The Medline Database.

This handout aims to introduce the non-expert to searching medical literature. Please also take a look at our Ovid video tutorial https://bb.imperial.ac.uk/bbcswebdav/orgs/ORG-WQ_Library_Info_Skills/Articulate/Ovid/presentation_html5.html

The Medline database.

Medline contains more than 25 million references to journal articles in life sciences with a concentration on biomedicine.(1)

Articles can be tracked in two ways:

1) By any word listed on the database, including words in the title, abstract, authors' names, and the institution where the research was done.
2) By a restricted thesaurus of medical titles, known as medical subject heading (MeSH) terms.
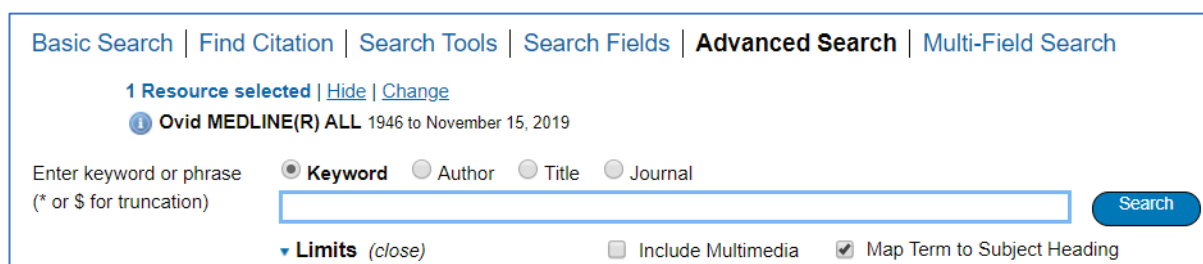
To illustrate how Medline works, this article will work through some common problems in searching. The scenarios use the Ovid version of Medline.

At Imperial College, you can access Ovid Medline in two ways:

1) Searching Medline Ovid in Library Search https://library-search.imperial.ac.uk/
2) Accessing it via the Medicine and Biomedical Science subject support page http://www.imperial.ac.uk/admin-services/library/subject-support/medicine-and-biomedical-science/ Make sure you just choose 'Medline' from the Ovid page- if you choose more than one database you will not be able to search for the subject headings.

Problem 1: You are trying to find a known paper.

Solution: search the database by field suffix (title, author, journal, institution etc) or by keywords.

We advise that you use Medline in the Advanced Search tab.

If you are interested in particular topics then type these into the search box. Medline searches for words together in a phrase. **If you would like articles on different topics then you can link these with AND** e.g. confidentiality AND patients casenotes will find articles that include the word confidentiality and also the phrase patients' casenotes. **Using OR will add the two sets together so use this when there are multiple ways of describing something** e.g. tumours OR carcinomas.

If you know the title of the journal article, then you can type this into the search box. To avoid also finding articles which use the same phrase then you can click on the 'title' option above the search box. Alternatively, you can use the suffix .ti

The default search for a keyword is .mp. This stands for 'multipurpose' and will search for those words in a variety of fields including the title, abstract, keyword heading word and unique identifier. If you would like to limit the field that the words could be in then you can add suffixes to your search e.g. epilepsy.ab will find articles where the word epilepsy appears in the abstract.

Syntax	Meaning	Example
.ab	Word in abstract	Epilepsy.ab
.au	Author	Greenhalgh-t.au
.jn	Journal	Lancet.jn
.ti	Word in title	Epilepsy.ti
.ti,ab	Word appears in the title or abstract	Epilepsy.ti,ab
.in	The institution that an author belonged to	Imperial College.in
.yr	The year of publication	2019.yr

The full list of suffixes is available here https://ospguides.ovid.com/OSPguides/medline.htm

Problem 2: You want to answer a specific question.
Solution: Construct a focused (specific) search by combining two or more broad (sensitive) searches.

