Search Strategy

Original material by Margaret Vugrin, MSLS

Updated by Shannon Harris, MSLS

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Goals & Objectives

Improve students' ability to construct strong search strategies in PubMed:

- Basic terminology is explained
- Appropriate usage examples are presented
- Questions are supplied for practice

Introduction

The old saying “Garbage in, garbage out” holds true for developing strong searching skills.

If you “Ask” the right question, you will “Acquire” the information you are seeking.

Database Used - PubMed

Examples are based on the PubMed database

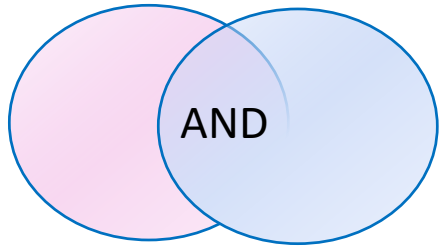
- PubMed is:
  - is free
  - has 36+ million records from over 5,200 publications
  - is updated daily
  - covers fields of:
    - medicine, nursing, dentistry, veterinary medicine, pharmacology, health care system, and allied health
  - is international in scope

Boolean Operators - Glossary

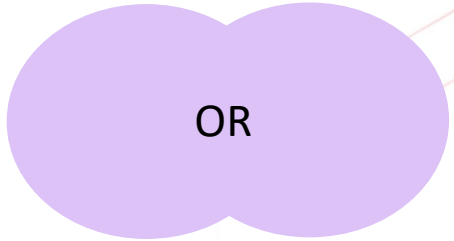
Boolean Operators: logic system used to combine search terms

- AND
- OR
- NOT

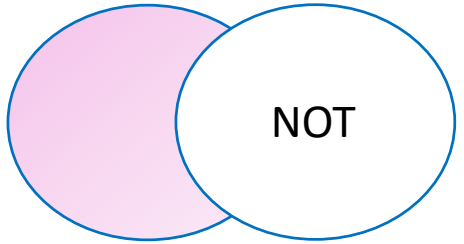
AND: retrieves only the middle section (intersection)



OR: retrieves all (left and right side)



NOT: excludes, only pink section is retrieved. Use sparingly.



Less is More!

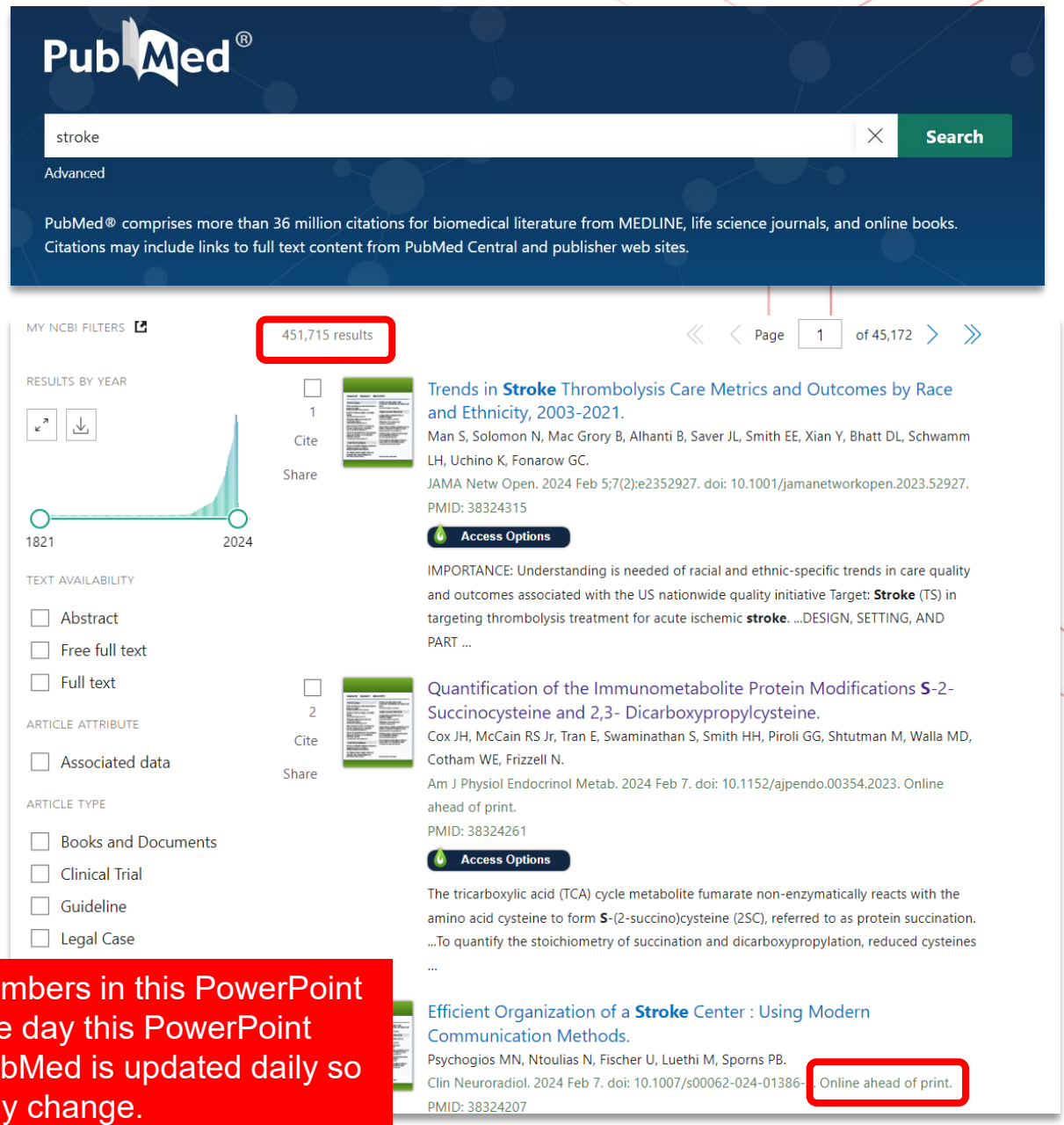
If you focus on your topic, even though you have fewer numbers of results, your results will be more relevant!

Keywords

Stroke (keyword) retrieves 451,000+ results

- Keyword searching locates the term anywhere in the electronic record, *even when the article's focus is on another topic.*
- "Swimming strokes" will also appear in the results of this search on "stroke".

Keyword searching *also* locates very recent articles that have not yet been indexed or tagged with *Subject Headings*.

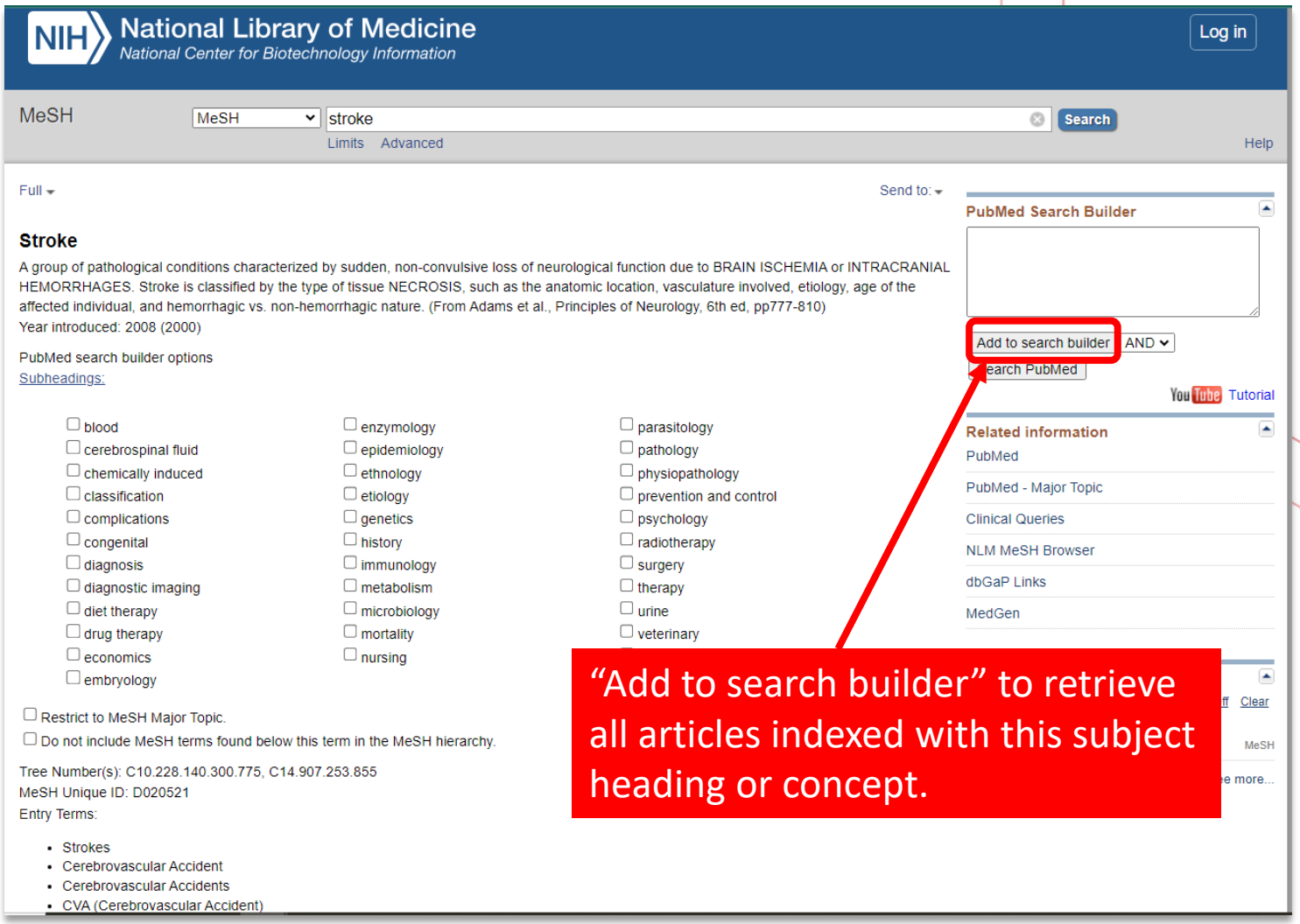


NOTE: result numbers in this PowerPoint were valid on the day this PowerPoint was created. PubMed is updated daily so the numbers may change.

Medical Subject Headings (MeSH)

Stroke (MeSH) retrieves 178,000+ records

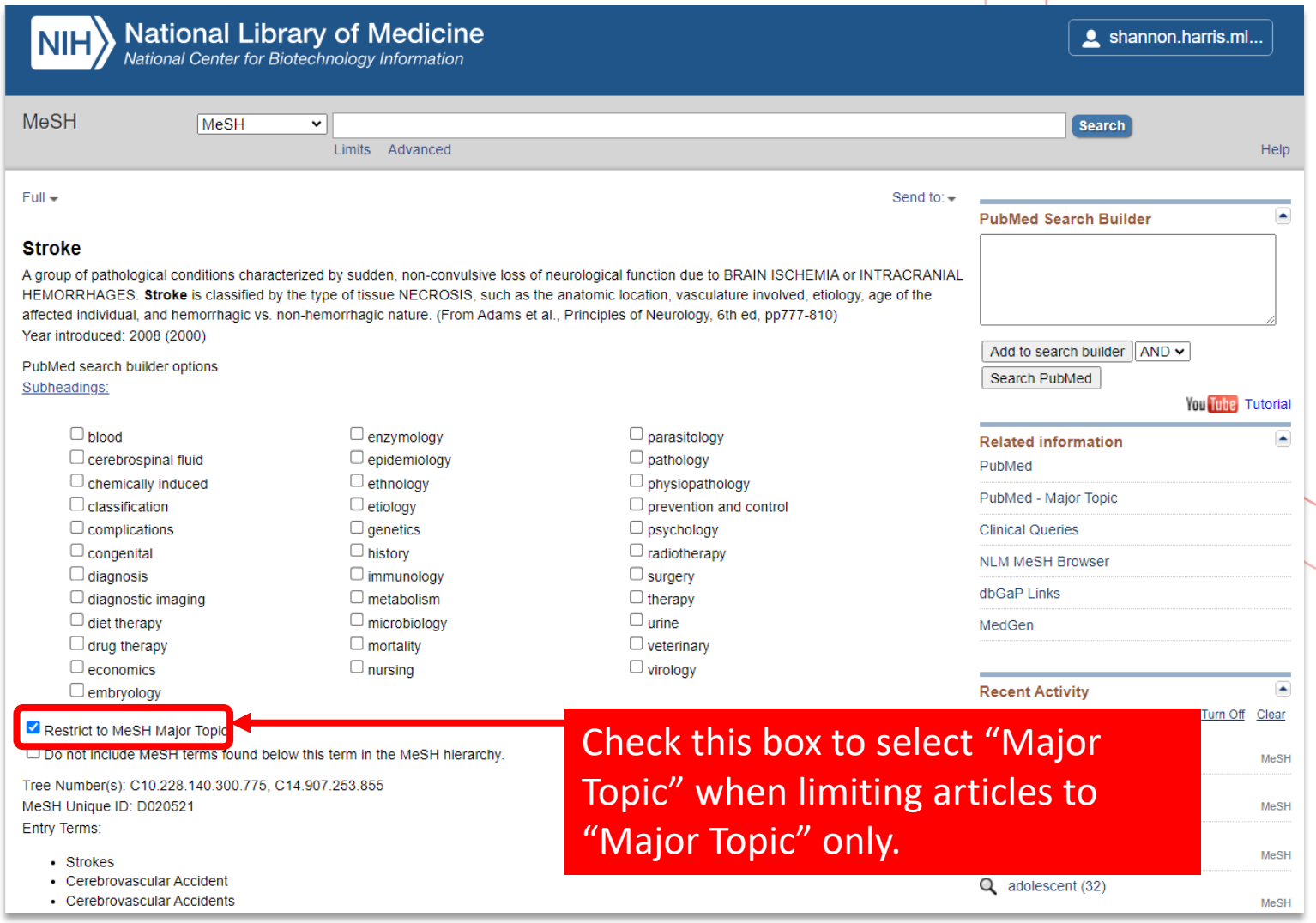
- MeSH is the controlled vocabulary or thesaurus used in PubMed to organize articles.
- Use MeSH headings to locate articles that are indexed or tagged for a specific concept.
- Related words or synonyms are included.
- Subject headings are easily modified using subheadings.



