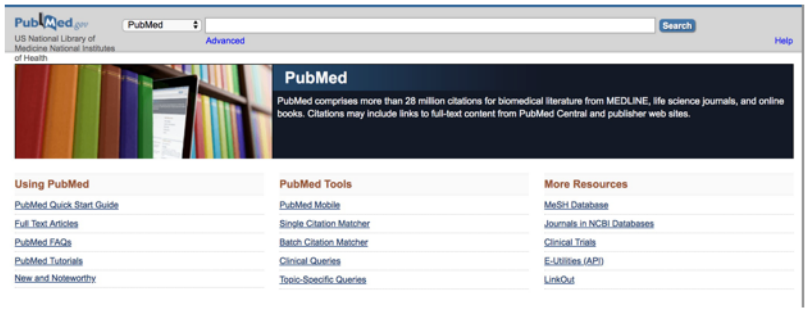
Practice-based Evidence in Nutrition (PEN®, www.pennutrition.com) is the global resource for nutrition practice.

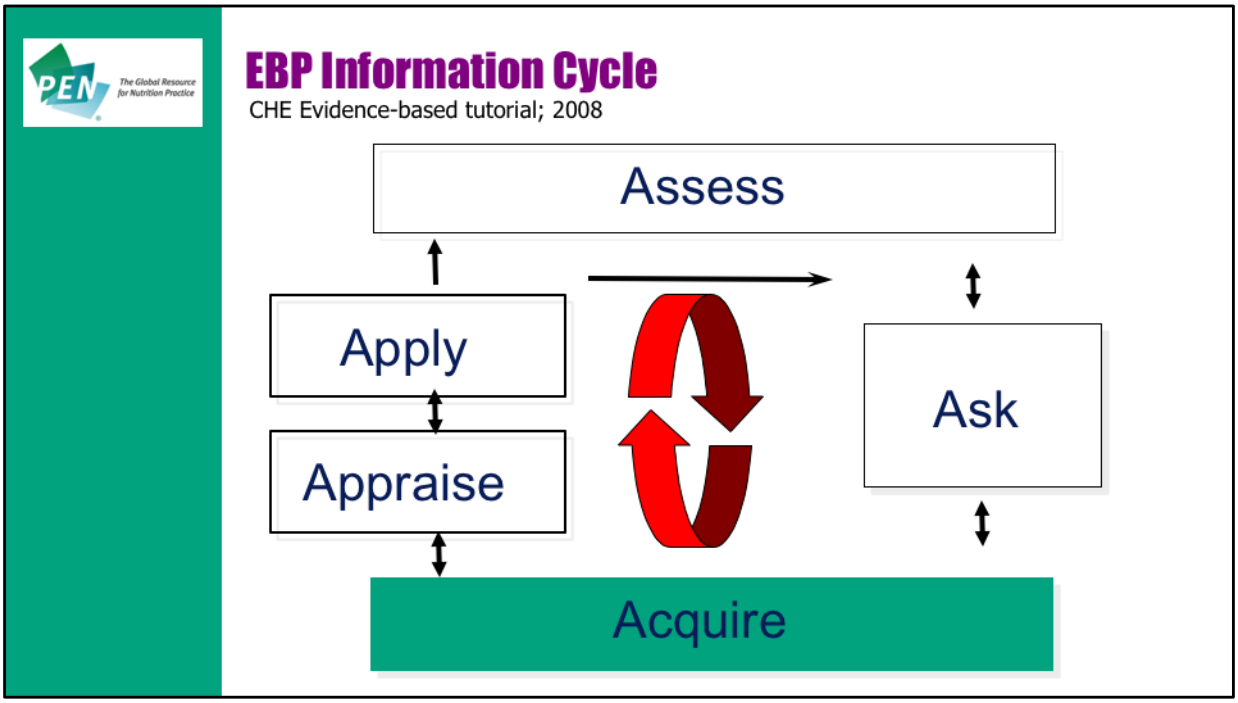
PEN® Key Feature

Using PubMed to Acquire Evidence

https://www.ncbi.nlm.nih.gov/pubmed



PubMed is a freely available database that provides access to MEDLINE, life science journals and online books. Citations include abstracts and may link to free full-text content from PubMed Central and open access publishers' websites https://www.ncbi.nlm.nih.gov/pubmed



The goal in searching is ideally to find quality answers to your structured questions in a timely manner.

A number of sources are available that provide different types and levels or quality of evidence.

We are looking for **the BEST evidence**, not every shred of evidence on a particular topic

Hierarchical literature retrieval

Identifying best available evidence

A. Secondary sources
   i. Systematic review or guidelines based on systematic review
      - most recent and highest quality, most closely represents PICO
      - meta-analyses
   ii. Narrative review with a search strategy

B. Primary sources
   - High quality primary study more recent than the review

To search efficiently and find the best available evidence, the first search should be for good pre-appraised or pre-filtered secondary sources that summarize the literature and give you a useful actionable plan based on the evidence. With these sources, the work of finding and critically appraising the literature has been done for you. Pre-filtered means that an individual or group of individuals with expertise in a particular area have reviewed and presented the information that **was collected, appraised, and combined in the methodologically strongest way.**

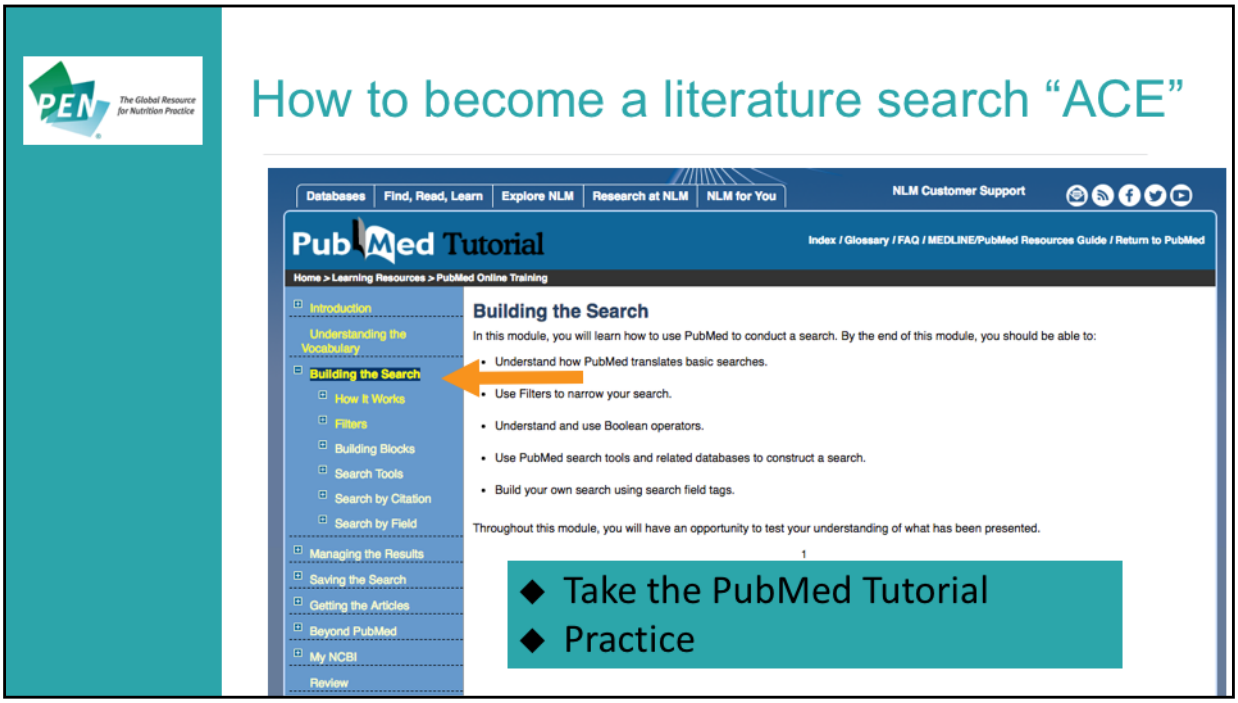
<u>The Hierarchical literature approach:</u>

