How to do a Literature Search?

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Introduction

We often search literature for various reasons, like improving patient care by getting answers to some patient related question, be acquainted with recent guidelines, searching medical images and videos. Searching literature on the topic of interest from the mammoth data available on internet is a tedious and time consuming job and sometimes even extensive search might turn out to be a futile process. Appropriate knowledge of correct method of finding data and various search engines available may prove to be highly useful in narrowing our search results in the most appropriate way. However if we look at literature there are very few articles available on this topic. Thus this review article was written to identify methods for effective literature search with special emphasis on pub med.

Aims and Objectives

1. To develop ways to search relevant literature including images, videos and guidelines in shortest possible time
2. To understand use of one of the most commonly searched sites PubMed

Steps to literature search

The basic strategy to search a literature should be:

1. Define your topic/research question
2. Develop keywords
3. Identify what type of literature you are searching for
4. Identify sources to search
5. Identify scope/limits of search

Defining your topic/research question

This is best done by following PICO format as mentioned in table 1.

Initials	Meaning
P	• Patient, Population or Problem • Characteristics • Condition or disease of interest
I	• Intervention or exposure • What do u want to do to this patient • Treat, diagnose, observe?
C	• Comparison • What is the alternative • Placebo, different drug, surgery
O	Outcome • Morbidity, mortality, complications

***Table 1:** Defining your research question.*

Developing keywords

Literature search can be done by using either keywords from the research question or controlled vocabulary. Using them can help in retrieving the results in a better way.

Controlled vocabulary is a pre-defined set of term used by a database to describe a particular term. It is also referred to as subjects, subject headings, subject terms, descriptors, thesaurus, or index terms. For example controlled vocabulary used in pub med is MeSH. Table 2 outlines the difference between using 'Controlled Vocabulary' and 'Keywords'.

Keywords	Controlled vocabulary
1. Natural language words	1. Pre-defined words
2. More flexible to search	2. Less flexible to search
3. Database looks for keywords anywhere in the record	3. Database looks for subjects only in the subject field
4. May yield many irrelevant results	4. Usually reveals highly relevant results

Table 2: Difference between keywords and controlled vocabulary.

Identify what type of literature you want to search for

You need to decide what type of literature would be appropriate to answer the study question. For example clinical trials, RCTs, systemic reviews, meta-analysis, case series, case reports, medical images, videos etc.

Identify sources to search

After having defined what actually we are searching for we need to identify where to search from. Two broad types of literature available are peer reviewed indexed literature and gray literature. "Peer reviewed indexed literature" are the ones which represent original research in a particular area. These articles are scrutinized by expert people before they are finally published. "Gray literature" refers to material that is not formally published by commercial publishers or peer-reviewed journals, including reports, fact sheets, white papers, conference proceedings, and other documents from various organizations and government agencies.

Another way to choose the search site is by deciding what we are actually searching for e.g. guidelines, images, videos, review articles.

Table 3 provides a brief description of the common databases and search engines available in medical field

Database	Remarks	Availability	Website
Bibliography manager			
MEDLINE	- National Library of Medicine's (NLM) premier bibliographic database - Maintained by the National Center for Biotechnology Information (NCBI) - Contains over 19 million citations - Provides abstracts and references covering the fields of medicine, nursing, dentistry, veterinary medicine, the health care system, preclinical sciences	Free	ncbi.nlm.nih.gov/ pubmed/
CINAHL: Cumulative Index to Nursing and Allied Health	Related to nursing and allied health	Subscription	
Clinical key	Medical search engine and database tool owned by Elsevier that offers access to the medical library	Free	clinicalkey.com/
Clinical trials	Database of privately and publicly funded clinical studies conducted around the world.		clinicaltrials.gov/
Cochrane Reviews	- Comprises of systematic reviews and meta-analysis - Offers free access to abstracts and some full length articles	Free	cochrane.org/reviews/
Directory of open access journals	- Provides more than 10,000 open access journals	Free	doaj.org
EMBASE	- Special focus on drugs and pharmaceuticals	Subscription	elsevier.com/
Ermed			
Google scholar	Includes most peer-reviewed online academic journals, books, conference, papers, theses and abstracts	Free	scholar.google.com/
Hinari	Set up by the WHO to enable developing countries to access collections of biomedical and health literature.		extranet.who.int/
Hubmed	- An alternative to PubMed	Free	hubmed.org/
Indian citation index	Contains articles from over 1000 Indian journals	Free	indiancitationindex. com/
Medscape			
Research gate			
SciELO	Contains 985 scientific journals from different countries	Free	scielo.org/
Scihub			
SCOPUS	One of the world's largest abstract and citation database of peer-reviewed research literature	Subscription	scopus.com/
Springer link	Access to millions of scientific documents from journals, books, series, protocols and reference works	Subscription	springer.com/
Uptodate	Evidence-based, physician-authored clinical decision support resource to make the right point-of-care decisions	Subscription	uptodate.com/
Wiley online library	Collections of online journals, books, and research resources, covering life, health, social, and physical sciences		onlinelibrary.wiley. com/
Zotero	Open-source reference management software to manage bibliographic data and related research materials	Free	zotero.org/