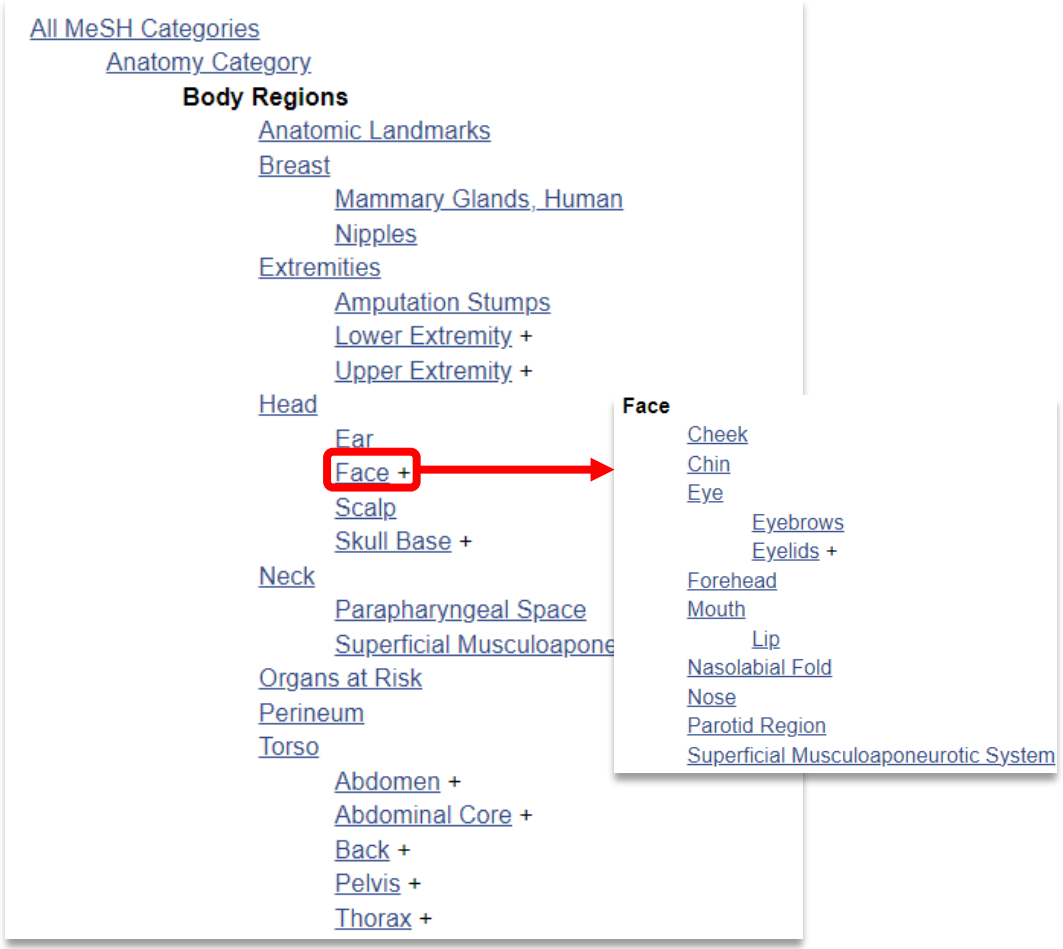
Major Headings

Stroke (Majr) retrieves 141,000+ records

- Limiting the subject heading to “Major Topic” locates only those articles where the focus of the article is on this main concept.
- NOTE: Fewer articles are located with Major Topic than when searching with MeSH; however, these articles are focused and more relevant to your search.

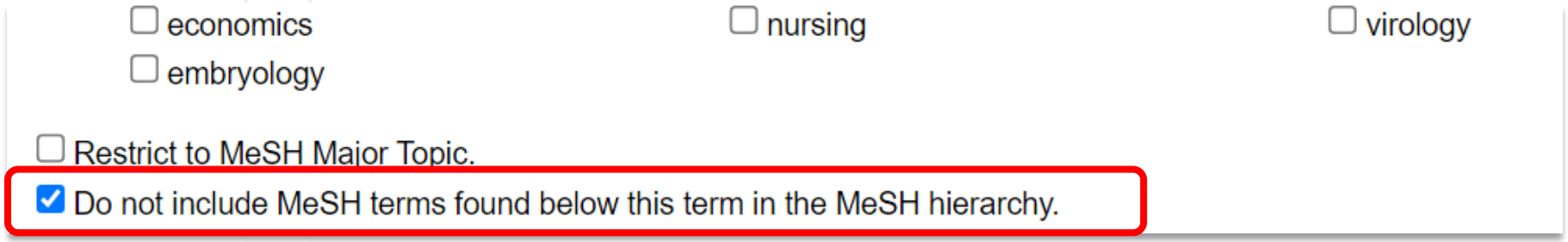


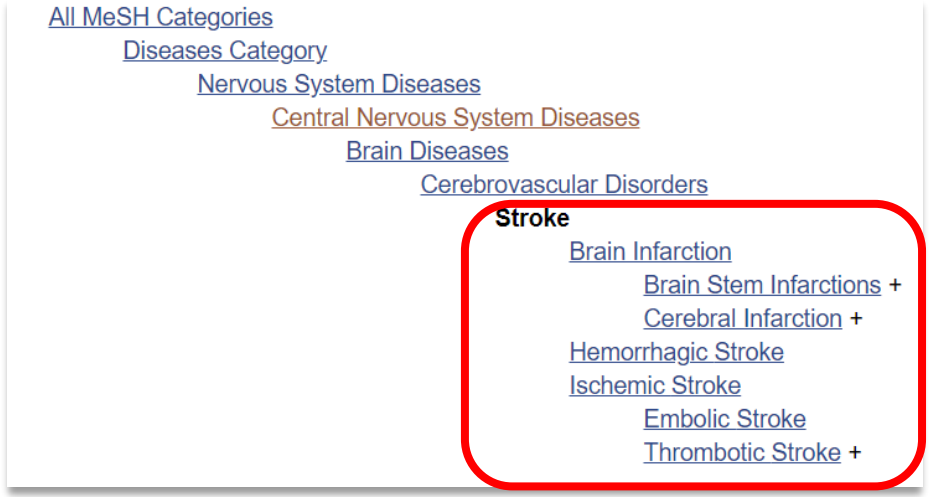
Example of MeSH Relationship



- MeSH is organized into thematic hierarchical categories.
- Themes are broken down into more specific concepts.
  - i.e. subject headings.
- Articles are indexed (tagged) for the most specific concept.
- "**+**" signifies that there are more specific terms available.
  - e.g. Face +
- MeSH vocabulary is updated annually.
- Most articles are tagged with 10-15 subject headings.

“Do not include indented MeSH terms”

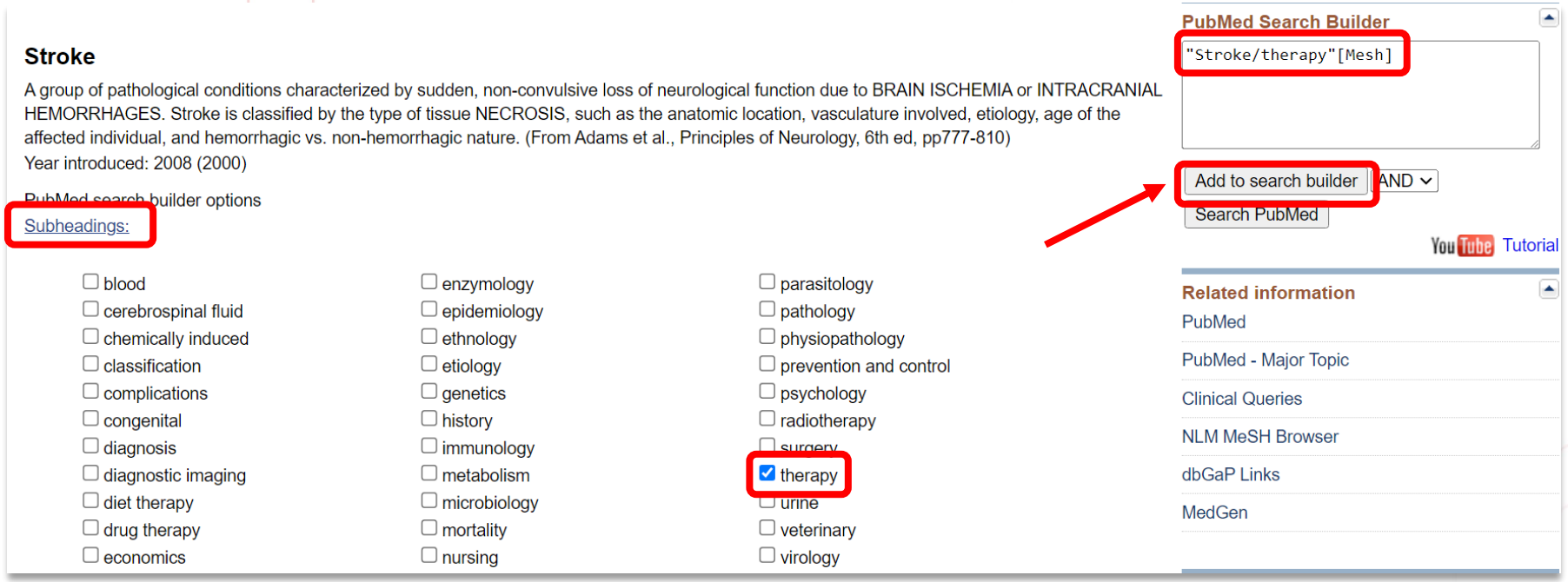




- All subject headings indented and below the chosen subject heading “Stroke” will automatically be included in the search strategy *unless* the “Do not include…” option is selected.
- Automatic inclusion of these terms broadens the search as related subject headings are added automatically.

i.e., Brain Infarction etc. is not included in this search because of our selection above.

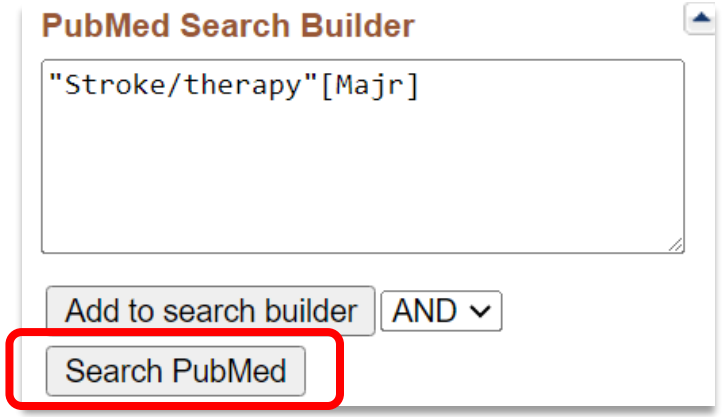
MeSH Subheadings



- Stroke (MeSH) with subheading: “therapy” retrieves 65,840+ results
- Stroke (Majr) with subheading: “therapy” retrieves 48,180+ records

Subheadings NARROW the subject heading.
e.g., diagnosis of stroke or genetics of stroke or therapy of stroke

☑ *Select* as many subheadings as you need.