A. Secondary sources include: i). high quality systematic review (SR) or guidelines based on SR. (The quality of a systematic review can be assed as using AMSTAR 2 tool: https://amstar.ca/Amstar-2.php). If more than 1 SR is identified, pick only one if it addresses all important outcomes. Consider: most recent and highest quality or SR that most closely represents PICO. Meta-analyses are preferred over narrative summary of results.
ii). if no high quality secondary research, a recent narrative review can be used to summarize primary research. Such a review should include a search strategy and be balanced and objective.

B. Include high quality / impactful primary study(s) only if: it is more recent than the SR, it reports an important outcome not included in the SR or no review with a search strategy is available

Note that evidence can come from any source – randomized controlled trials (RCTs) and non-randomized studies (NRS).

A meta-analysis of high quality RCTs is not equivalent to a meta-analysis of observational studies / NRS. On the other hand, not all RCTs are high quality, so although we use a hierarchical approach to identify the best available evidence, we do need to look at the quality of the included studies – this is covered in the 'appraise' section of the information cycle.



How to become a literature search ace?
Take the PubMed tutorials (they are very good). They can be accessed at:
https://www.nlm.nih.gov/bsd/disted/pubmedtutorial/
Practice – you'll get better and develop strategies that work for you.

1. Identify Search Terms

Understand the Research Question

- Determine PICO

e.g. *In healthy adults and those at high risk, should lower glycemic index diets be recommended for primary or secondary prevention of cardiovascular disease?*

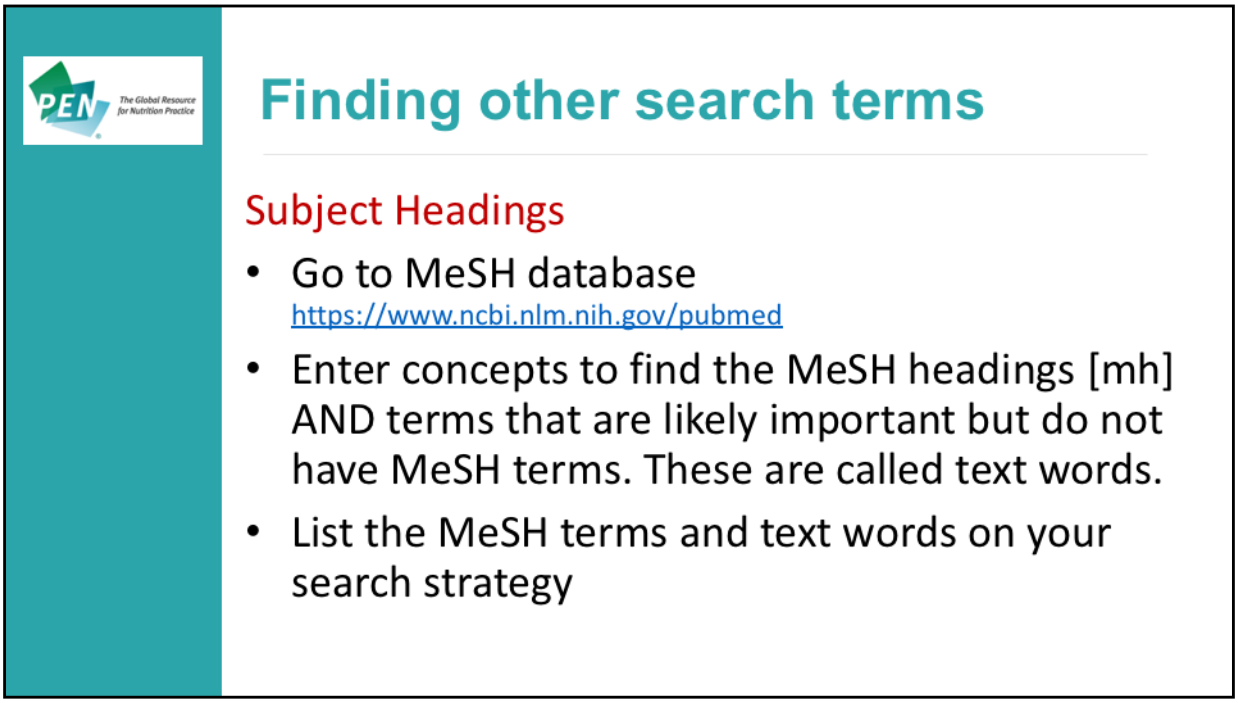
PICO = Population, Intervention, Comparison, Outcome
The research question can evolve with the search but the main concepts related to population and intervention will likely apply.
In the example question in italics,
Population for prevention and treatment of cardiovascular disease (CVD) could be: healthy adults, adults with risk factors for CVD and those with a history of CVD
Intervention relates to low glycemic index diets
Comparison and specific Outcomes do not always need to be included in the question

PICO Concept

Population	Cardiovascular disease Primary prevention Secondary prevention
Intervention	Carbohydrates Low glycemic index Low glycemic load

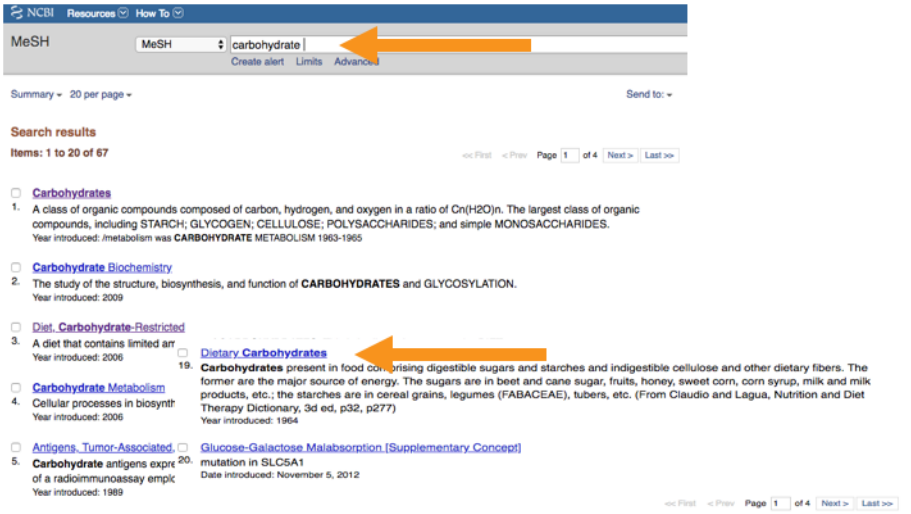
Focus key concepts on population and intervention.