Table 3: Description of the common databases and search engines available in medical field.

Websites	Remarks	Availability	
CDC Public health image library (PHIL)	Images in this are historic in nature, may not be relevant for current practice	Free	
HON media (Health on net)	Repository of over 6'800 medical images and videos, pertaining to 1700 topics and themes.	Free	
Medline plus	extensive library of medical photographs and illustrations	Free	
Medpix	Medical Image Database with over 59,000 indexed and curated images	Free	
Open Access Biomedical Image Search Engine- OPEN I	Provides access to over 3.7 million images from about 1.2 million PubMed Central articles; 7,470 chest x-rays with 3,955 radiology reports; 67,517 images from NLM History of Medicine collection; and 2,064 orthopedic illustrations.	Free	
Science direct		Free	Advanced search

Table 4: *Websites for medical images.*

Website	Remarks	Availability
NEJM	- Provides procedure videos, interviews with perspective authors, and roundtable discussions. - Available on you tube	Free
Medicalvideos.com	- Library of medical and surgical videos in HD version - Videos can be searched according to speciality	Free
Medtube.net	- Speciality wise videos available	Free
Medcram.com	Medical education videos, online medical lectures and CME	Subscription
Medline plus	- Provides various health and surgery videos	Free
HON media (Health on media)	- Repository of thousands of images and videos - 3 step browsing is there	Free

Table 5: *Websites for medical videos.*

Sources from where guidelines related to neonatology can be collected are:

1. National guidelines clearing house
2. Google scholar
3. American academy of pediatrics
4. NICE
5. UK guidelines
6. Neonatal guidelines-NHS
7. ACOG
8. RCOG
9. WHO
10. NNF and IAP in Indian context

Clues for searching in a particular database

1 .Use of Boolean Operator: They connect the search words in a way so as to narrow or broaden the results. Standard Boolean operators used are AND, OR, NOT all three in capital letters. When AND is used between two terms the results containing both terms are retrieved only. When OR is used between two terms the results containing either of terms are retrieved. Use of NOT excludes any result containing the term, they are often used to get rid of a particular subgroup. Thus use of AND and NOT will narrow the search results and use of OR will broaden the result.

2. Use of field tags: They indicate which field is to be searched. In PubMed field tags go in [] and follow term. For example while searching for an author XY write XY [au]. Various filed tags used in PubMed can be seen on its site.

3.Use of truncations: It is a search technique in which last few alphabets of a word are replaced with a symbol. The database will provide results that include any ending of that root word. Frequently used truncation symbols include the asterisk (*), a question mark (?) or a dollar sign ($). For example if we write therap* all the articles with words therapy, therapist, therapeutic, therapies will be retrieved.

Searching in PubMed

MeSH (Medical subject headings)

It is the controlled vocabulary used in PubMed. MeSH terms are displayed in the hierarchy called as MeSH tree. This allows to broaden or narrow the search results.

