You can see in the example below, three filters have been applied (Human, English and the last 10 years), and it has taken the results from 3842 to 1736.



Evaluate the results.

After running the search in a database you need to

- display the search results on the screen
- evaluate these results to see if they adequately match your topic

In the planning stage we discussed what sort of information you needed, these are your inclusion and exclusion criteria. You need to evaluate each article against these criteria to make sure they are relevant to your topic/needs. i.e.:

- does the paper cover the correct topic?
 - You are guaranteed to find at least one totally irrelevant paper in every search you do.
- Is the information recent enough?
 - did you specify a date range?
- Does it match the type of information you wanted
 - Qualitative, quantitative, research design?
- Is it from a primary or secondary source?

If you found relevant articles – congratulations!



Refine if needed.

If you did not find relevant articles or need to find more, consider:

- which keywords/subjects found the best references
- which keywords/subjects might be inappropriate
- alternative keywords/subjects
- whether you entered the search statement correctly and used the correct operators?
- If you searched the most appropriate database? i.e: do you need peer reviewed articles but all you found was newspaper articles
- are you using alternative keywords and synonyms, including alternative spellings i.e.: instead of using chocolate use confectionary?
- have you tried using truncation or wildcards to capture all forms of your keyword?

But what if you found too many articles?

Narrow your search or make it more specific, for example

- add another concept or keyword to make it more specific
- add limits to your search, i.e.: limit to a particular language, years of publication or peer reviewed only
- restrict your search to specific fields, for example, the title or the abstract

You should now have evaluated and, if necessary, refined your search results. The objective is for MOST of the articles to be relevant. Once you have a manageable number of search returns, you will need to read through them and apply your inclusion and exclusion criteria to help you decide if the references you found are useful and relevant to your research.

There is no magic number to make a 'manageable' result list. You need to decide this for yourself, and each search you do will be different. Some topics will have huge amounts of articles relating to them; in this case your 'manageable' number of results will be higher than a more obscure topic.

Save, save, save!

Many databases will allow you to create a free account with them, this account allows you to save the search strategy when you have finished. This is a really good idea, in case you have to re-run the search for any reason, you want to make changes to your keywords or you are unable to complete the search in one session.

The screenshot shows a search strategy builder interface. It features a list of search terms with edit and delete buttons. The terms are:

- #4: "carpal tunnel" or "carpal tunnel syndrome" or CTS or "median mononeuropathy" or "wrist pain" or "finger pain" or "hand pain" or "hand weakness" or "hand numbness" or "hand tingling" or "disease of hand" or "repetitive motion" or "repetitive motion disorder" or "repetitive motion injury" or "Tinel sign" or "Phalen's sign" or "repetitive strain disorder" or "repetitive strain injury" or RSI (1165 results)
- #5: splint* or brac* or reinforc* or support or strap* (260155 results)
- #6: #4 and #5 (481 results)
- #7: (empty field, N/A results)

Below the list, there is a 'Clear Strategy' button and a 'Save strategy' section. The 'Save strategy' section includes a 'Strategy Name' field, a 'Comments' field, and a 'Save Strategy' button. A red circle highlights the 'Save strategy' text, and a red arrow points from it to the 'Save Strategy' button.

However, you need to keep in mind; the numbers will change if you rerun the search from a saved history. Many databases update their article list on a regular basis (daily, weekly, monthly), the numbers you found when you ran the search may be different if you rerun the same search a month, or even a week later. For this reason it is best to record the number of results you got at the time of the search and to save the relevant articles.

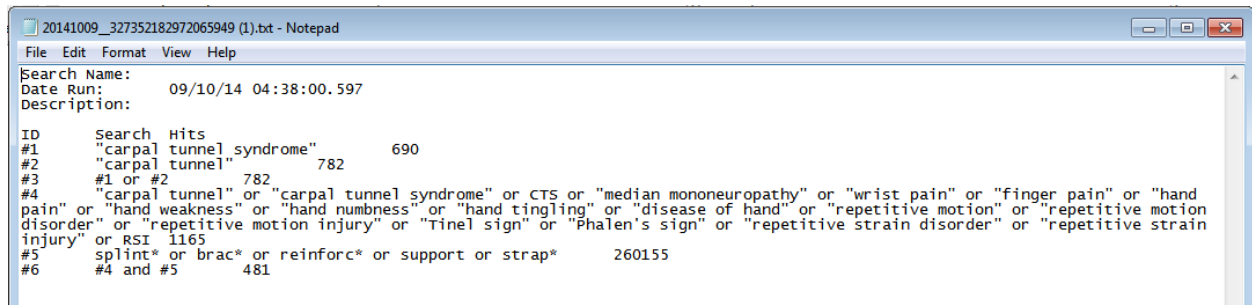
Below are examples of a recorded search history, how you chose to do it is personal, but do it you must!

