Ten Ways to Improve Your PubMed Search

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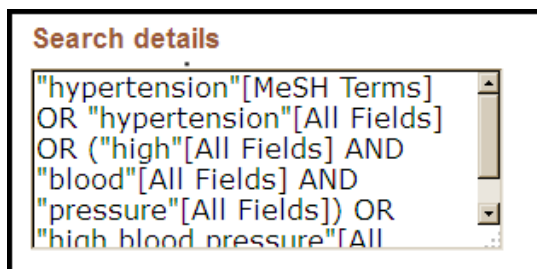**Updated June 25, 2014**

1. **Be aware of how PubMed interprets your search terms.**

    PubMed's simple search box may look the same as Google's, but PubMed is constructed very differently. Unlike Google, PubMed has a database of subject headings and key medical terminology through which every search is filtered. PubMed interprets any search terms you enter and "maps" them to this controlled vocabulary, as well as simply looking for these terms in all the fields of each of its 21+ million records. This *"Automatic Term Mapping"* will cause the search *high blood pressure* to retrieve all articles on the topic *hypertension* as well as those using the individual words *high, blood,* and *pressure* and the exact phrase *"high blood pressure."* In the same way, the search term *cancer* will also add the word *neoplasms* to your search. [1]

    PubMed may interpret some search phrases differently than you might expect. For example, if you enter the phrase *Do Not Resuscitate* PubMed will interpret this as follows: *do[All Fields] NOT resuscitate[All Fields],* i.e., all articles containing the word *"Do"* are retrieved, and then those using the word *resuscitate* are removed due to the word *not* being interpreted as the Boolean operator *NOT.* In this case, it would be better to search for the exact phrase *"do not resuscitate"* by enclosing it in double quotation marks: [2]

    It's a good idea to always check the *"Search Details"* window -- located to the right of your search results -- to see how PubMed interpreted your search strategy:


    ```
    Search details
    "hypertension"[MeSH Terms]
    OR "hypertension"[All Fields]
    OR ("high"[All Fields] AND
    "blood"[All Fields] AND
    "pressure"[All Fields]) OR
    "high blood pressure"[All
    ```

2. **Avoid using acronyms or other abbreviations as search terms.**

    PubMed is often able to discern the meaning of SOME acronyms and abbreviations, e.g., *GERD = gastroesophageal reflux.* However, some common abbreviations are NOT recognized, e.g., *BP, RSV, ACBE,* **or** *AOM.* These are searched AS IS, retrieving ANY occurrence of the term whether or not it refers to the corresponding medical term.

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[1] PubMed NEVER searches the full-text of an article. PubMed only matches your terms with those in the searchable fields for each citation, e.g., Author name, Author Address, Title, Abstract, MeSH (Medical Subject Headings).

[2] However, using quotation marks like this turns **off** the automatic term mapping feature (see #3 below for more information).

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Don't assume that PubMed somehow magically *"knows"* what is meant by a medical search term or phrase. This is a common reason why a search in PubMed will fail to retrieve relevant articles, or retrieve far too many irrelevant ones. For instance the commonly used *"Peds"* used in a PubMed search will not necessarily retrieve articles on the medical care of children.[3]

3. **Use exact phrase searches only when necessary.**

   You can force PubMed to search for an exact phrase by enclosing the words in double quotation marks (*"kidney allograft"*), using a hyphen (*text-messaging*), entering the phrase with a search tag (*robotic surgery [ti]*), or in some cases, by using an asterisk as a wildcard character to truncate the phrase (*citizen jur**) and retrieve the root word with alternate endings, e.g., *"jury"* *"juries".*[4] Doing this turns off the Automatic Term Mapping (ATM) used in PubMed to match keywords with the formal Medical Subject Headings (MeSH). *"Heart Attack"* will only retrieve articles with that exact phrase, but not those using an alternate term such as *myocardial infarction*. *Heart Attack* searched without double quotes **WILL** include those articles containing *myocardial infarction*.

   HOWEVER, not all phrases are recognized in PubMed. If you search with a phrase enclosed in double quotation marks, e.g., *"hourly injection"* and you receive the error *"Quoted phrase not found"* this means that the phrase as searched does not appear on the PubMed "phrase list." In this case, the double quotes are ignored and the terms are mapped using Automatic Term Mapping (http://www.nlm.nih.gov/pubs/techbull/jf11/jf11_skill_kit_pm_phrase_searching.html)

4. **Use Boolean Operators to connect search terms.**

   - *AND* retrieves results that include all the search terms.
   - *OR* retrieves results that include at least one of the search terms.
   - *NOT* excludes the retrieval of terms from your search.

     Examples
     - Find articles on the use of ciprofloxacin for anthrax in children:
       anthrax AND ciprofloxacin AND children

     - Find citations on the use of either penicillin or tetracycline for anthrax in children:
       anthrax AND (penicillin OR tetracycline) AND children

     - Find citations on the use of either penicillin or tetracycline for anthrax in children excluding ciprofloxacin:
       anthrax AND (penicillin OR tetracycline) AND children NOT ciprofloxacin

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[3] In fact, PubMed will translate the word *Peds* as the following: **"Protein Eng Des Sel"[Journal] OR "peds"[All Fields]. "peds"[All Fields]** means that PubMed will retrieve articles with that word in any searchable field, e.g., article title, abstract, author name or address, journal name, MeSH. **"PEDS"** could also retrieve articles on the topic of "**p**otential **e**nergy **d**istribution**s**"!

[4] However, PubMed has a limit of 600 variations of a truncated term.

If not specifically added, PubMed applies the *"AND"* operator automatically between concepts, e.g., *vitamin c common cold*   is translated as *vitamin c AND common cold.* Even though the use of *AND* is no longer required, using it puts **YOU** in control of how the search is executed rather than leaving it all up to the computer.