MeSH Subheadings/Qualifiers

Abnormalities
Administration & Dosage
Adverse Effects
Agonists
Analogs & Derivatives
Analysis
Anatomy & Histology
Antagonists & Inhibitors

Blood
Blood Supply

Cerebrospinal Fluid
Chemical Synthesis
Chemically Induced
Chemistry
Classification
Complications
Congenital
Cytology

Deficiency
Diagnosis
Diagnostic Imaging
Diet Therapy
Drug Effects
Drug Therapy

Economics
Education
Embryology
Enzymology
Epidemiology
Ethics
Ethnology
Etiology

Genetics
Growth & Development

History

Immunology
Injuries
Innervation
Instrumentation
Isolation & Purification

Legislation & Jurisprudence

Metabolism
Methods
Microbiology
Mortality

Nursing

Organization & Administration

Parasitology
Pathogenicity
Pathology
Pharmacokinetics
Pharmacology
Physiology
Physiopathology
Poisoning
Prevention & Control
Psychology

Radiation Effects
Radiotherapy
Rehabilitation

Secondary
Standards
Statistics & Numerical Data
Supply & Distribution
Surgery

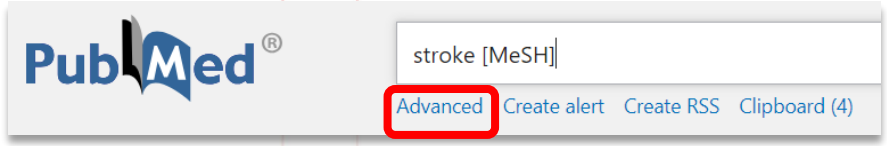
Therapeutic Use
Therapy
Toxicity
Transmission
Transplantation
Trends

Ultrastructure
Urine

Veterinary
Virology

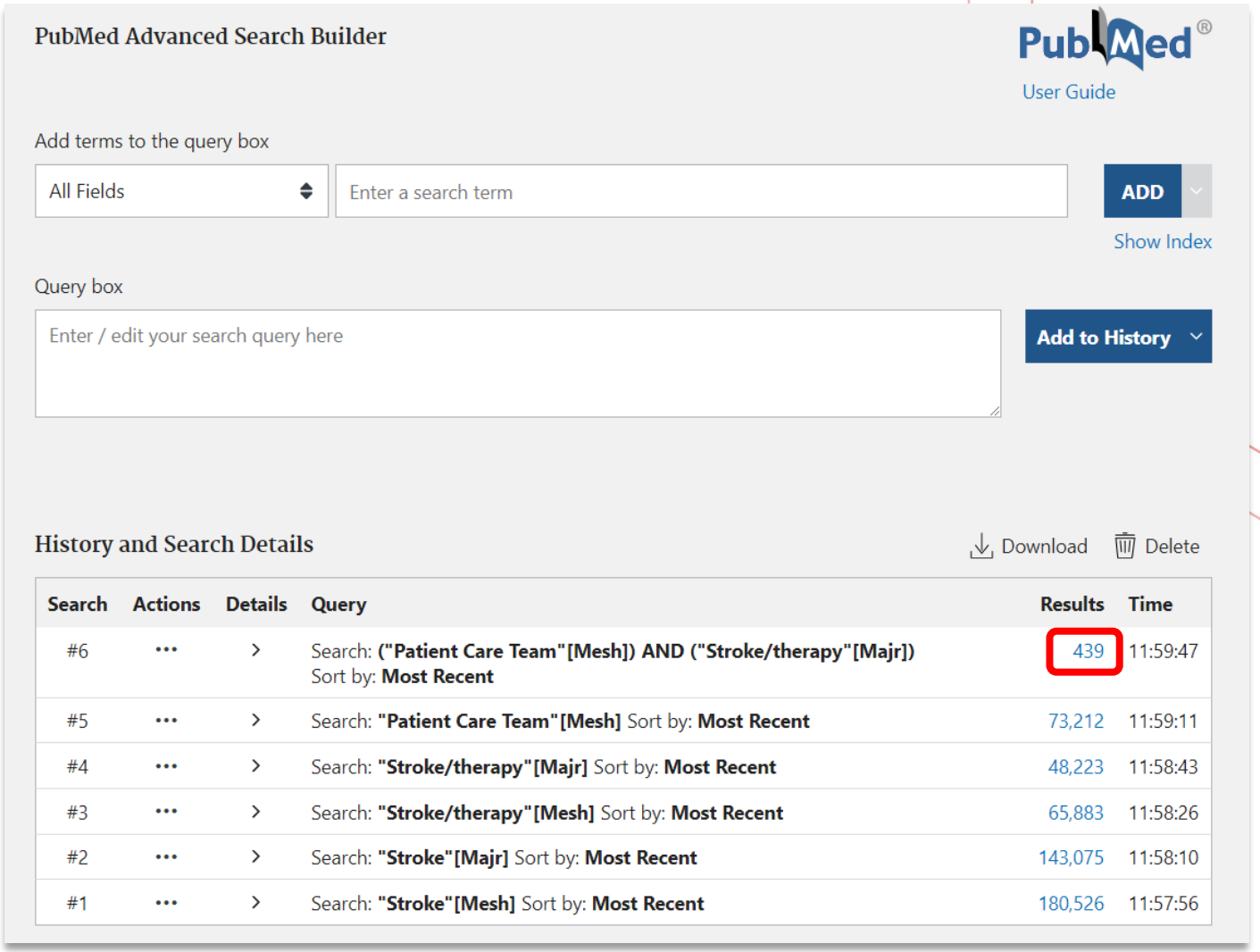
- Subheadings NARROW the subject heading.
- Usually they are combined with the subject heading.
  - e.g., Stroke/therapy ("stroke" is the subject heading and "therapy" is the subheading.)
- Not all subheadings are available for all terms.
  - e.g., Stroke/therapeutic use
- Subheading definitions: https://www.nlm.nih.gov/mesh/qualifiers_scopenotes.html

PubMed Advanced Search



The Advanced Search Page shows your search history, strategies, and search results. These search statement numbers (e.g. #5 or #6) can be combined with each other, [AND], or with new search terms [#X] using Boolean logic operators “AND”, “OR”, “NOT”.

Note: The result numbers in your search sets may be different since the database is updated daily.

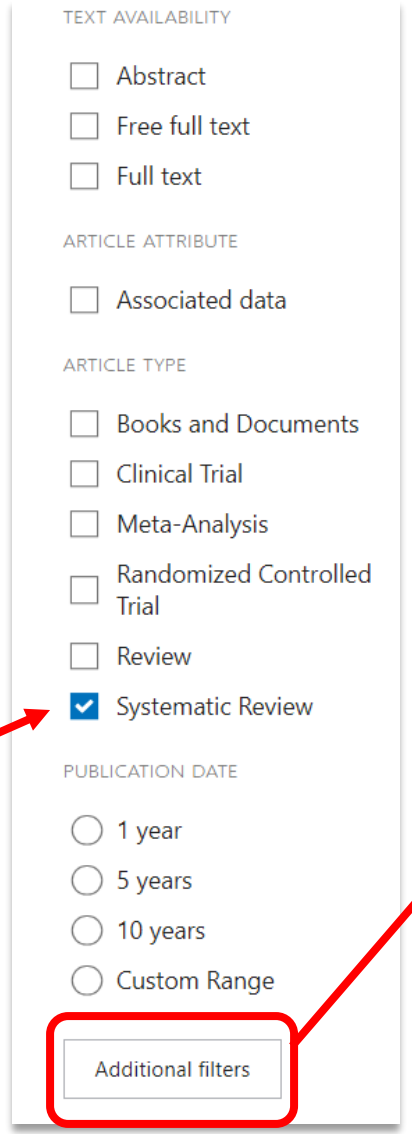


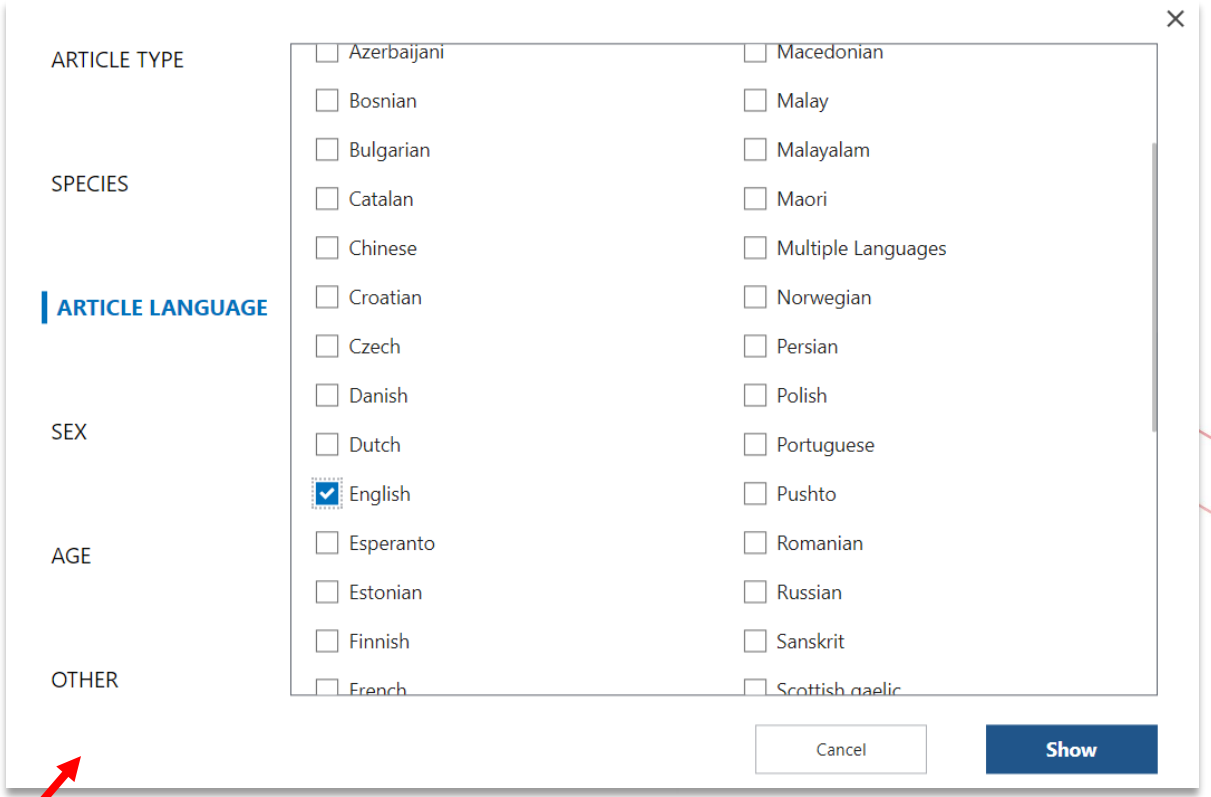
Search	Actions	Details	Query	Results	Time
#6	•••	›	Search: **("Patient Care Team"[Mesh]) AND ("Stroke/therapy"[Majr])** Sort by: **Most Recent**	439	11:59:47
#5	•••	›	Search: **"Patient Care Team"[Mesh]** Sort by: **Most Recent**	73,212	11:59:11
#4	•••	›	Search: **"Stroke/therapy"[Majr]** Sort by: **Most Recent**	48,223	11:58:43
#3	•••	›	Search: **"Stroke/therapy"[Mesh]** Sort by: **Most Recent**	65,883	11:58:26
#2	•••	›	Search: **"Stroke"[Majr]** Sort by: **Most Recent**	143,075	11:58:10
#1	•••	›	Search: **"Stroke"[Mesh]** Sort by: **Most Recent**	180,526	11:57:56

Filters – used to narrow down topic

Filters are located on the left side of the results page.

Activate filters by clicking checkboxes. Filters are active when the checkbox is blue.





Click Additional Filters to add other filters such as Humans, English, or Age Groups.

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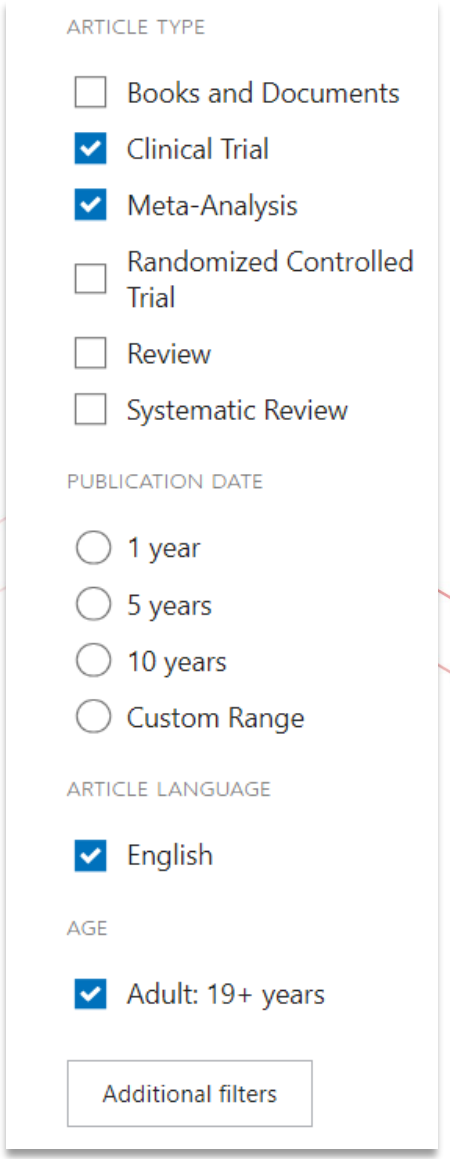
Filters – used to narrow down topic

- Commonly used modifiers are located within the Filters options.
- The Boolean operator OR is the default operator *within* groups.
  - e.g., **Meta-Analysis** or **Clinical Trial** from the Article Type grouping retrieves articles of either publication type.
- The Boolean operator AND is the default operator *between* groupings.
  - e.g. **English** from the Article Language grouping combined with **Adult 19+ years** from the Age grouping retrieves articles that are in English and deal with adults 19 years old and older. All concepts must be present for retrieval.