For example if put cytomegalovirus in MeSH terms we get following display.
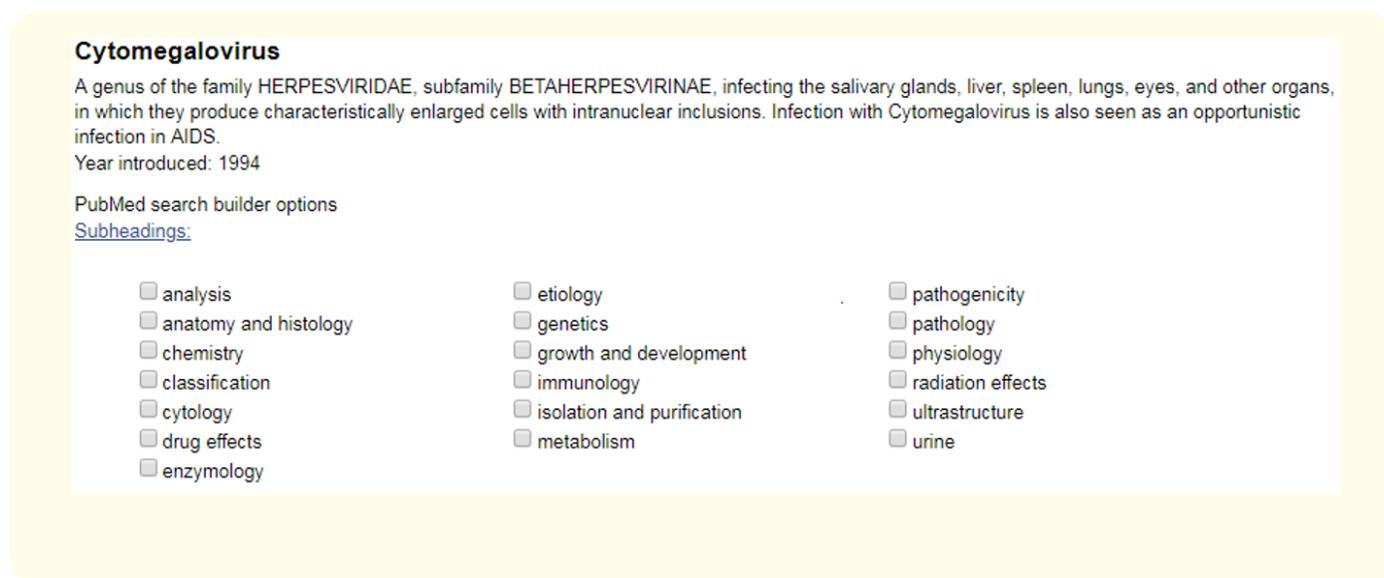
Cytomegalovirus

A genus of the family HERPESVIRIDAE, subfamily BETAHERPESVIRINAE, infecting the salivary glands, liver, spleen, lungs, eyes, and other organs, in which they produce characteristically enlarged cells with intranuclear inclusions. Infection with Cytomegalovirus is also seen as an opportunistic infection in AIDS.
Year introduced: 1994

PubMed search builder options
Subheadings:

- analysis
- anatomy and histology
- chemistry
- classification
- cytology
- drug effects
- enzymology
- etiology
- genetics
- growth and development
- immunology
- isolation and purification
- metabolism
- pathogenicity
- pathology
- physiology
- radiation effects
- ultrastructure
- urine

Figure 1

With the help of subheadings we can further refine our search.

The results are also displayed in hierarchical form with topmost category being the broadest category and narrower categories displayed below the top ones.

Figure 2

Advanced search

It helps in field specific search in pubmed. Some of the fields displayed are author, date, editor, journal, publisher, title etc. Various fields can be combined using Boolean operators AND, OR, NOT.

Filters

Filters can be used to narrow down the search results. Various filters which can be applied in pub med are article type, publication dates, species, languages, sex, ages and many more.

Limits

Limits are again used to narrow down the results for example according to affiliations, authors, journal, article title.

Conclusion

Searching literature is a scientific art which can be learnt with knowledge and practice. The basic steps mentioned in this article can be used to refine literature search and to get the best results in shortest possible time.

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