MeSH = Medical Subject Headings
MeSH can be used to find other search terms (synonyms) for your main concepts. MeSH terms are assigned by PubMed indexers who select from a list of predefined subject headings. Using MeSH searches alone will not identify recent articles that have not yet been indexed (e.g. Epub), so this should not be the only search, but can be combined with other searches.



To find relevant subject headings and other terms, go to:
MeSH database https://www.ncbi.nlm.nih.gov/pubmed
These MeSH headings [mh] will be used in your search.

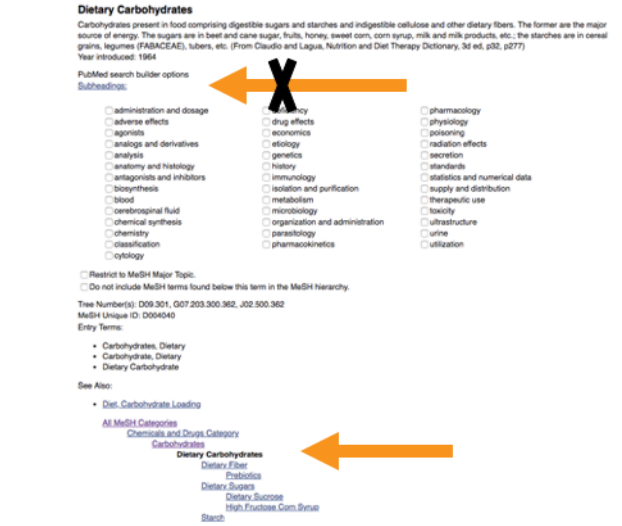
E.g. MeSH terms for carbohydrates



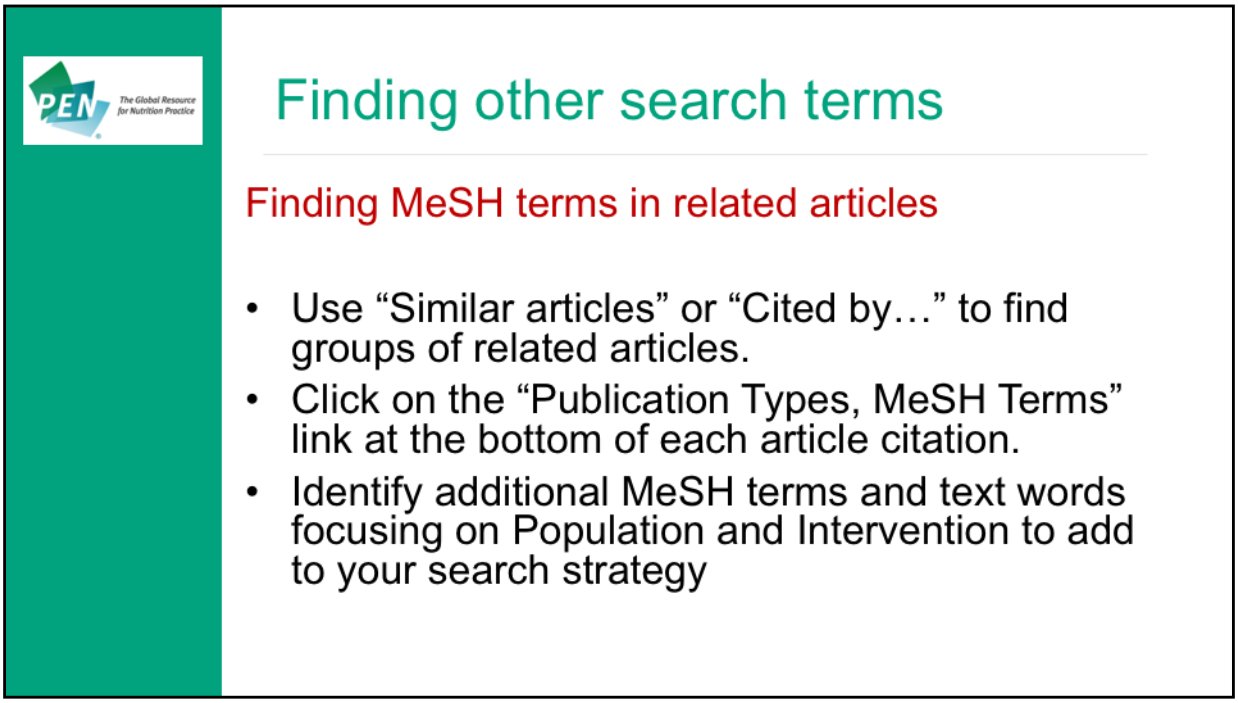
In the MeSH database enter the concept and the search results display a number of MeSH terms

For carbohydrate, Carbohydrates shows up as a MeSH term, but Dietary Carbohydrates is a better descriptor