You will often be looking for articles that include several topics to answer a specific question. For example, you might have an anorexic patient who wants oral contraceptives to be prescribed in order to prevent their bones thinning. This section will explain how you can find relevant research in order to advise your patient. You will be looking for three concepts:
1) Anorexia
2) Oral Contraceptives
3) Osteoporosis

You need to make sure that you are searching only one database at a time. This means that you will have the 'map term to subject heading' box below the search box.

To find articles about anorexia, type this word into the search box. As long as you haven't added a suffix (e.g. .ti) then Ovid will try to 'map' your request to one of its standard medical subject headings (abbreviated to MeSH.) You will therefore see the page below.

If you click on the i in the scope column for both subject headings you can see a definition of that MeSH. The one that is most suitable for our research is anorexia nervosa therefore select this subject heading. You can click on continue now or you can choose one of the extra two choices; explode or focus.

Explode means that your results will include everything given this subject heading and also any more specific subject headings. The MeSH terms are like the branches of a tree with, for example, "feeding and eating disorders" subdividing into "anorexia nervosa," "bulimia nervosa" and so on. Medline indexers are instructed to index items by using the most specific MeSH terms they can. By clicking on the 'anorexia nervosa' link we can see how the subject headings are organised (see image below.)

If you were interested in discovering if oral contraceptives could prevent the bones thinning of people with all eating disorders but just tick the subject heading of "feeding and eating disorders" you will miss all the articles indexed with the more specific disorders unless you "explode" the term by putting a tick in the 'explode' column of 'feeding and eating disorders.'

By ticking **Focus** you will ensure that you only get results back that are actually about anorexia nervosa rather than those that mention anorexia in passing.

Once you have decided if which subject headings you want, and whether you want to explode or focus them, click on 'continue.' The next screen offers a choice of subheadings but ignore these and click 'continue' again.

If you focussed the subject heading 'anorexia nervosa' you should now have this in your search history at the top of the page. The * shows that the term is a major focus of the article, and the / represents a MeSH term.

To get articles about osteoporosis, type the term into the search box. This time we are not going to focus the subject heading.

Finally, type search for oral contraceptives. This will tell you that the subject heading is 'contraceptives, oral.' If you click on the link for this MeSH you will see that there are more specific MeSH terms underneath, both the drug Gestrinone and also the more specific types of oral contraceptive. Therefore explode this subject heading, press continue and then, once again, ignore the subheadings page.

You will now have a search history that looks like this:

▼ Search History (3)		
# ▲	Searches	Results
☑ 1	*Anorexia Nervosa/	10409
☑ 2	Osteoporosis/	43135
☑ 3	exp Contraceptives, Oral/	45270

Save Remove Combine with: AND OR

Put a tick in each line and the click on AND. This means that your results will show articles which have the subject heading osteoporosis, the subject heading for anorexia nervosa where that MeSH was a focus of the article and the subject heading for oral contraceptives as well as the more specific subject headings which are below oral contraceptives in the tree. As you can see from the below, this means that there are only four articles to look at.

▼ Search History (4)		
# ▲	Searches	Results
☐ 1	*Anorexia Nervosa/	10409
☐ 2	Osteoporosis/	43135
☐ 3	exp Contraceptives, Oral/	45270
☐ 4	1 and 2 and 3	4

Problem 3: The search gives no articles, or too few

Solution: Use a combination of subject headings and keywords to ensure you are finding all the relevant research.

It takes up to a year for subject headings to be applied to articles so if you only search for MeSH you will not find recent research. Also, not all articles will necessarily have subject headings applied to them. Therefore, you should adopt a "belt and braces" approach and search keywords as well as by MeSH terms. After all, it is difficult to write an article on the psychology of diabetes without mentioning the words "diabetes," "diabetic," "psychology," or "psychological," so the truncation stems "diabet*.mp" and "psychol*.mp." would supplement a search under the MeSH term "exp diabetes mellitus/" AND "exp psychology/."

