

PubMed for improvers

Fine tune your skills in literature surveys, as **Kirsteen Burton** and **Lorraine Toews** explain how

In my student directed learning group I've been assigned an evidence based learning task: "What is the effectiveness of chelation therapy for atherosclerosis in the elderly, aged 65 and over?"

The above type of common clinical question needs an evidence based answer, and, as introduced in Mohammad Al-Ubaydli's article,¹ PubMed is a free search engine offered by the US National Library of Medicine. It is one of a number of efficient tools to begin a search of the huge corpus of medical literature. So, open PubMed's website (www.pubmed.gov) and in the search box enter "chelation atherosclerosis" and you find 81 articles. Even after applying PubMed limits for age (65 or over) and publication type (randomised controlled trial), you are down to seven papers. However, you've got exams looming in the next couple of weeks, clinical core sessions to attend, and this learning task to complete.

In an ideal world, you would ask a wise medical librarian to help you locate only one or two - as opposed to seven, 10, or more - articles focused specifically on your topic. This is feasible. By using a few advanced PubMed literature search tips you can build more efficient searches that will result in a more precise, smaller number of more relevant articles on the clinical question that you're facing.

Identify PICO

The acronym PICO is commonly used and might come in handy to help you think more clearly before diving into a PubMed search. PICO stands for the following:

- P - Patient or problem
- I - Intervention, for example, treatment, test, exposure .
- C - Comparison intervention .
- O - Outcome

Most clinical questions can be broken down into components that will fit into two or more of the above PICO terms. Using the clinical question you have been given as an example, here is how the terms fit into PICO. The patient or problem is atherosclerosis. The intervention is a treatment, chelation. There is no comparison intervention, and there is no outcome.

The PICO terms that you have identified can now be used in your PubMed search, but first, let's review the concept of MeSH terms, which you will use to streamline your searches.

MeSH: a medical thesaurus

MeSH stands for medical subheadings. MeSH terms (pronounced mesh) were created by the National Library of Medicine's expert staff, to group synonyms for medical

words - a thesaurus of medical terms. In 2005, the MeSH thesaurus contained 22 568 such terms. These describe the major and minor aspects of an article in major and minor headings, respectively.

Why was it important to create this large MeSH thesaurus of terms? It was the National Library of Medicine's way of making your life easier when performing literature searches as this MeSH thesaurus is used by the library to organise and index all the articles from the thousands of biomedical journals that are included in Medline (medical literature analysis and retrieval system online). Medline is an international literature database of life sciences and biomedical information. Each article in each of the journals found within Medline has been assigned 10-20 MeSH terms that should adequately describe the content of that article and that, unlike simple text words, when used in searches, should help to decrease the number of less relevant articles in your results.²

Furthermore, no matter what terminology is used by the articles' authors - for example, "ascorbic acid" or "vitamin C" - it will have been captured and placed under one MeSH umbrella term, in this case, "ascorbic acid".

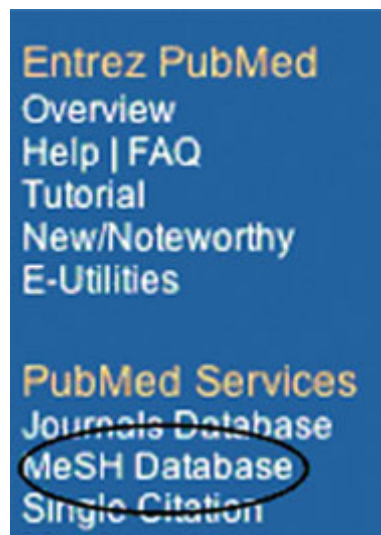


Fig 1 Find the MeSH Database under PubMed Services

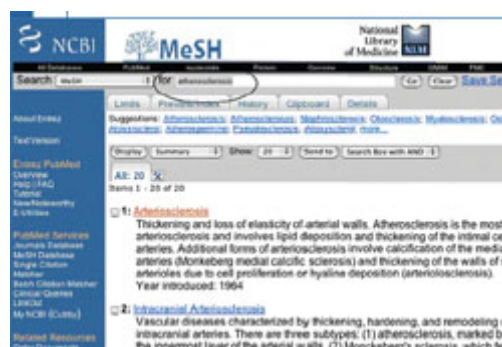


Fig 2 Enter "atherosclerosis" in the MeSH search box



Fig 3 MeSH subheadings under a major heading

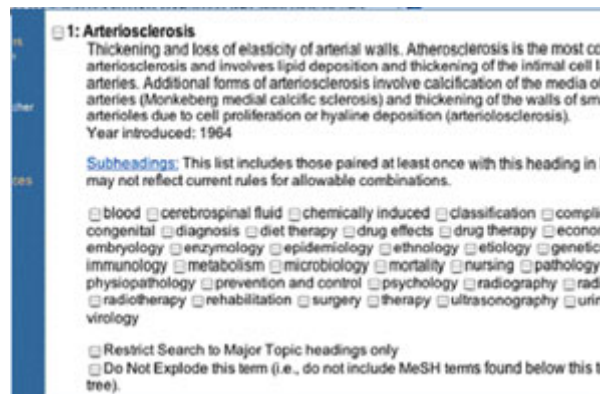


Fig 4 Send the MeSH term to the search box, and it appears with the beginnings of your search

Using MeSH terms

MeSH terms can help you build a more precise PubMed search. Here is a step by step approach:

Step 1 - Once you open PubMed's homepage, on the left hand PubMed sidebar, under the PubMed Services section, the second hotlink in the list is MeSH Database. If you select this, you will be taken to the MeSH database search bar.