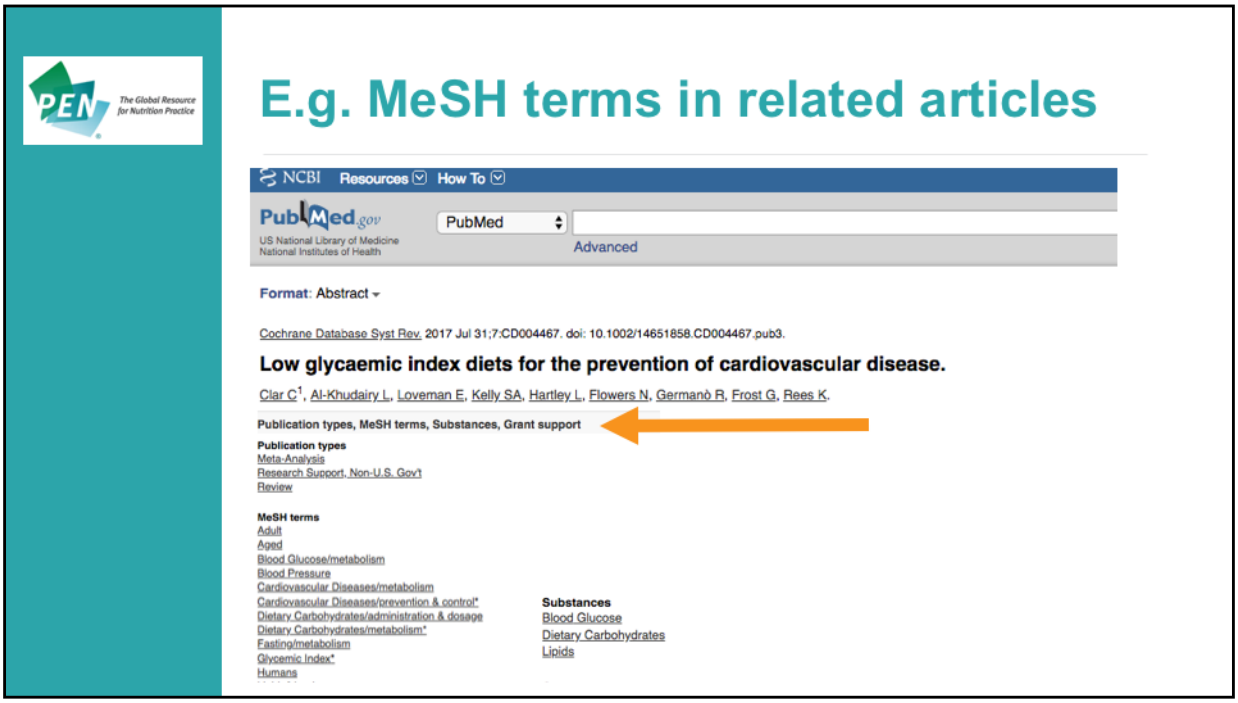
MeSH categories - Dietary carbohydrates



Clicking on the MeSH term will display Subheadings and All MeSH categories
It is best NOT to limit search by MeSH subheadings as this is reliant on indexers specifying each relevant subheading.
MeSH Categories shows the tree structure – in this case Dietary Carbohydrates includes other terms such as Dietary Fiber, Dietary Sugars, Starch…..



Subject headings used for one article on the topic will likely be used for other articles on the topic.



Looking at the MeSH terms used in this article, identifies that Glycemic Index was a major topic of the article (indicated with an asterisk *).
Primary Prevention and Secondary Prevention were other MeSH terms to describe the Population
Substances include supplementary concept terms (i.e. text words) and MeSH terms

Expanded search terms

	MeSH Terms [mh]	Text words
P	Cardiovascular diseases Primary Prevention Secondary Prevention Metabolic Syndrome	Cardiovascular disease
I	Glycemic index Glycemic load Dietary Carbohydrates	Glycaemic Glycaemic index Glycaemic load

MeSH headings can be searched in PubMed by inserting [mh] after the search term. As a reminder, MeSH headings should not be the only search terms used as this does not identify recent, non-indexed articles.

2. Combining terms

- Boolean connectors AND and OR

Boolean Operator	Example	Retrieves
AND	Cardiovascular disease AND glycemic index	Limits search – *use between concepts*
OR	Cardiovascular disease OR Metabolic syndrome	Expands search – *use within concepts*

Any search in PubMed needs to use Boolean operators - that are capitalized ‘AND’ or ‘OR’

Brackets should be included to group ‘OR’ concepts together. E.g. (cardiovascular disease OR metabolic syndrome)