The Boolean operators *"OR"* and *"NOT"* must still be inserted into your search strategy if appropriate. Always capitalize Boolean operators (**AND, OR, NOT**) when using them in PubMed. Using lower case may yield unexpected results.

5. **Combine synonymous terms or terms representing similar concepts with *"OR"* in parentheses.**

   Consider the following search: *(glucosamine OR chondroitin) AND (NSAIDS OR non-steroidal anti-inflammatory drugs) AND osteoarthritis AND knee pain*

   The terms *"glucosamine"* and *"chondroitin"* represent two potential alternative treatments being considered for knee pain associated with osteoarthritis. These are being compared with *"NSAIDS"* and *"non-steroidal anti-inflammatory agents"* (synonymous terms) which represent a more traditional therapy. Think of *"OR"* in terms of *"either/or."* Articles retrieved will contain one, the other, or both concepts.

6. **Use enough search terms to represent all of your important concepts.**

   When constructing a search in PubMed, use all of the important concepts from your basic clinical question. If you are looking for articles that compare the efficacy of *glucosamine* or *chondroitin* with that of *NSAIDs* for treating *osteoarthritis pain* of the *knee* in *adults*, a good first search could include all of these words: *glucosamine, chondroitin, nsaids, non-steroidal anti-inflammatory drugs, osteoarthritis, knee, pain, adults*.

   The search constructed from these concepts could look something like this:
   (glucosamine OR chondroitin) AND (nsaids OR non-steroidal anti-inflammatory drugs) AND osteoarthritis AND knee AND pain AND adults

   If you do not retrieve enough (or any) relevant articles, try running the search again and delete the least important term(s) one at a time, e.g., *adults, pain, knee.*

7. **Avoid using so many search terms that you retrieve few, if any, articles.**

   Sometimes, the tendency is to include so many search terms that few or no articles are retrieved:

   acupuncture AND physical therapy AND exercise AND glucosamine AND chondroitin AND (NSAIDS OR non-steroidal anti-inflammatory agents) AND osteoarthritis AND knee AND pain
   Number of articles retrieved: 1

Remember that each term that is added to the search with "**AND**" decreases the number of results. If you are interested in all of the therapies listed above, try searching one or two at a time, or combine some search terms with **"OR":**

(glucosamine OR chondroitin) AND (nsaids OR non-steroidal anti-inflammatory agents) AND osteoarthritis AND knee AND pain
Number of articles retrieved: 69

(physical therapy OR exercise) AND (glucosamine OR chondroitin) AND (nsaids OR non-steroidal anti-inflammatory agents) AND osteoarthritis AND knee AND pain
Number of articles retrieved: 23

physical therapy AND (glucosamine OR chondroitin) AND (nsaids OR non-steroidal anti-inflammatory agents) AND osteoarthritis AND knee AND pain
Number of articles retrieved: 18

acupuncture AND (glucosamine OR chondroitin) AND (nsaids OR non-steroidal anti-inflammatory agents) AND osteoarthritis AND knee AND pain
Number of articles retrieved: 5

8. **Avoid using imprecise search words.**

Some words you might try as search terms may be used inconsistently in published articles or are too imprecise to be useful, e.g., *increased, better, greater, less, worse*, etc.

Suppose you are looking for articles discussing whether the use of inhaled corticosteroids leads to a decrease in growth for children with asthma. You might be tempted to run this search:

asthma AND inhaled corticosteroids AND <u>decreased</u> growth
Filters: published in the last 10 years; English; Child: birth-18 years
Results: 14

Removing the term "*decreased*" yields many more possibly relevant articles:

asthma AND inhaled corticosteroids AND growth
Filters: published in the last 10 years; English; Child: birth-18 years
Results: 145

There are a variety of ways to express the concept of **"decreased growth"** without actually using that exact wording (e.g., *flattening growth curve, effects on growth, growth impairment*). Using *"decreased"* as a search term will limit your search to just those articles that actually contain it. The better way to express this concept is by just using the search term *"growth"* alone.

9. **Never use articles, prepositions, or other minor parts of speech as search terms, e.g.,** *"increase in growth" "drug therapy vs. diet therapy."*

    Words such as *"in" "of" "the" "with" "some" "vs"* are not useful search terms and will be either removed from your search and replaced with the Boolean operator *AND*, or will be searched as is, which will limit your results to only those articles that actually use the word in the title, abstract, or other searchable fields.[5]

10. **Avoid unnecessary filters, e.g., "Core clinical journals", "Full Text"," Free Full Text"**

    Some of the *filters* used by PubMed (to the left of the search results page) are not useful and may cause you to miss useful articles:
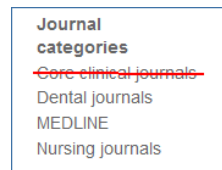
    "Core clinical journals," under the filters for **"Journal categories,"** is a list of about 120 clinical English language journals. It is meant to represent those journals likely to be available in a small, clinical medical library.

    The filters **"Full Text"** or **"Free Full Text"** will limit your search results to those citations that include a link to full text or a link to *free* full text. These filters **DO NOT** correspond to the online journal subscriptions available to you via the UCI Libraries. Use the UC-eLinks icon to see if the full-text of a particular article is available:

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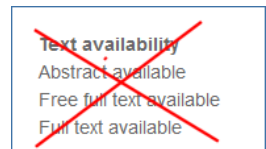
[5] However, some PubMed Medical Subject Headings (MESH) may include these as a part of the term, e.g., *"Delivery of Health Care"* or *"Attention Deficit Disorder with Hyperactivity."*