Step 2 - Using your clinical problem, and the PICO terms that you have identified for this question, enter your first term. (In this case, start with the problem "atherosclerosis".) If you enter "atherosclerosis" in the MeSH search box and press Go, then you will be presented with a convenient list of all the possible MeSH matches for your term.

In this case, PubMed has identified 20 MeSH headings, with "arteriosclerosis" the broadest. Scan that list of MeSH headings to include all those that seem relevant to the type of arteriosclerosis that you wish to investigate. However, say you were interested in a specific aspect of atherosclerosis - for example, the epidemiology of atherosclerosis - you can click on the "arteriosclerosis" heading link, and this will take you to a screen that shows any MeSH subheadings under the "arteriosclerosis" heading.

Since "epidemiology" is listed as a MeSH subheading for "arteriosclerosis", by selecting it you are creating a search for articles that focus on the epidemiology of arteriosclerosis.

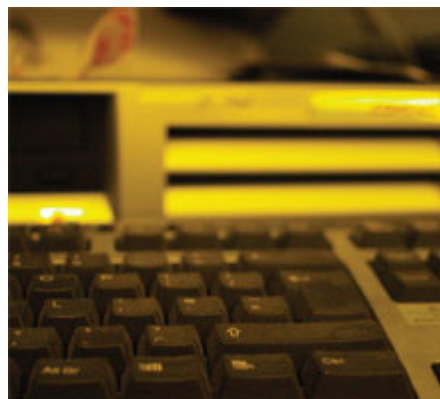
On the other hand, if you are unsure which MeSH headings or subheadings fit your research question, or if you would like to retrieve all articles related to your PICO term, then return to the previous screen, and you can select all the heading boxes that seem to apply to your term, and PubMed will include all of these MeSH headings as well as each of their subheadings in your search.

Incidentally, you may also notice that your MeSH database search for "atherosclerosis" generated a number of links to other terms that may have similar spellings to your own - for example, "otosclerosis" or "nephrosclerosis". This is PubMed's way of ensuring that if your spelling is not up to scratch and you have misspelled your search terms, you have a second chance at recognising and selecting the correct ones.

Step 3 - So far, you've found one MeSH heading that fits your PICO term - "arteriosclerosis". You can specify that you want this term included in your search and begin to build your search by sending it to the search box. Select "Search Box with AND" from the "Send to" drop down list. This tells PubMed that you wish to search the literature for the MeSH term "arteriosclerosis" using the Boolean operator and - you are indicating that your search will include more than one MeSH term. When you send the MeSH term to the search box, this appears on the screen with the beginnings of your search in it.

The more MeSH terms you can include in your search, the more precise your results will be. Now you can try the next term on your PICO list and try another MeSH database search for "chelation". In this case, the MeSH database identifies three possible MeSH headings, and because the first, "chelation therapy" seems to be a good fit, you can add it to your search box, just as you did for "arteriosclerosis".

Step 4 - Since we've now exhausted our PICO term list, we're ready to have PubMed search the literature using the terms that we've sent to the search box. To do this, select the Search PubMed button below the search box.



LP WOODS

I'm a website, trust me

The result is that, even without applying limits, 22 articles that focused on both arteriosclerosis and chelation therapy are listed. Note, that by using MeSH terms, our initial search has been reduced from 81 to 22 articles. This list of articles can be whittled further by applying the PubMed limits feature for age (65 and older), and publication types (randomised controlled trials). Our final literature search result is three articles.

Our original search used text words (non-MeSH terms) and the same limits, and generated seven articles. So by using MeSH terms we have better than halved the number of resulting articles and potentially halved the amount of time that we need to review the articles retrieved. So a few minutes spent searching the MeSH database has potentially saved us a few hours scanning double the number of articles for the relevant information we need to answer our clinical question.

Additional pointers

A few additional points, to keep in mind, may help to further increase the precision of your searches. You can further tweak your searches to favour articles that provide information on treatment, diagnosis, or prognosis as follows:

Treatments - As we've seen, using the "randomised controlled trial" limit identifies articles about treatments used in randomised controlled trials. Likewise, selecting the "meta-analysis" limit identifies articles that pool results of randomised controlled trial studies.

Diagnosis - Tacking on the text word "sensitivity [tw]" (a non-MeSH search term and [tw] to tell PubMed it's a text word) to your final subject search finds more articles that focus on diagnosis.³

Prognosis - Using the "cohort studies" limit helps to generate a larger number of studies that are concerned with the prognosis of a disease. MeSH terms may be combined with text words that are not in the MeSH database (again, using PubMed syntax, "textword [tw]") to narrow a search within a MeSH term. If you need to find articles that involve a specific drug, bear in mind that drugs are indexed by their generic name.

Save time

A few minutes to identify relevant MeSH terms should help you save time when searching the literature by helping you find articles that are about on the subject of interest to you.

Further information

- PubMed help (www.ncbi.nlm.nih.gov/books/bv.fcgi?rid=helppubmed.chapter.pubmedhelp)

- PubMed tutorial - A comprehensive online tutorial that can guide you through each function on PubMed's sidebar, from the University of Florida Health Science Center Libraries (www.library.health.ufl.edu/pubmed/pubmed2)

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