See Boolean Operators slide.



WHEN DO I USE…

- **Use MeSH** when unfamiliar with the topic and don't know how much has been written on the subject. It will give you the broadest search for your term as a **concept**.
- **Use Major:** If you find too much on the subject then go back to the MeSH database and start filtering (narrowing down) by choosing to only get those articles that are focused on your topic (Majr).
- **Attach subheadings** to either MeSH or Major: when you are interested in a particular facet of your concept.

Most importantly, you will use pieces of the database to construct what you hope will give you the answer to your question.

IT DEPENDS ON THE QUESTION!

- Sometimes your topic may be so small and already narrow that you only need to use MeSH.
  - Today (4/5/24) a search for Rhinosinusitis results in 180 articles
    - So will only need minimal work to narrow down.
  - Today (4/5/24) there are 1,295,057 articles on Heart Diseases
    - You will definitely want to narrow this down.
- **How?** Maybe you are interested in population, then locate a 2nd MeSH term.
  - e.g. African Americans and combine.
    - ("Heart Diseases"[Mesh]) AND “Black or African American"[Mesh]

IT DEPENDS ON THE QUESTION!

- Articles are indexed/tagged to the most specific level of subject heading.
  - Heart diseases is very broad so narrow the strategy to a more specific term: myocardial infarction [MeSH]
  - You are interested in prevention:
    - There is a subheading for prevention and control that can be used with myocardial infarction
    - ("Myocardial Infarction/prevention and control"[Mesh]) = 11,188 articles (4/5/24) **Still too many!**
- So you may relook at your question and realize that what you really want are articles on the prevention of Myocardial Infarction in the African American population.
  - (2 MeSH headings and one of the MeSH headings has a subheading attached)
  - ("Myocardial Infarction/prevention and control"[Mesh]) AND “Black or African American"[Mesh] = 14

REMEMBER: Combining two concepts (two MeSH terms) also narrows your topic.

Comment > Evid Based Med. 2016 Feb;21(1):33-4. doi: 10.1136/ebmed-2015-110258. Epub 2015 Nov 25.

ACE inhibitors in African Americans with hypertension associated with worse outcomes as compared to other antihypertensives

Lars H Lund [1]

Affiliations + expand

PMID: 26608476 DOI: 10.1136/ebmed-2015-110258

Article Link | View Complete Issue

This article was one the results of the strategy: ("Myocardial Infarction/prevention and control"[Mesh] AND "Black or African Americans"[Mesh]

Publication types

- Comment

MeSH terms

- Angiotensin-Converting Enzyme Inhibitors / therapeutic use*
- Antihypertensive Agents / therapeutic use*
- Black or African American*
- Female
- Humans
- Hypertension / drug therapy*
- Male
- Myocardial Infarction / prevention & control*
- Stroke / prevention & control*

Substances

- Angiotensin-Converting Enzyme Inhibitors
- Antihypertensive Agents

The following slides and examples will help you to practice using these concepts

This form can help organize your thought process.

Search Question:

Databases:

1 ⟷	AND	2 ⟷	AND	3 ⟷	AND	4
↕ OR						

Do you need… ?

subheadings

dates

limiters such as:

language

human or animal

age groups

publication types

journal subsets

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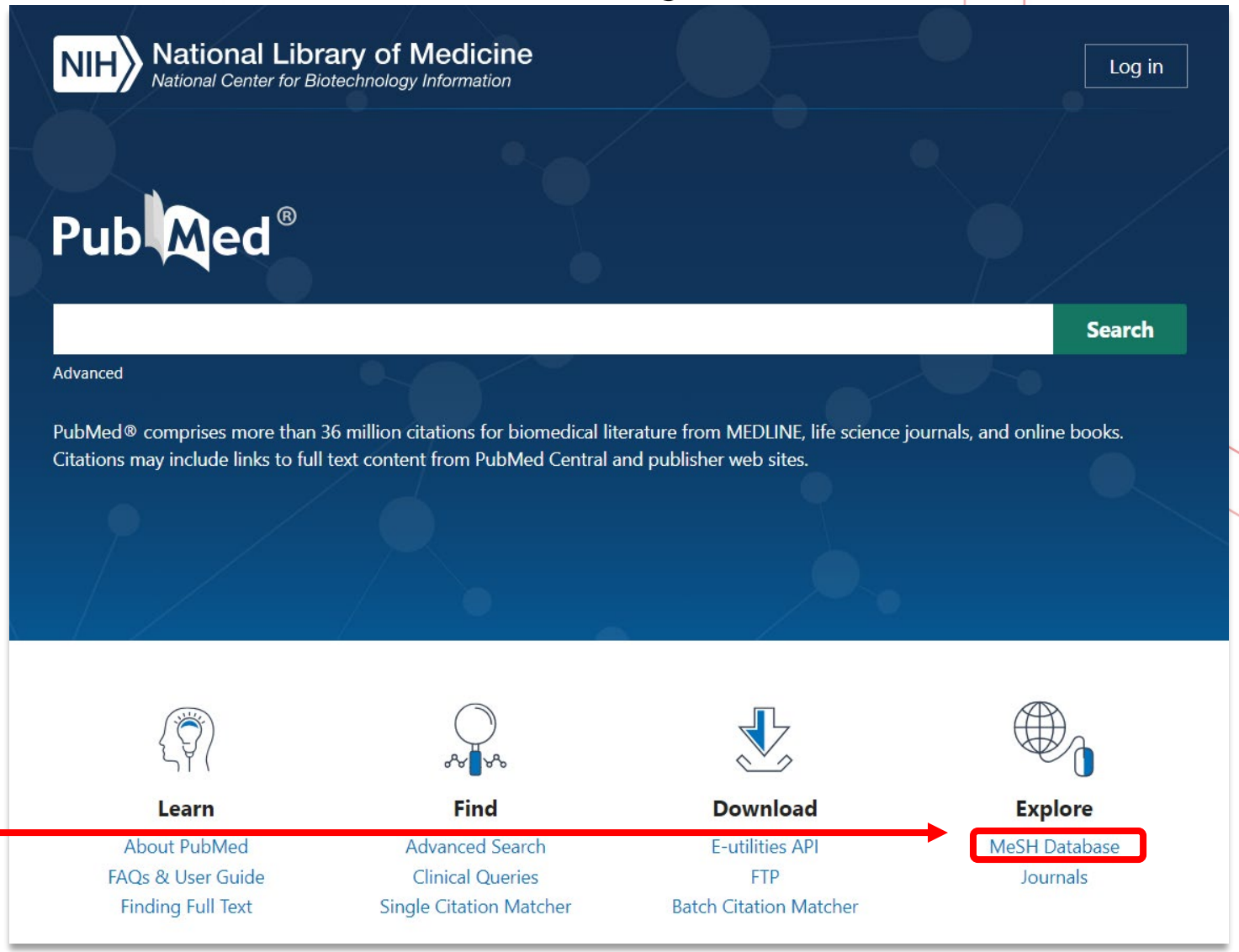
PubMed: How to Search Step-by-Step

- Access PubMed from library homepage https://ttuhsc.libguides.com/new to be connected to library subscriptions (more full text articles).
- From the PubMed homepage, click on **MeSH Database** to search by concept, or subject heading.



Review Point

- Using the major Boolean operators “AND,” “OR,” and “NOT,” a search strategy can be refined to effectively locate articles on specific topics.

- True or false: The Boolean operator “AND” means that an article MUST be indexed for both terms.
  - (e.g., HELLP Syndrome “AND” Pregnancy means that both concepts will be in all the articles)

Review Point

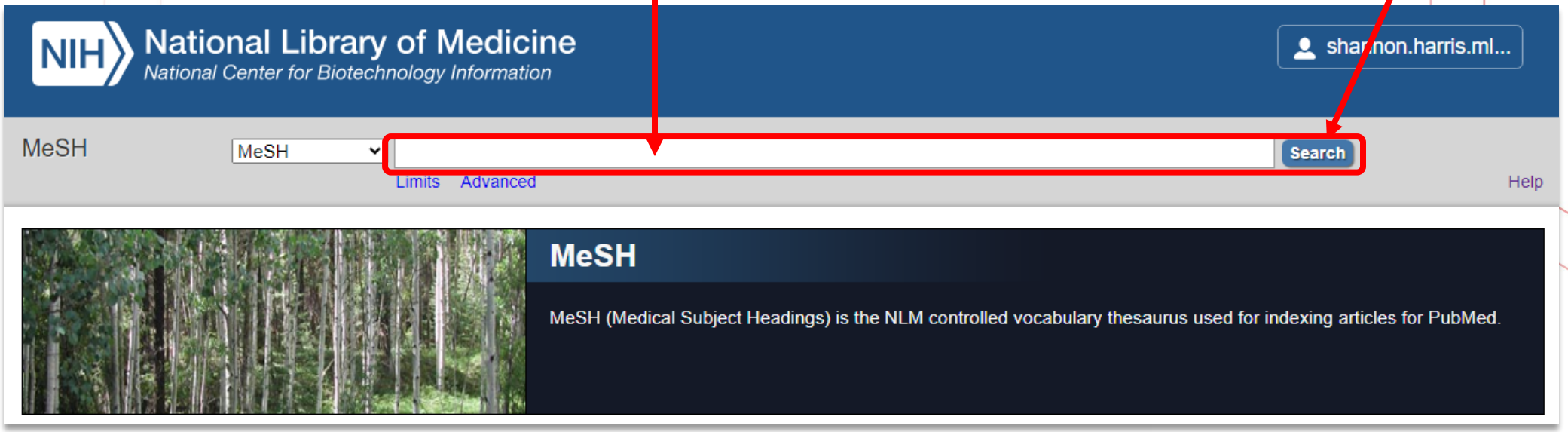
- **True**

- When using the Boolean operator “AND”, articles are indexed for both terms. Only the articles in the intersection will be retrieved.

See Boolean Operators slide.

Using MeSH

Step 1: On the MeSH page, type needed term. Then click Search.



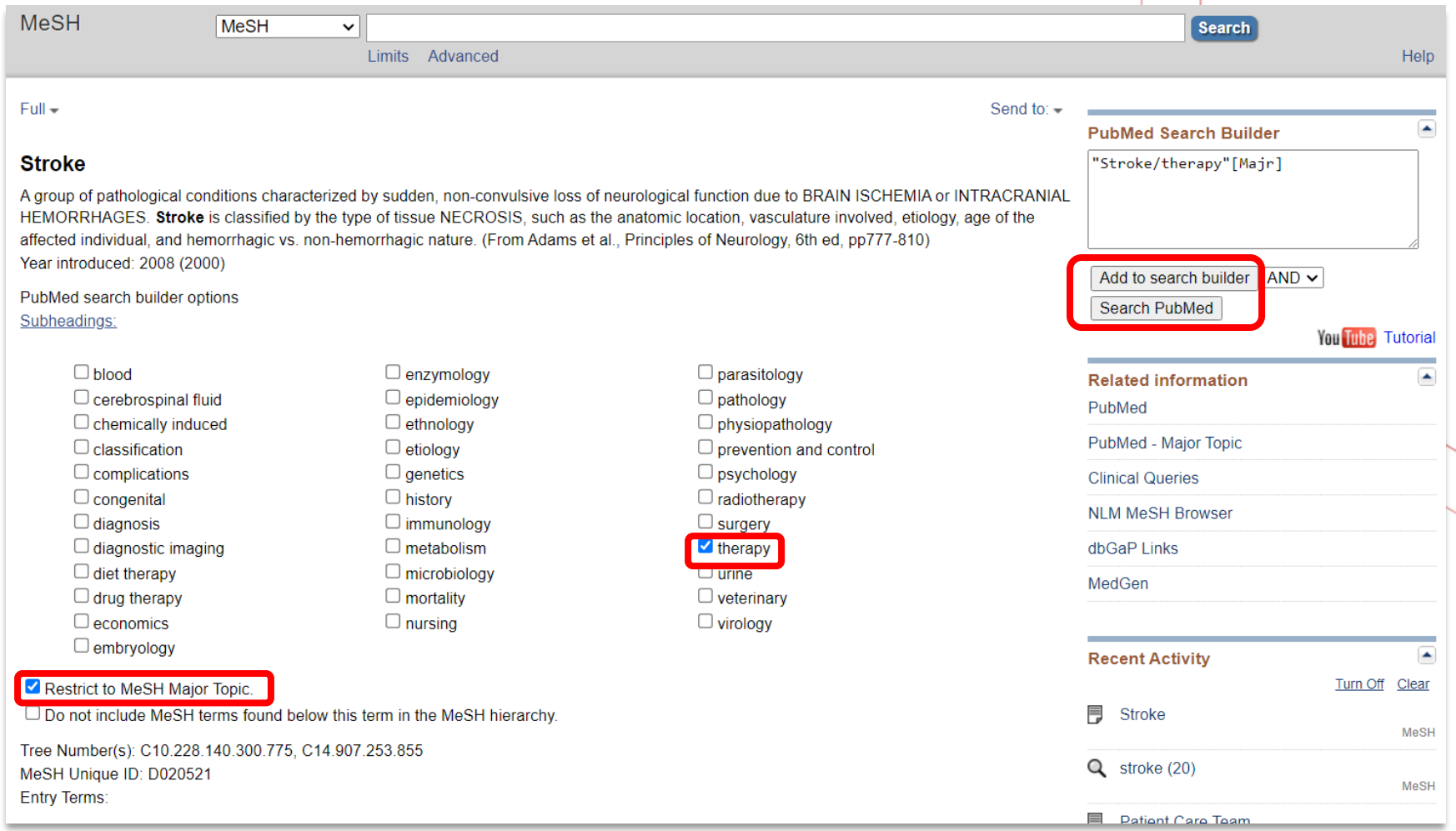
If your term does not show up, consider using synonyms and if they are MeSH headings they will display. Next, consider a broader term that may be helpful. If you are still having difficulties locating an appropriate MeSH term, consult a librarian.