3. Searching

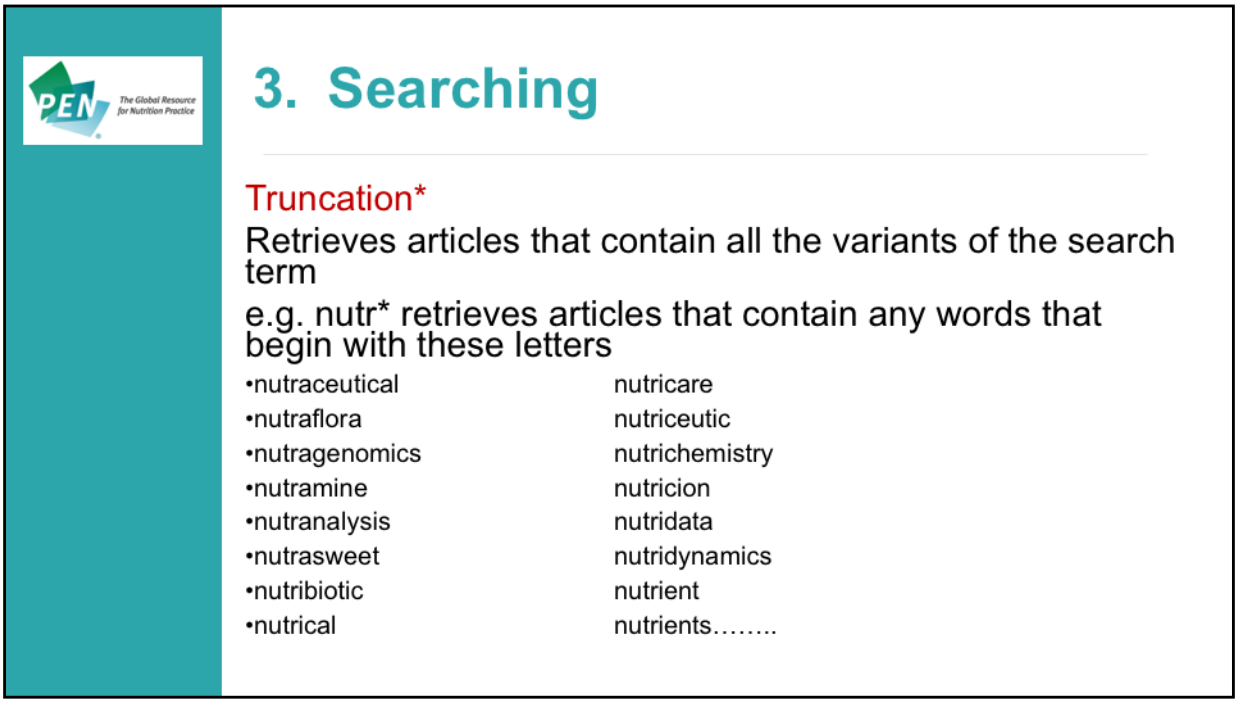
Field Searching

Searching in particular fields for a more comprehensive search

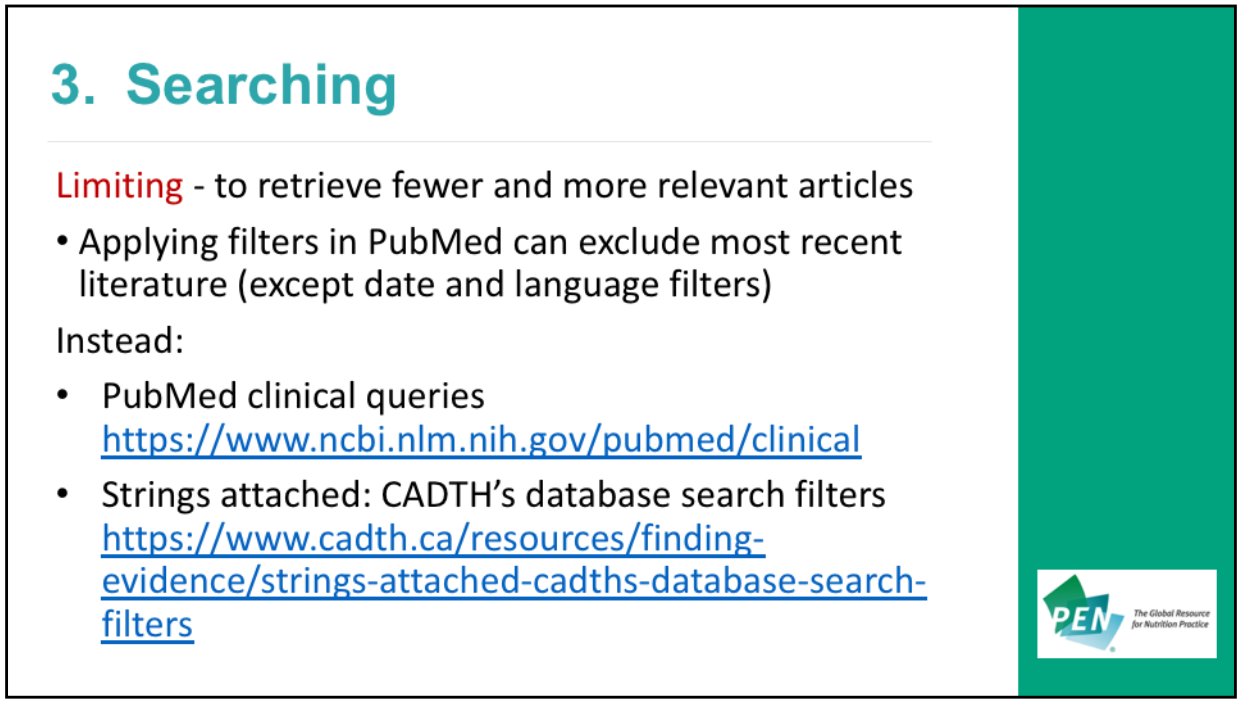
- Title[ti]
- Abstract[ab]
- Title or abstract[tiab]

e.g. glycemic index[tiab]

Searching within particular fields including article title and abstract



The PubMed truncation symbol is the asterisk (*). It is sometimes referred to as a wildcard since it finds all terms that begin with a given string of text. Truncation broadens the search and can retrieve a lot of articles, so it should be reserved for occasions when few results are retrieved or there is limited use of a term.



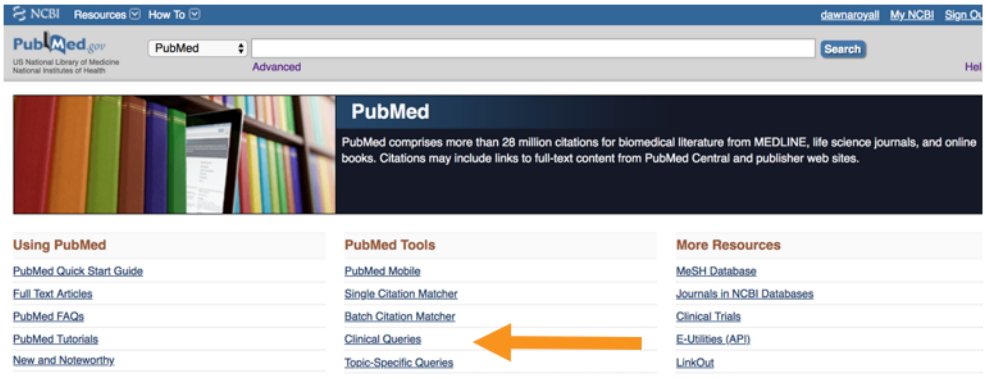
Applying filters in PubMed can exclude some citations that have not yet been indexed including Epub ahead of print, so this excludes the most recent literature on the topic. The exception to this is date filters language filters

An alternative is to use:
PubMed clinical queries: https://www.ncbi.nlm.nih.gov/pubmed/clinical

Strings attached: CADTH's database search filters:
https://www.cadth.ca/resources/finding-evidence/strings-attached-cadths-database-search-filters

Focused clinical search

PubMed clinical queries



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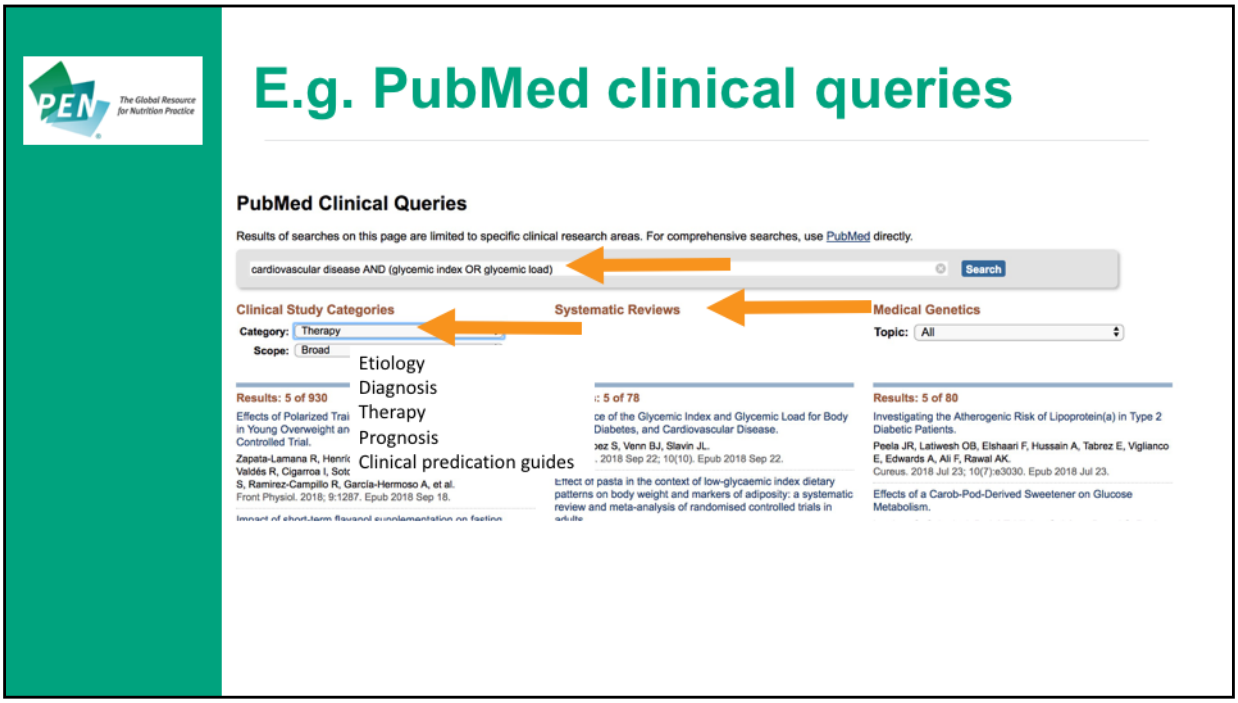
PubMed Clinical Queries is available at:
https://www.ncbi.nlm.nih.gov/pubmed/clinical
Clinical queries is used to identify specific clinical research, especially systematic reviews