When you are searching for keywords, Medline searches for exactly what you have typed. This is why the **truncation *** is so useful. But you should also add any other spellings or synonyms that cover each concept. The **wildcard ?** is another useful symbol to use when searching- it tells the database that there might be a missing or extra character in a word. For example, organi?ation and tumo?r are two ways of quickly finding both the American and British spellings of those words.

Something else to consider is that researchers may have used the words in a different order to the phrase that you are searching for. Remember that Ovid does automatic phrasing unless you use AND between the words. This means that if you searched for prescribing errors you would not find articles that talk about 'errors when prescribing.' You could use **adjacency** to find words that are near each other.

What to write	What this does	Example	What this might find
Adj1	Finds the words together but in either order.	Prescribing adj1 error*	Prescribing errors / errors prescribing
Adj2	Finds the words together, in either order and with up to one word in between	Prescribing adj2 error*	Prescribing errors / errors prescribing / Error in prescribing etc
Adj3	Finds the words together, in either order and with up to two words in between	Prescribing adj3 error*	Prescribing errors / Error in prescribing / errors and inappropriate prescribing etc
The number following adj will always be one more than the possible number of words between the two terms			

Build up your search by combining all the keywords and MeSH that cover a topic with OR. You can then use AND to link these topics together.

# ▲	Searches	Results
1	Anorexia Nervosa/	12692
2	anorexi*.mp.	36440
3	1 or 2	36440
4	exp Osteoporosis/	54545
5	osteoporos?s.mp.	84292
6	(thin* adj3 bone*).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]	1453
7	(age adj2 bone loss*).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]	781
8	4 or 5 or 6 or 7	85957
9	exp Contraceptives, Oral/	45267
10	(oral adj2 contraceptive*).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]	37184
11	Gestrinone.mp.	270
12	(estrogen adj2 contraceptive*).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]	2065
13	9 or 10 or 11 or 12	54432
14	3 and 8 and 13	17

Here is an example of a search, using keywords and subject headings, that could be used to help us with our patient in Problem 2. We have used truncation, wildcard and adjacency to increase the range of the keywords. As a result, we have increased the number of articles found from 4 to 17.

Problem 4: Your search gives irrelevant articles
Solution: Refine your search as you go along in the light of interim results.

Often, a search will find lots of articles which are irrelevant to your question. This is especially the case when you have been searching keywords because of the multiple ways a word can be used. The Boolean operator "NOT" can help here. For example, if you were to look for articles about surrogate endpoints in clinical pharmacology research, your results would include lots of articles you didn't want all about

surrogate motherhood. Therefore searching for (surrogate not mother*).mp. means that your results not include any words beginning with mother. The truncation symbol * will find all words from a single stem, such as mother, mothers, motherhood, and so on.

However, **you should be careful when you use NOT**. In this example there might be useful articles about surrogate endpoints in clinical research with mothers and using NOT means that these are not found.

Deciding to use the "not" operator is a good example of how you can (and should) refine your search as you go along—much easier than producing the perfect search off the top of your head.

Problem 5: You don't know where to start searching.

Solution: Use the Scope Note of the subject headings.

One of the difficulties with searching is that one word can have many meanings. Let's take the term "stress." It comes up often but searching for particular types of stress would be laborious and searching "stress" as a keyword would be too unfocused. We need to know which subject heading covers the concept that we want. As long as you have the 'map term to subject heading' box ticked, when you search for stress you will get this list of options.