PubMed: How to Search Step-by-Step

Step 2: Select subheadings (optional) and/or restrict to Major Topic (optional) based on your search needs.

Step 3: Click **Add to Search Builder**.

Step 4: Click **Search PubMed**.



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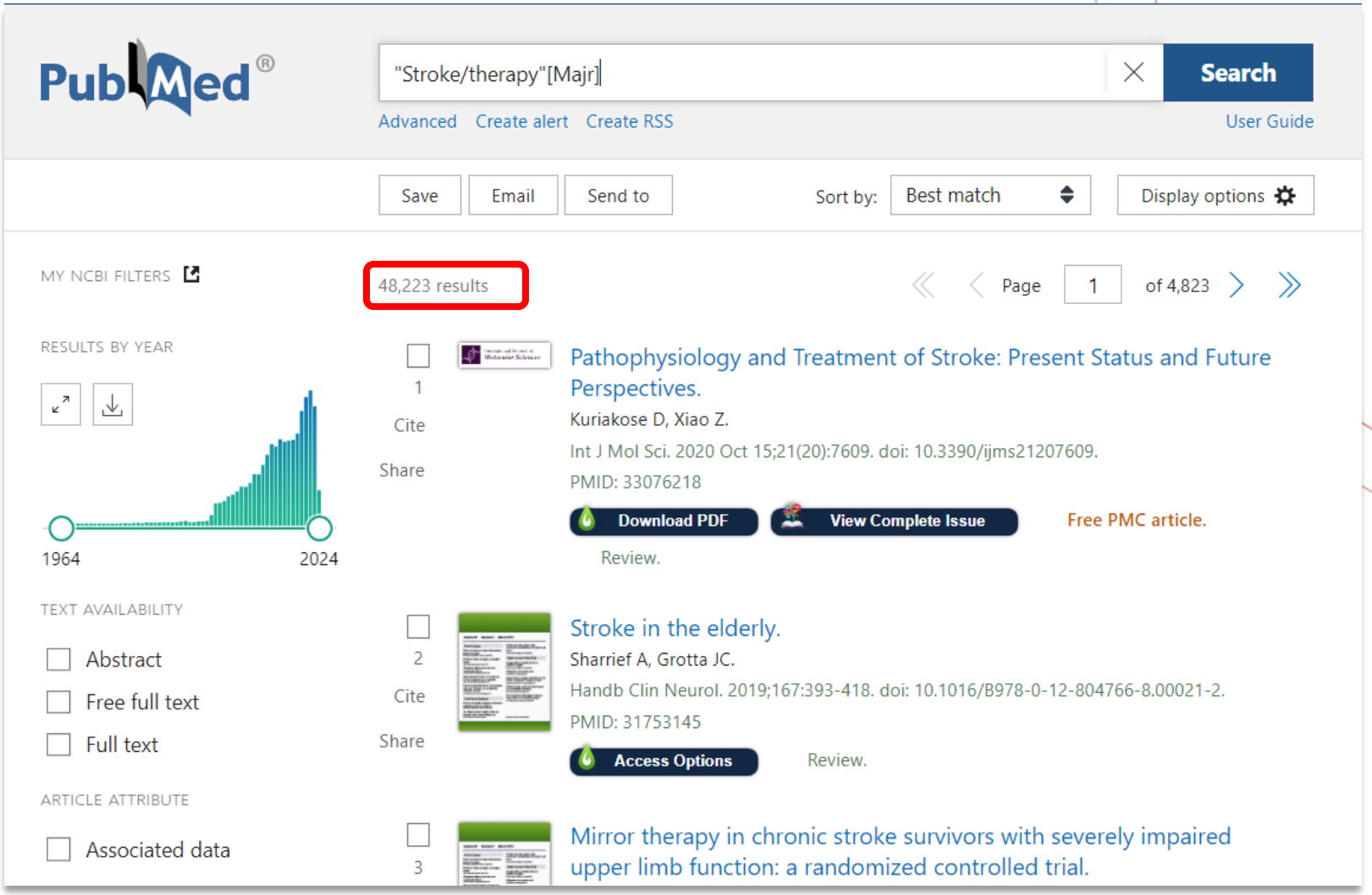
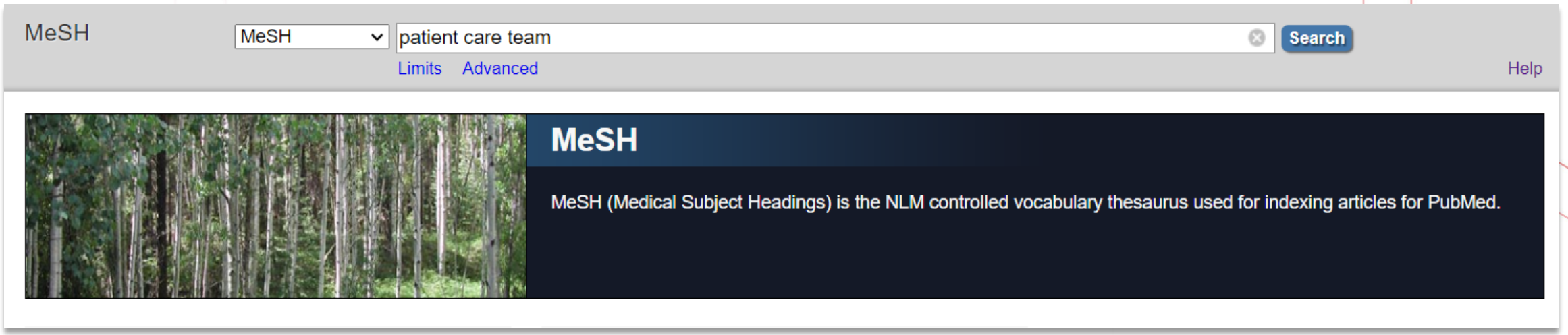
PubMed: Results for 1st Concept

1st concept results:



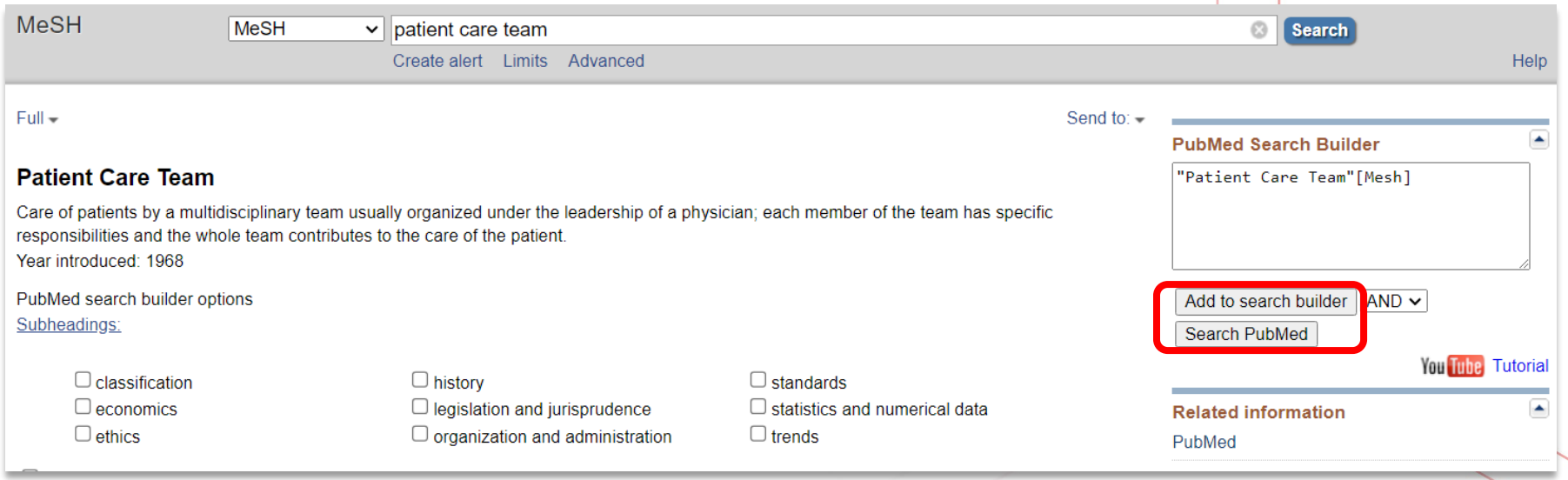
Using MeSH: 2nd Concept

Repeat steps/selections with 2nd concept.

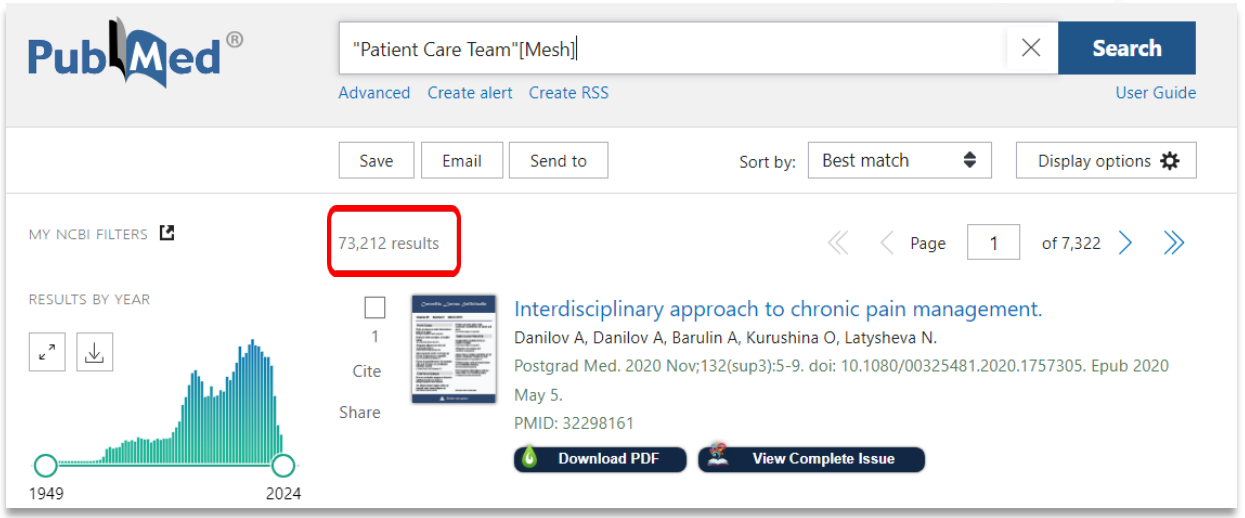


Using MeSH: 2nd Concept

Choose 2nd concept selections, click **Add to search builder** and click **Search PubMed**.