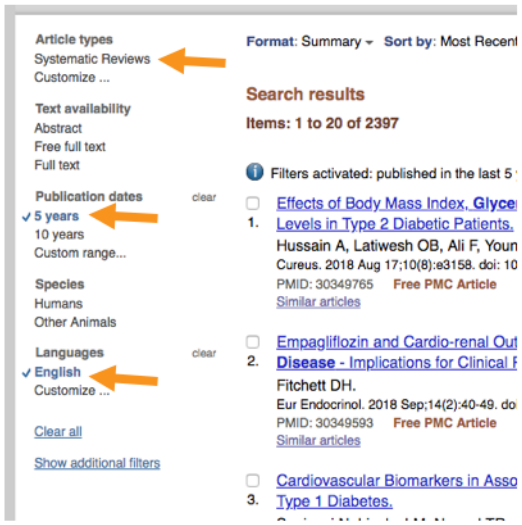
Use the search terms for the population and intervention part of the PICO question; In this example of cardiovascular disease AND (glycemic index OR glycemic load), PubMed Clinical Queries yielded 78 Systematic Reviews. This preliminary search is useful to screen for systematic reviews prior to conducting a more thorough search.

The Clinical Study Categories are: etiology, diagnosis, therapy, prognosis, clinical prediction guides. The scope can be broad or narrow to identify primary studies.

Other Limits

Exclusion criteria

- Publication dates
- English languages
- Article types
  - Systematic Reviews



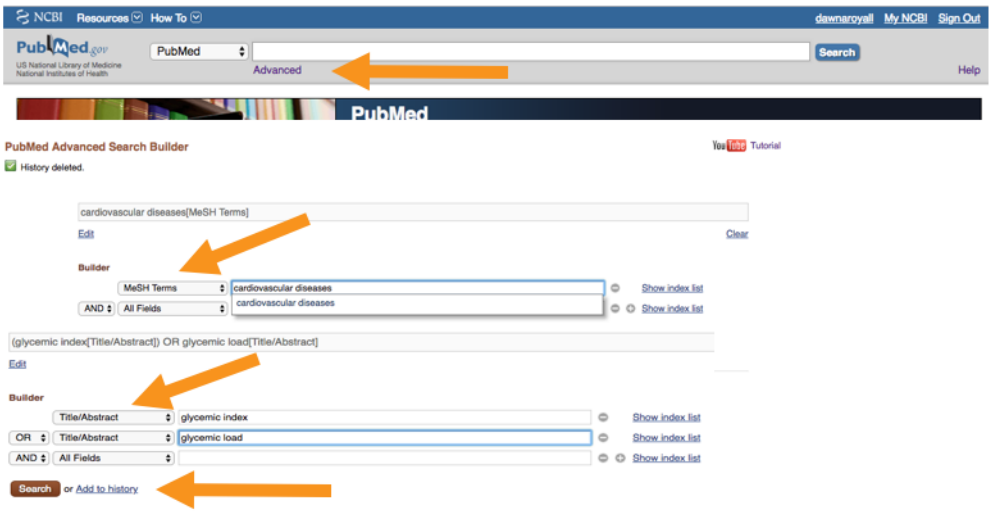
After a search has been conducted in PubMed, exclusion criteria can be applied:

- Publication date: may consider only looking for evidence since the question was last updated in PEN (or last 5 years)
- Language limits: generally consider only English language articles

These filters do not appear to exclude indexed literature so will include the most recent articles.

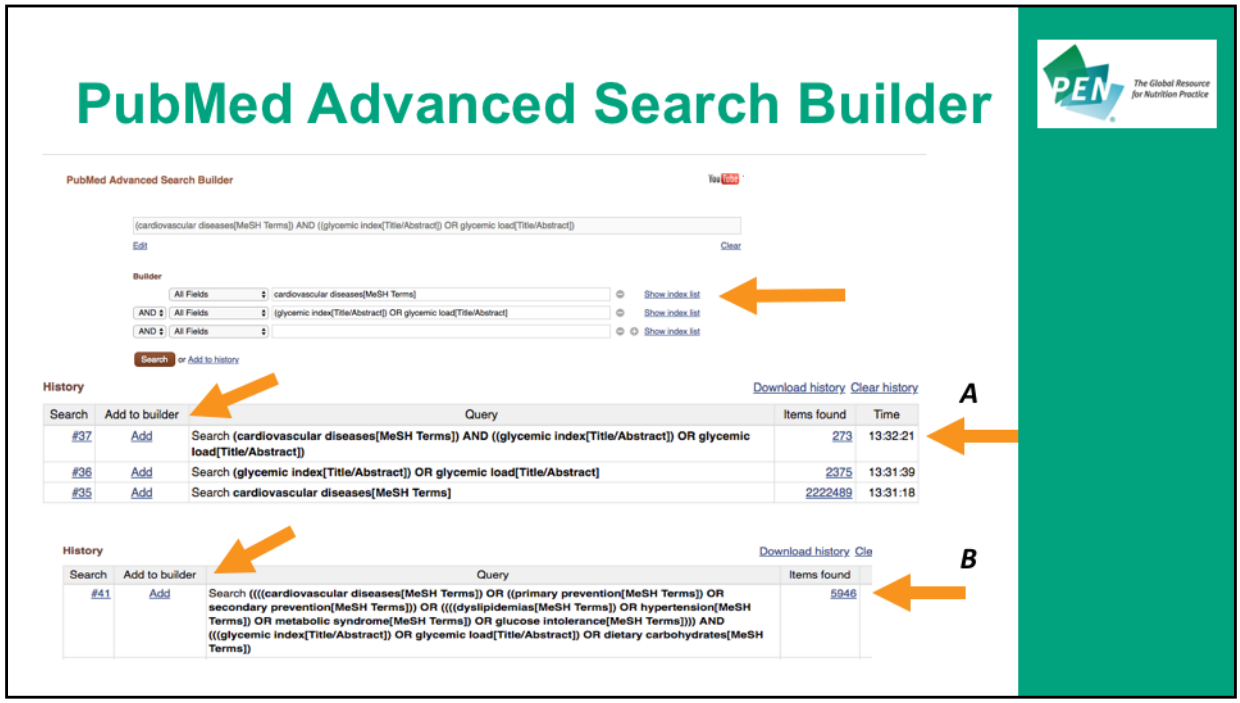
Another filter that can be applied at this time is Article types – for Systematic Reviews. This should result in a similar search as PubMed Clinical Queries – systematic reviews