The screenshot shows the 'Search Manager' interface of The Cochrane Library. It features a list of search terms with edit and delete buttons. The terms are:

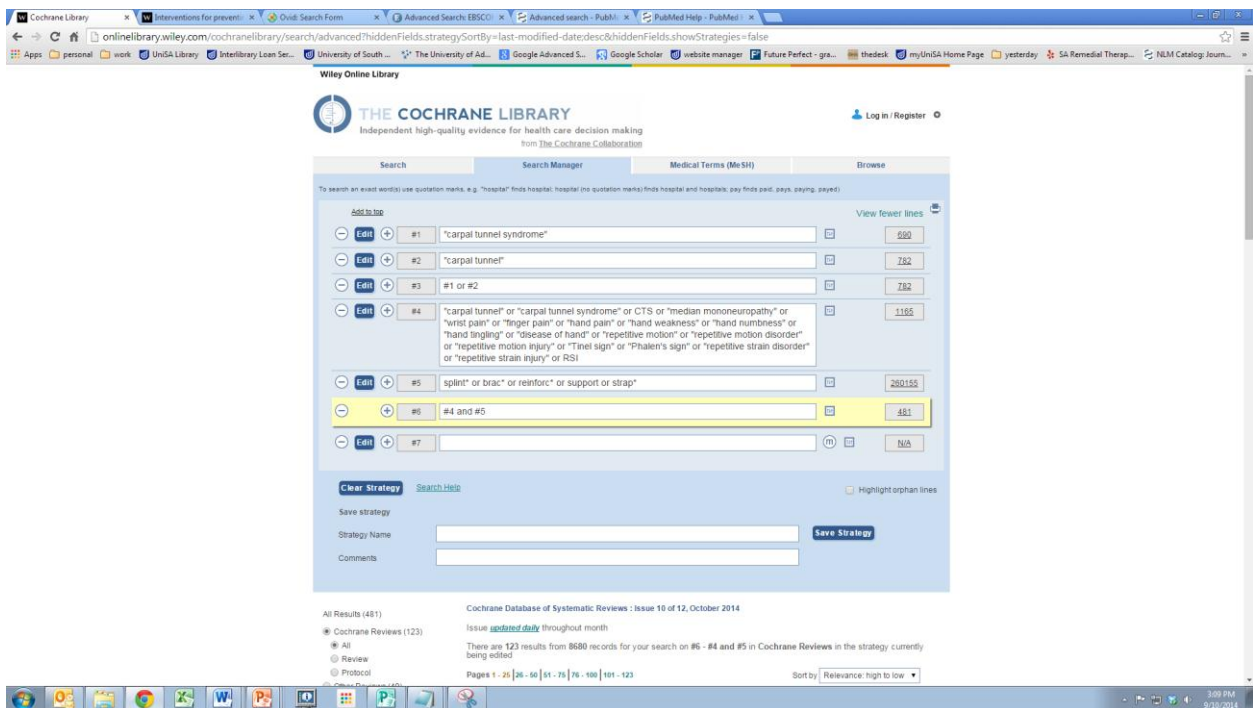
- #1: "carpal tunnel syndrome" (690 results)
- #2: "carpal tunnel" (782 results)
- #3: #1 or #2 (782 results)

At the top right, there is a 'Log in / Register' button. Below the list, there is a 'View fewer lines' button and a 'Print' icon. A red circle highlights the 'Print' icon, and a red arrow points from it to the 'View fewer lines' button.

Selecting the print button in the Cochrane library gives you a notepad file with the search terms and number of results (see below)



You can take a screen capture of the search page



Or you can use a search table. Search tables have the benefit of being interactive; you can set up each concept in the table and tailor it for each database (phrase searching, wildcards and truncation symbols etc.), then copy and paste into the database (this helps reduce spelling errors!).

Database	Search #	Search term	Hits
PubMed	1.	"carpal tunnel" or "carpal tunnel syndrome" or CTS	13123
	2.	"median mononeuropathy"	40
	3.	"Phalen's sign"	13
	4.	"Tinel sign"	112
	5.	"repetitive strain disorder" or "repetitive strain injury" or RSI or "repetitive motion" or "repetitive motion disorder" or "repetitive motion injury"	1178
	6.	OR/ 1-5	14336
	7.	splint* or brace or reinforc* or support or strap*	7643029
	8.	AND/ 6-7	4007
	9.	Limit 8 to humans, last 10 years, English language.	1867

There is one more thing.....**record every step!** This makes writing your methods section easier, it means your review is repeatable, and if you need to make any changes, you have a record of exactly what you did at each step, so making any changes should be very straight forward.

Congratulations, you now know how to conduct a systematic search of the literature!