2nd concept results:



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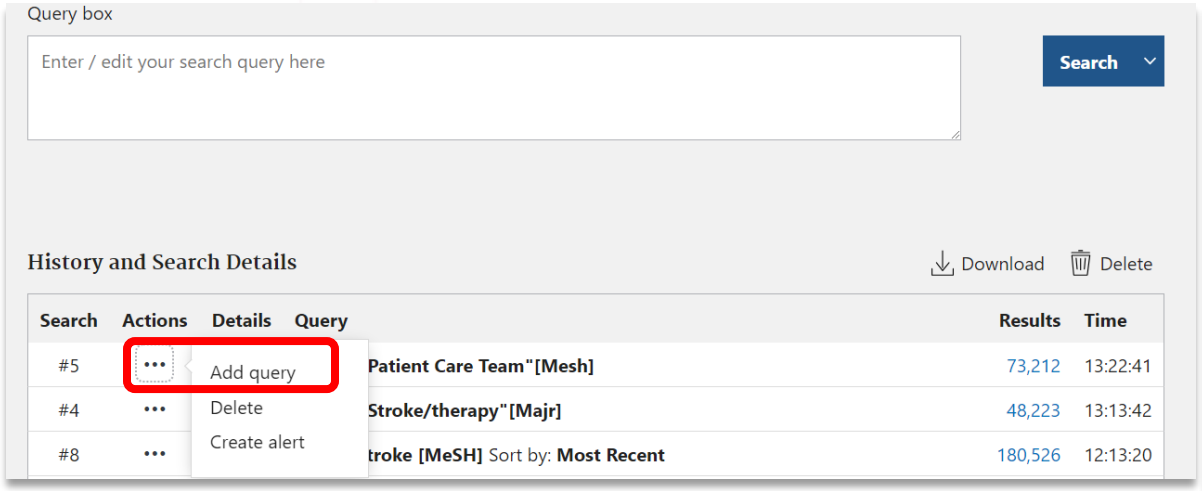
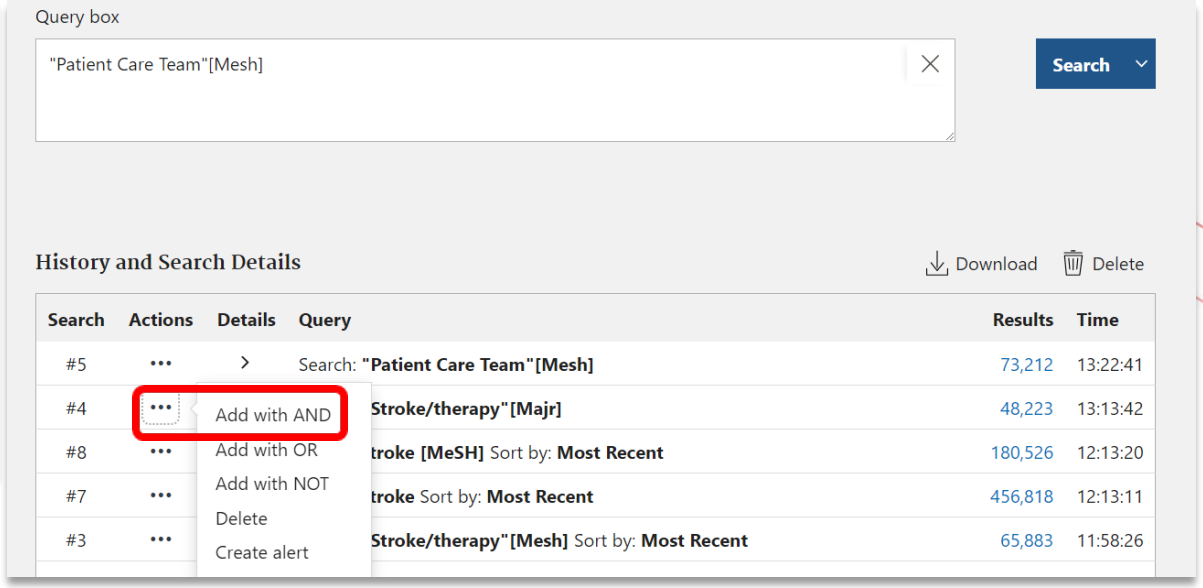
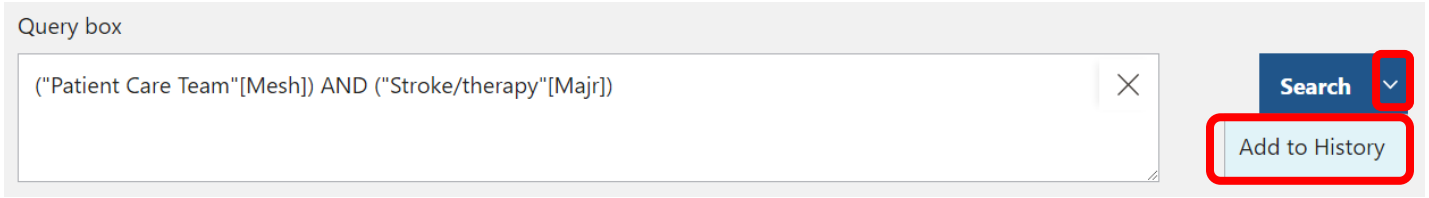
Using Advanced Search with “AND”

1. For 1st term, click on **dots** under **Action** and select **Add Query.**
2. For 2nd term, click on **dots** under **Action** and select **Add with AND.**
3. Click arrow and **Add to History** to add numbers to your search history.







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Results after using Boolean “AND”

Notice the search has been done with MeSH headings (Search String #10, with 537 results) and then refined more using Major Headings (Search String #11, with 166 results).

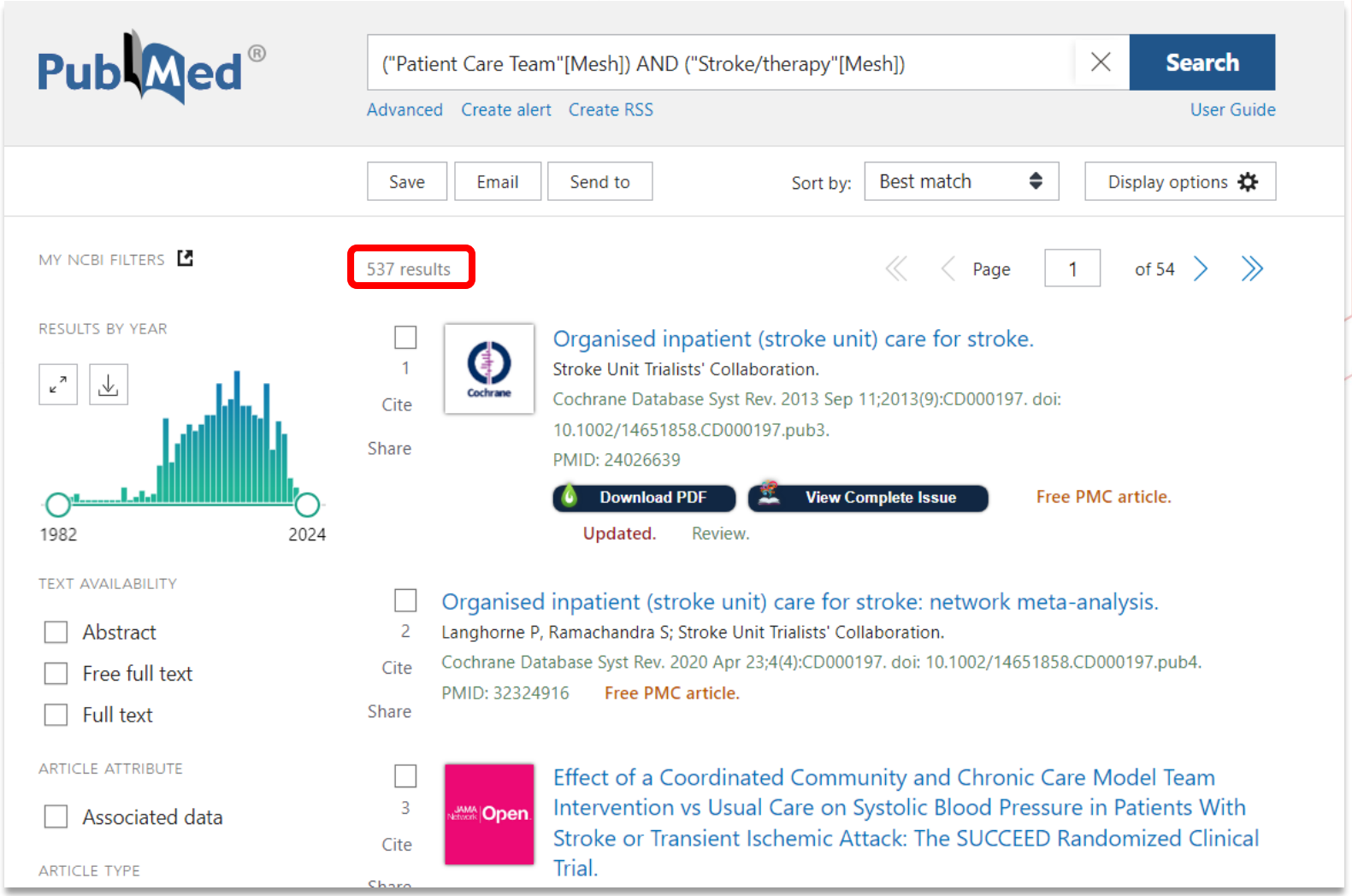
History and Search Details

Download Delete

Search	Actions	Details	Query	Results	Time
#11	•••	›	Search: **("Stroke/therapy"[Majr]) AND ("Patient Care Team"[Majr])**	166	15:11:41
#10	•••	›	Search: **("Patient Care Team"[Mesh]) AND ("Stroke/therapy"[Mesh])**	537	15:11:33
#9	•••	›	Search: **"Patient Care Team"[Majr]** Sort by: **Most Recent**	31,545	15:11:11
#5	•••	›	Search: **"Patient Care Team"[Mesh]**	73,212	13:22:41
#4	•••	›	Search: **"Stroke/therapy"[Majr]**	48,223	13:13:42
#8	•••	›	Search: **stroke [MeSH]** Sort by: **Most Recent**	180,526	12:13:20
#3	•••	›	Search: **"Stroke/therapy"[Mesh]** Sort by: **Most Recent**	65,883	11:58:26
#2	•••	›	Search: **"Stroke"[Majr]** Sort by: **Most Recent**	143,075	11:58:10
#1	•••	›	Search: **"Stroke"[Mesh]** Sort by: **Most Recent**	180,526	11:57:56

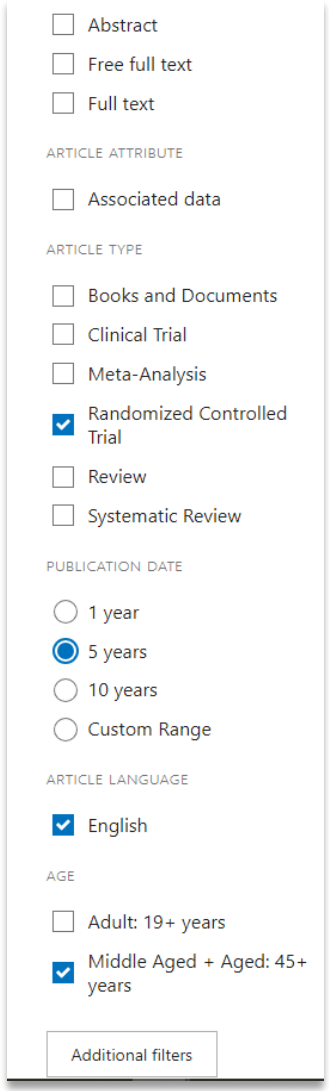
In order to narrow the topic further, the filters on the next screen can be applied. Click on the number of results that you want to manipulate and then select filters from the filters list (next slide).