PubMed Advanced Search



Advanced search (located under the search box) can be used to build the detailed search strategy. It helps with searching by field and by combining search concepts, but it can be challenging to use this search if there are too many search terms.
For Field search, click on All Fields and choose the limits E.g.
MeSH Terms for cardiovascular diseases
Title / Abstract for glycemic index OR glycemic load
Click on **Add to history** after each entry

PubMed Advanced Search Builder

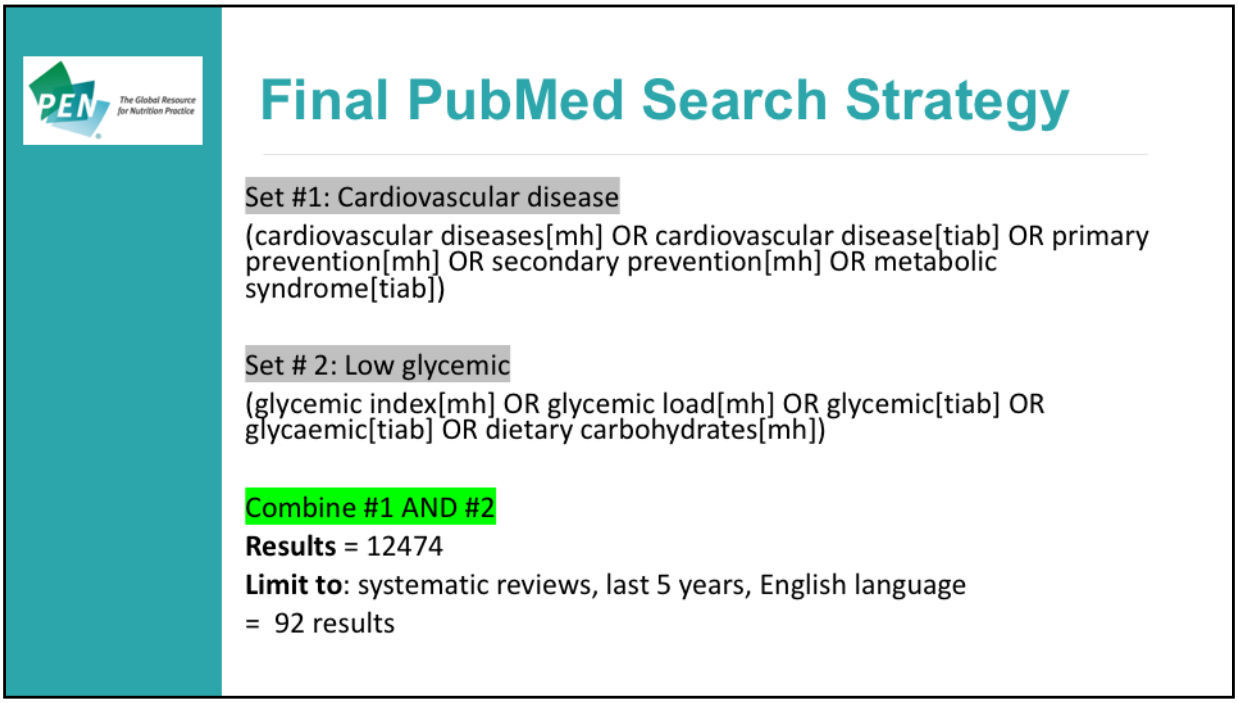


As you include more concepts, you can click on Add to Build the search strategy. As the Search strategy is building, the number of Items found are displayed at the bottom.

For ***A***, fewer search terms found 273 items - this is not a large number, but does include all study designs rather than limiting to systematic reviews.

In contrast, for ***B*** over 5000 items were identified when all search terms were included – this is too large and the search would need to be narrowed.

The YouTube video link at the top of the page provides a brief tutorial: https://www.youtube.com/watch?v=dncRQ1cobdc&feature=relmfu



In conducting the search strategy, it is useful to:

1. Put all of the concepts related to the population together – in brackets separated with OR
2. Put all of the concepts related to intervention together – in brackets separated by OR
3. Combine the 2 concepts and add limits

4. Adapting the search

Narrowing – if the search is too large

- Focus by adding terms, limiting terms to particular fields or adding limits

Expanding – if the search is too narrow

- Remove overly restrictive terms or adding similar terms to your search

5. Documenting the search strategy

PEN Search Strategy Worksheet:

Search Strategy

Content

Should diets lower in glycemic index (GI) or glycemic load (GL) be recommended for the primary prevention of cardiovascular disease (CVD) or the secondary prevention of CVD (i.e. individuals with a history of CVD or with multiple CVD risk factors e.g. metabolic syndrome)?

SEARCH TERMS

MeSH Terms

Cardiovascular diseases
Metabolic Syndrome X
Dyslipidemias
Cholesterol/blood
Triglycerides
Cholesterol, HDL
Cholesterol, LDL
Blood glucose
Blood pressure
Adult

Databases and Grey Literature Sources (e.g. international guidelines) Searched

PubMed
TRIP
Recent guidelines using systematic literature search: Canadian Cardiovascular Society

Reasons for excluding reviews or studies identified using a hierarchal literature search

Excluded systematic reviews as outcomes were reported in other reviews that were more relevant and/or lower risk of bias:

1. Fan J, Song Y, Wang Y, Hui R, Zhang W. Dietary glycemic index, glycemic load, and risk of coronary heart disease, stroke, and stroke mortality: a systematic review with meta-analysis. PLoS One. 2012;7(12):e52182. doi: 10.1371/journal.pone.0052182. Epub 2012 Dec 20. Abstract available from: https://www.ncbi.nlm.nih.gov/pubmed/23284926
2. Dong JY, Zhang YH, Wang P, Qin LQ. Meta-analysis of dietary glycemic load and glycemic index in relation to risk of coronary heart disease. Am J Cardiol. 2012 Jun 1;109(11):1608-13. doi: 10.1016/j.amjcard.2012.01.385. Epub 2012 Mar 20. Abstract available from: https://www.ncbi.nlm.nih.gov/pubmed/22440121
3. Cai X, Wang C, Wang S, Cao G, Jin C, Yu J, et al. Carbohydrate Intake, Glycemic Index, Glycemic Load, and Stroke: A Meta-analysis of Prospective Cohort Studies. Asia Pac J Public Health. 2015 Jul;27(5):486-96. doi: 10.1177/1010539514566742. Epub 2015 Jan 14. Abstract available from: https://www.ncbi.nlm.nih.gov/pubmed/25593213