Select	Subject Heading	Explode	Focus	Scope
☐	Dental Stress Analysis	☐	☐	ⓘ
☐	Echocardiography, Stress	☐	☐	ⓘ
☐	Endoplasmic Reticulum Stress	☐	☐	ⓘ
☐	Fractures, Stress	☐	☐	ⓘ
☐	Heat Stress Disorders	☐	☐	ⓘ
☐	Medial Tibial Stress Syndrome	☐	☐	ⓘ
☐	Nitrosative Stress	☐	☐	ⓘ
☐	Occupational Stress	☐	☐	ⓘ
☐	Oxidative Stress	☐	☐	ⓘ
☐	Salt Stress	☐	☐	ⓘ
☐	Stress Disorders, Post-Traumatic	☐	☐	ⓘ
☐	Stress Fibers	☐	☐	ⓘ
☐	Stress, Mechanical	☐	☐	ⓘ
☐	Stress, Physiological	☐	☐	ⓘ
☐	Stress, Psychological	☐	☐	ⓘ
☐	Urinary Incontinence, Stress	☐	☐	ⓘ
☐	stress.mp. *search as Keyword*			

If you click on the Scope icon ⓘ for any of these MeSH, then you can check its definition to make sure you have the correct heading. The Scope Note is also really useful because it gives some examples of synonyms in the 'used for' section. For example, if you click on the scope icon for Stress, Psychological then you get the page below. If this was the correct type of stress for your research question, then you might decide to add psycholog* stress* OR stress* adj3 emotion* OR life stress* to your search. The scope note is therefore a quick way of starting to build up your list of keywords, even if you don't initially know much about the topic.

Problem 6: Limiting a set loses important articles but does not exclude those of low methodological quality

Solution: Apply a search filter.

If your search still gives you several hundred articles you could insert a quality string designed to limit your set to publication type, such as randomised controlled trial, systematic review, or meta-analysis. It is tempting to use the limits under the search box but these will exclude articles that don't yet have subject headings applied to them and therefore you won't have the most recent research.

Instead, use EBQFs (evidence based quality filters), which are complex search strategies developed by some of the world's most experienced medical information experts. You can copy and paste them into Medline and save them in your Ovid account to be added to your subject searches.

A commonly used and quick filter is the one used to get rid of articles that have MeSH applied that show they were about animals. This means that you will not need to have to go through as many irrelevant articles if you are only looking for research conducted on humans.

1. [Final search strategy result]
2. exp animals/ not humans.sh
3. 1 not 2

Websites where you can find filters for studies include:
SIGN https://www.sign.ac.uk/search-filters.html
ISSG https://sites.google.com/a/york.ac.uk/issg-search-filters-resource/home/search-filters-by-design
BMJ Best Practice https://bestpractice.bmj.com/info/toolkit/learn-ebm/study-design-search-filters/

Problem 7: Medline hasn't helped

Solution: Explore other medical and paramedical databases

Medline is a good starting place for your research but it doesn't include 100% journals. Other medical databases have a different focus for example PsycINFO concentrated on psychology and the behavioural and social sciences. Depending on your research question you may also find it beneficial to look in a database that covers many topics. For example, Scopus searches nearly 22,000 titles covering science, technology, medicine, social science and arts & humanities.

You can find the list of databases we recommend for medical research on our subject support page http://www.imperial.ac.uk/admin-services/library/subject-support/medicine-and-biomedical-science/ If your research topic veers into another area then you might want to look at the subject support page for other topics. For example, if you were investigating the costs of implementing a particular health policy then you might want to look on the subject support page for business to find some appropriate databases. The full list of subject support pages is available here http://www.imperial.ac.uk/admin-services/library/subject-support/

If you would like any support using these databases or have any questions about this handout please email library@imperial.ac.uk and one of the medicine liaison librarians will be able to help.

1. U.S. National Library of Medicine. *Medline: Description of the database*. Available from: https://www.nlm.nih.gov/bsd/medline.html [Accessed 19th November 2019.]

This worksheet is an updated version of Greenhalgh T. How to read a paper: The Medline Database. *British Medical Journal*. 1997; 315: 180-183. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2127107/pdf/9251552.pdf [Accessed 19th November 2019]

Words and content have been taken from this text to keep this handout kept as similar to the original article as possible although the information has been updated and adjusted to cover using the web version of Ovid Medline.