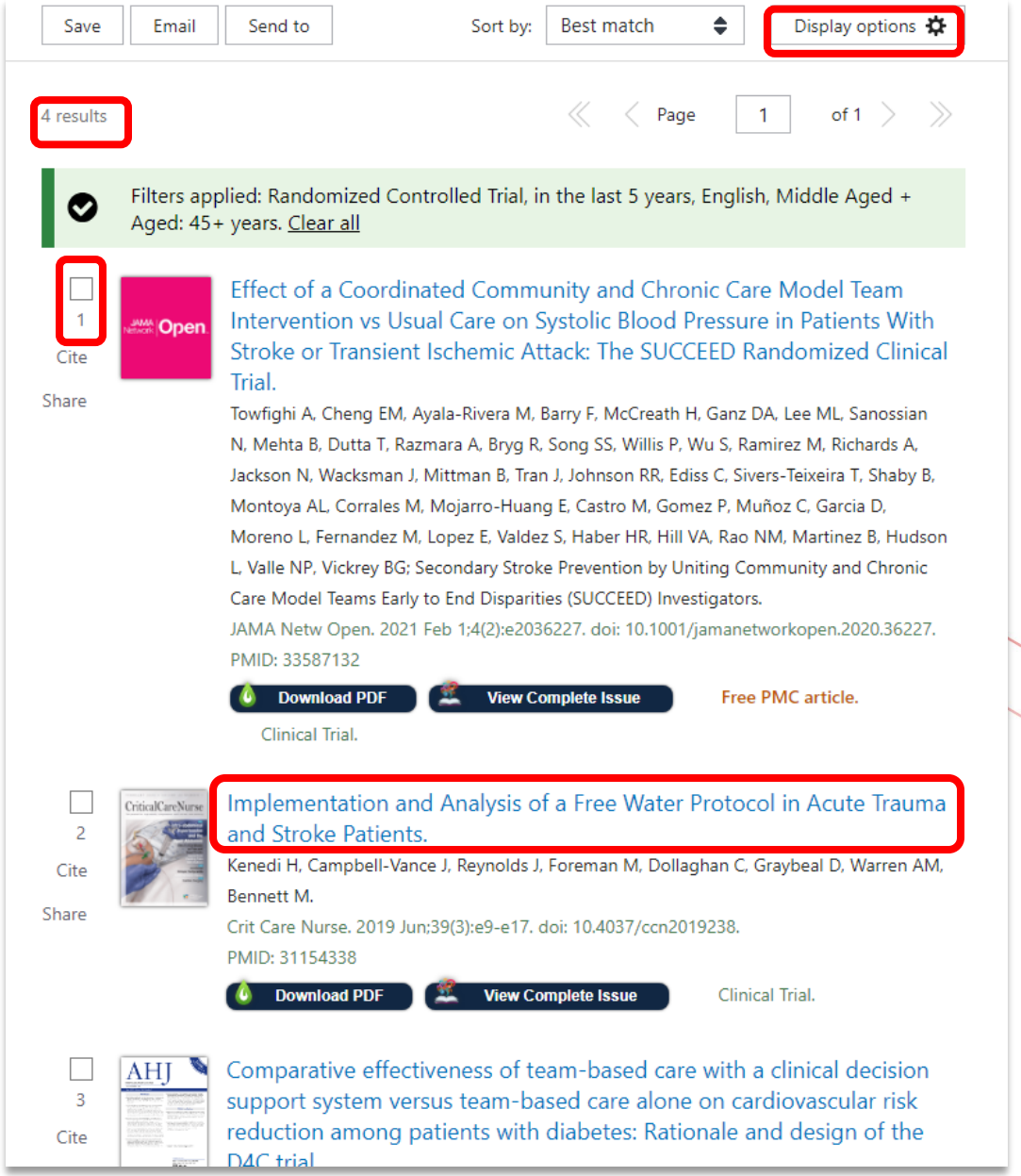
Results, before filters



Results after using filters

- There are 4 articles focused on your specific topic (these numbers change over time).
- To view further information on article(s), click on small box(es) next to numbers(s).
- To change to Abstract view, select **Display options** and then select format of interest in pull down menu.
- When interested in just one article, click on the title to view the abstract.





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Abstract Format

This is the format you will see when you click an article title to view the abstract.

Randomized Controlled Trial > Crit Care Nurse. 2019 Jun;39(3):e9-e17. doi: 10.4037/ccn2019238.

Implementation and Analysis of a Free Water Protocol in Acute Trauma and Stroke Patients

Helen Kenedi [1], JoBeth Campbell-Vance [2], Jenny Reynolds [2], Michael Foreman [2], Christine Dollaghan [2], Dion Graybeal [2], Ann Marie Warren [2], Monica Bennett [2]

Affiliations + expand

PMID: 31154338 DOI: 10.4037/ccn2019238

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Abstract

Background: Free water protocols allow patients who aspirate thin liquids and meet eligibility criteria to have access to water or ice according to specific guidelines. Limited research is available concerning free water protocols in acute care settings.

Objectives: To compare rates of positive clinical outcomes and negative clinical indicators of a free water protocol in the acute care setting and to continue monitoring participants discharged into the hospital system's rehabilitation setting. Positive clinical outcomes were diet upgrade, fewer days to diet upgrade, and fewer days in the study. Negative clinical indicators were pneumonia, intubation, and diet downgrade.

Methods: A multidisciplinary team developed and implemented a free water protocol. All eligible stroke and trauma patients (n = 104) treated over a 3-year period were randomly assigned to an experimental group with access to water and ice or a control group without such access. Trained study staff recorded data on positive outcomes and negative indicators; statistical analyses were conducted with blinding.

Results: No significant group differences in positive outcomes were found (all *P* values were > .40). Negative clinical indicators were too infrequent to allow for statistical comparison of the 2 groups. Statistical analyses could not be conducted on the small number (n = 15) of patients followed into rehabilitation, but no negative clinical indicators occurred in these patients.

Conclusions: Larger-scale studies are needed to reach decisive conclusions on the positive outcomes and negative indicators of a free water protocol in the acute care setting.

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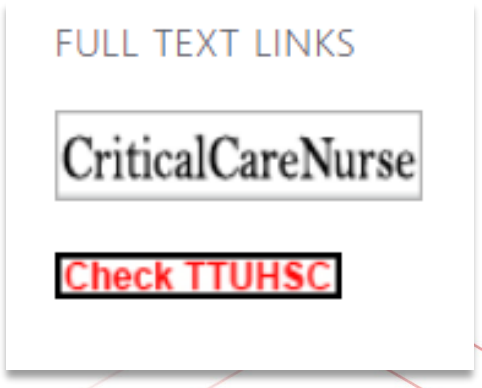

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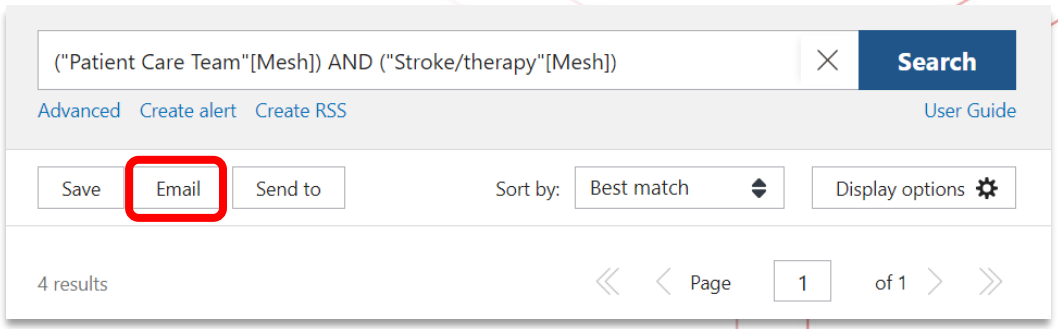

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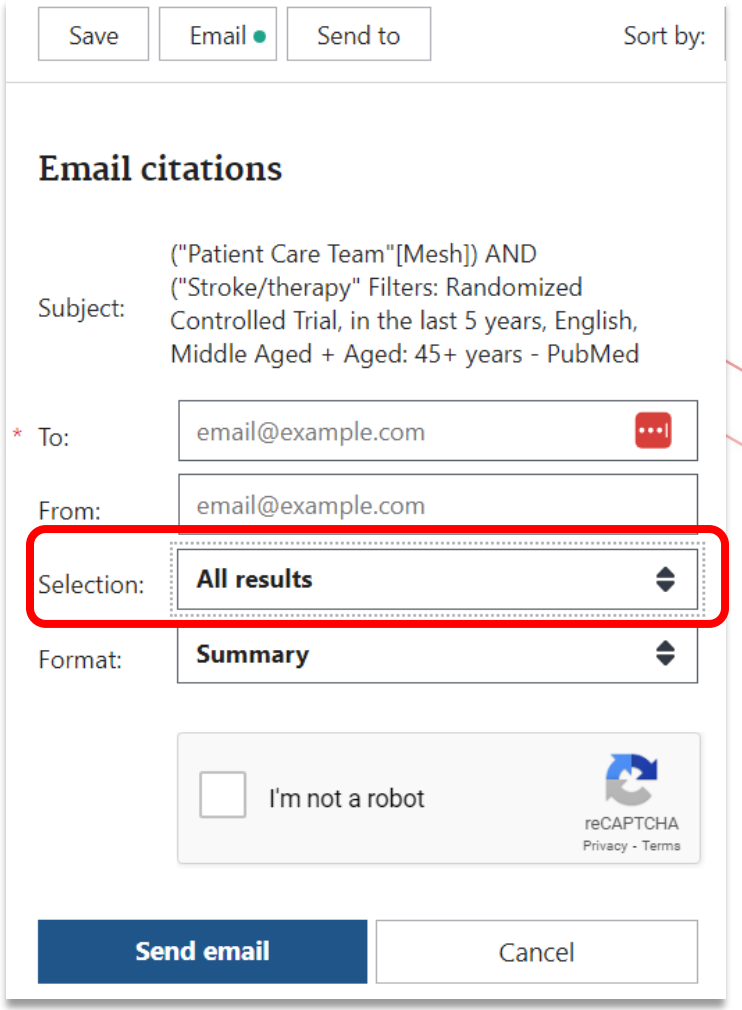

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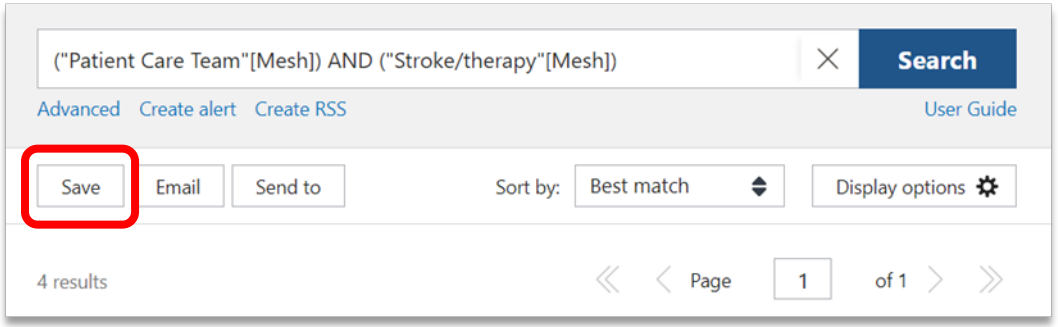