Date of Search

Date Search Completed: August 20, 2017
Date Range of Search: 2012-2017

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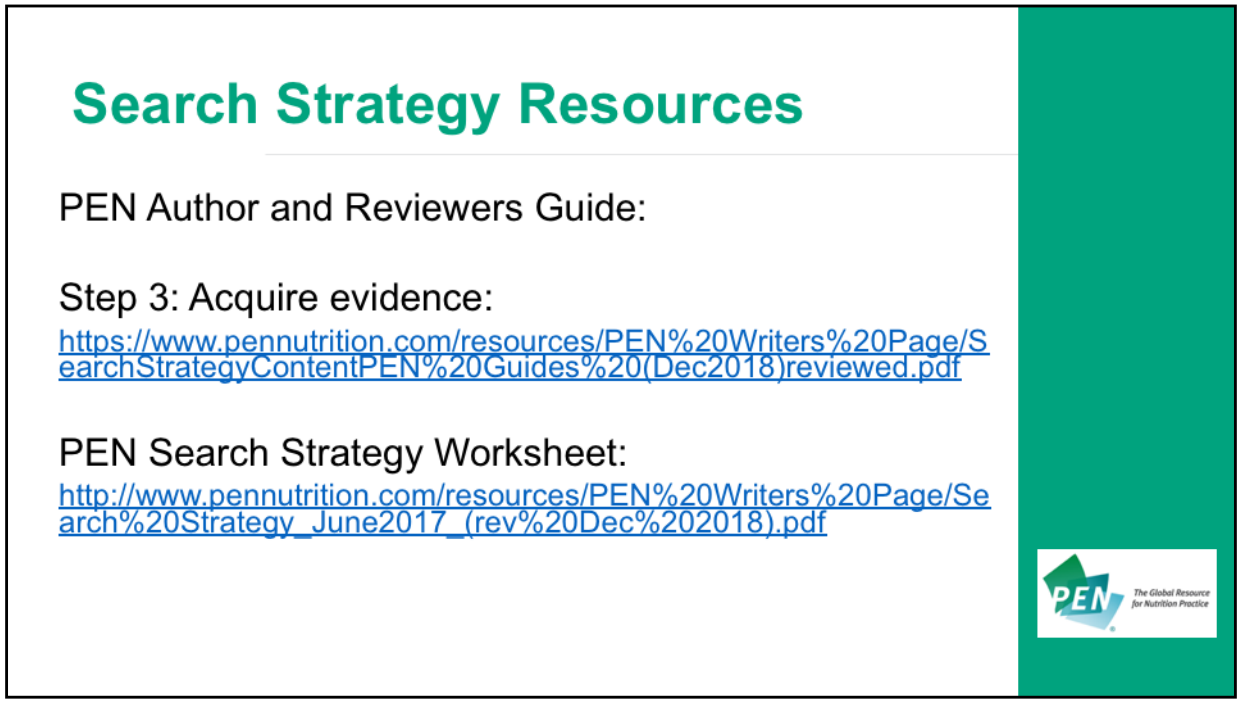
Documenting the search strategy includes:
Search terms (MeSH and text words)
Databases and Grey Literature Sources Searched
Reasons for excluding reviews or studies identified using a hierarchical literature search – for example if two systematic reviews were identified that were published in the same year, what was the reason for excluding one of the systematic reviews
Search dates / Limits



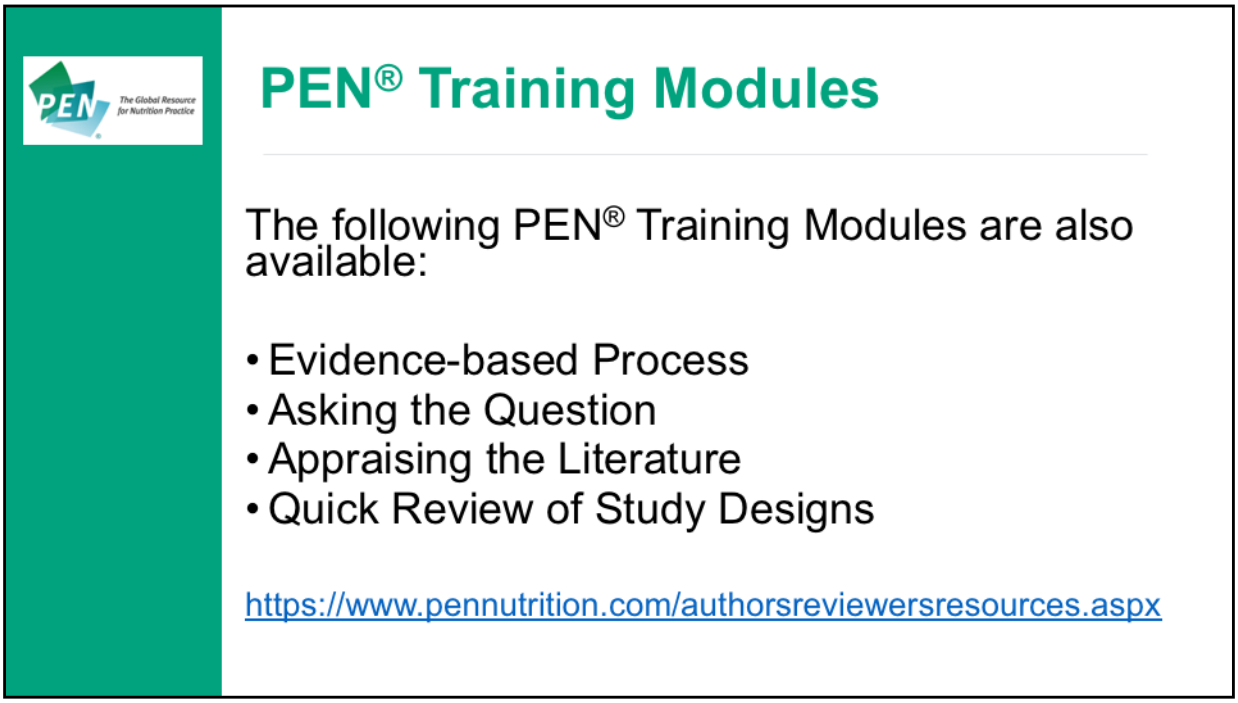
Additional Search Strategy Resources are available to download from the PEN Author and Reviewer's Guide:

Step 3: Acquire evidence
https://www.pennutrition.com/resources/PEN%20Writers%20Page/SearchStrategyContentPEN%20Guides%20(Dec2018)reviewed.pdf

PEN Search Strategy Worksheet
http://www.pennutrition.com/resources/PEN%20Writers%20Page/Search%20Strategy_June2017_(rev%20Dec%202018).pdf

Literature searching summary:

- Find the terms for the 'P' and 'I' variables from your question
- Prepare a list of your MeSH terms and text words
- Incorporate field searching (e.g. [tiab])
- Combine terms using Boolean connector "AND" (or "OR")
- Look first for: Filtered literature (systematic reviews and guidelines based on a systematic review)
- If you have not found enough in the filtered literature, begin searching primary studies with limits (e.g. date, language)
- Document your search strategy



The other PEN® Author training modules can be accessed at:
https://www.pennutrition.com/authorsreviewersresources.aspx

Thank you to the Research Information Services at CADTH for reviewing and providing input into this module.

Questions? Contact Us:
http://www.pennutrition.com/contact.aspx

If you have any questions on this module please use Contact Us on the PEN website: http://www.pennutrition.com/contact.aspx

Come be Social with PEN®

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