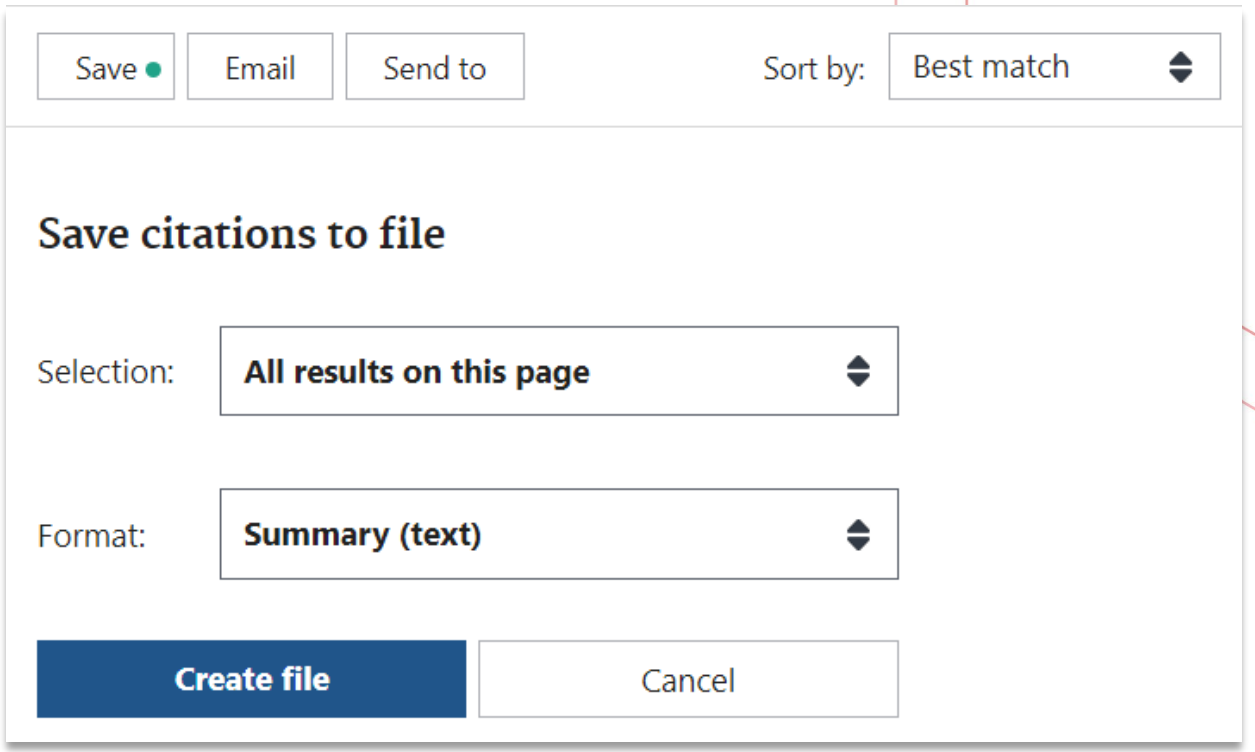

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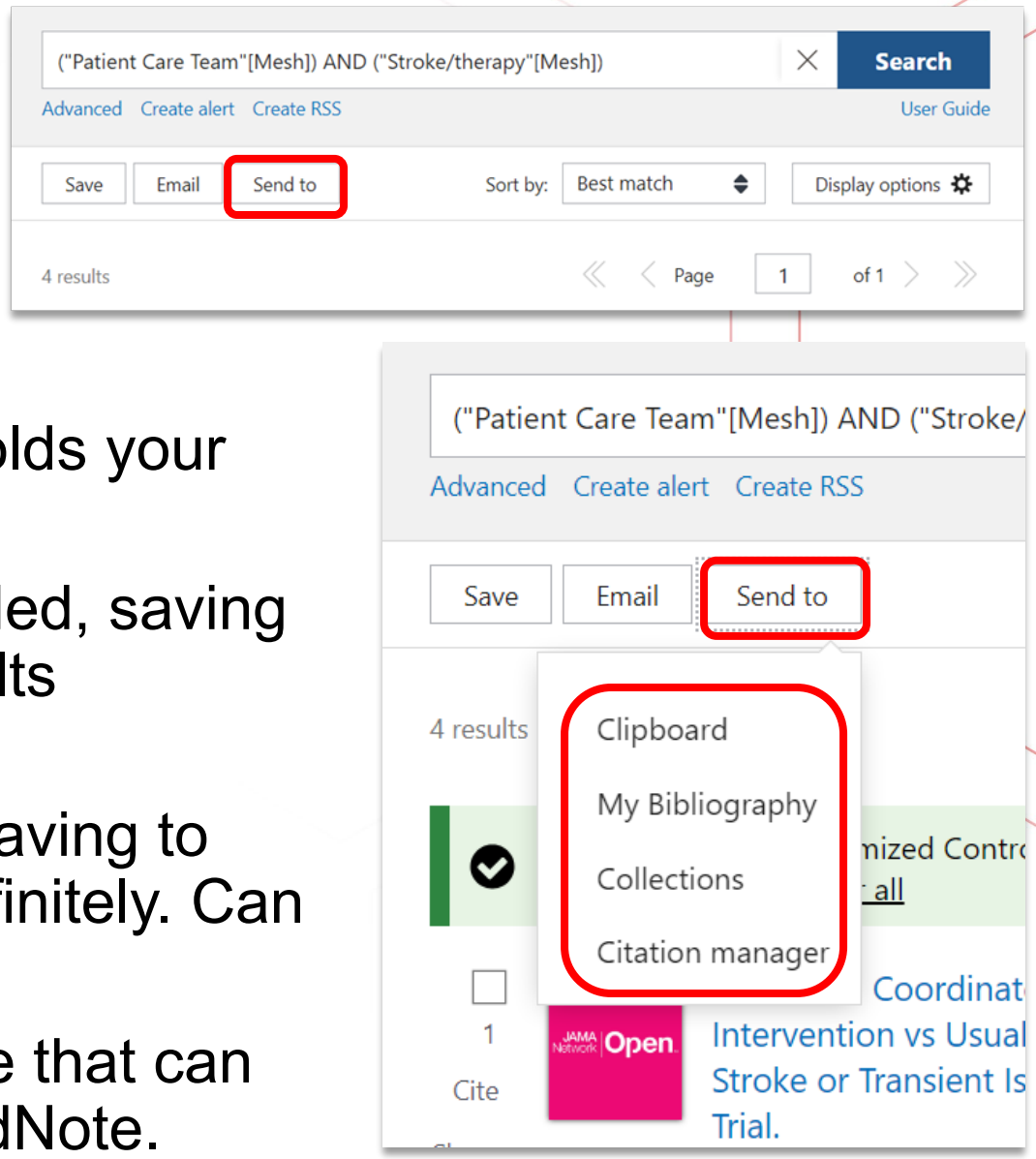

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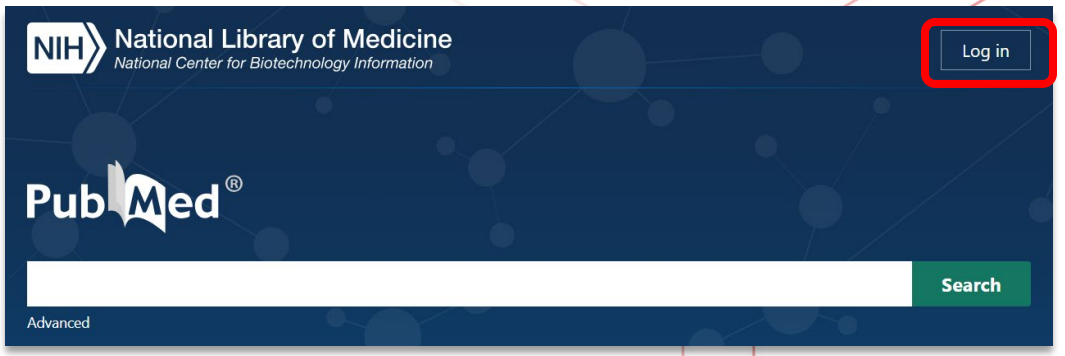
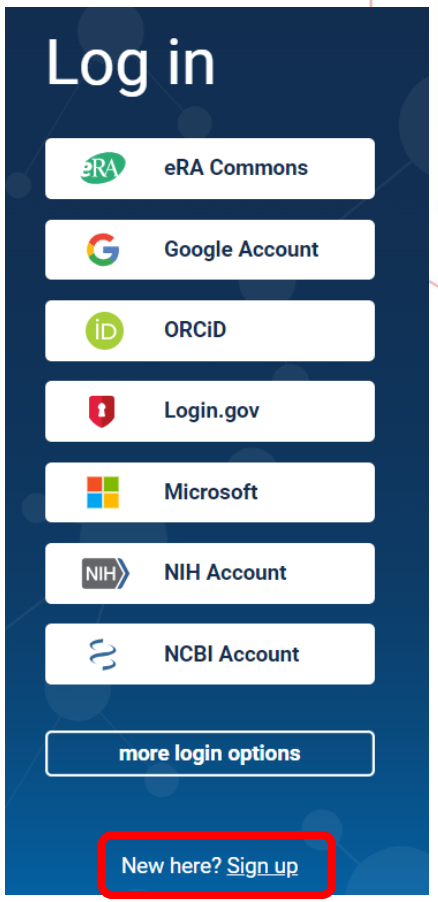
- **Citation manager**– creates a download file that can be imported into citation managers like EndNote.

PubMed Account

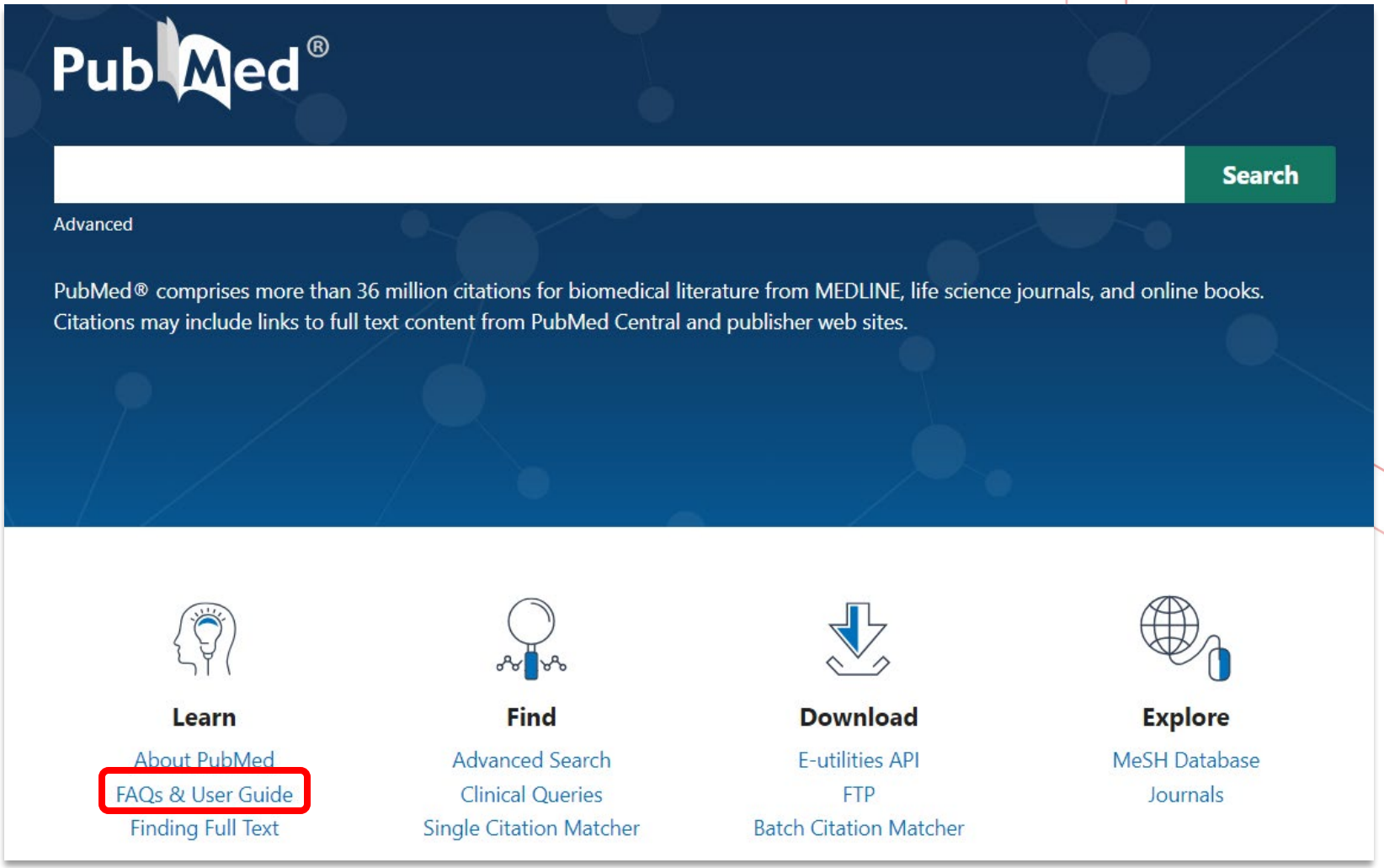
- Logging in to PubMed allows you to save results and search strategies indefinitely and refer back to them as needed.
- PubMed requires the use of a third-party login.
- To create your login, click **Log In** on the PubMed homepage.
- Select **New here? Sign up** to create your account.
  - You will not be able to use your TTUHSC email address.
  - Google Account works best.





Future Study

- From PubMed homepage, select **FAQs & User Guide** under Learn.
- You will find information on how best to use PubMed.



Practice Question #1

1. Research the use of telemedicine in rural health care services in Texas.

Possible answer is on next page.

You may want to try searching this topic before moving on.

Answer: Practice Question #1

1. Research the use of telemedicine in rural health care services in Texas.

This is a possible strategy to answer Practice Question #1. Read strategy from bottom up.

Locating the correct subject heading or MeSH term and then using appropriate subheadings, if applicable, creates a good strategy for research questions.

History and Search Details Download Delete

Search	Actions	Details	Query	Results	Time
#4	•••	›	Search: **(("Texas"[Mesh]) AND ("Rural Health Services"[Mesh])) AND ("Telemedicine"[Mesh])**	14	11:28:24
#3	•••	›	Search: **"Telemedicine"[Mesh]** Sort by: **Most Recent**	47,090	11:28:13
#2	•••	›	Search: **"Rural Health Services"[Mesh]** Sort by: **Most Recent**	14,236	11:27:51
#1	•••	›	Search: **"Texas"[Mesh]** Sort by: **Most Recent**	29,145	11:27:36

Practice Question #2

2. Does use of finasteride prevent the risk of developing prostate cancer in the male population over 65 years of age? Limit to Randomized Controlled Trial, English and Human.

Possible answer is on the next page.

You may want to try searching for this topic before moving on.

Answer #1: Practice Question #2

2. Does use of finasteride prevent the risk of developing prostate cancer in the male population over 65 years of age? Limit to Randomized Controlled Trial, English and Human.

Two possible strategies to answer this question. This is possible strategy #1: three MeSH terms without subheadings.

Possible strategy #2 is on the next slide.

History and Search Details

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Search	Actions	Details	Query	Results	Time
#7	•••	›	Search: **(("Finasteride"[Mesh]) AND ("Prostatic Neoplasms"[Mesh])) AND ("Risk"[Mesh])** Filters: **Randomized Controlled Trial, English, Humans** Sort by: **Most Recent**	32	17:33:15
#4	•••	›	Search: **(("Finasteride"[Mesh]) AND ("Prostatic Neoplasms"[Mesh])) AND ("Risk"[Mesh])** Sort by: **Most Recent**	107	17:32:57
#3	•••	›	Search: **"Risk"[Mesh]** Sort by: **Most Recent**	1,406,783	17:32:47
#2	•••	›	Search: **"Prostatic Neoplasms"[Mesh]** Sort by: **Most Recent**	152,557	17:32:34
#1	•••	›	Search: **"Finasteride"[Mesh]** Sort by: **Most Recent**	2,470	17:32:20

Answer #2: Practice Question #2

2. Does use of finasteride prevent the risk of developing prostate cancer in the male population over 65 years of age? Limit to Randomized Controlled Trial, English and Human.

This is possible strategy #2: three MeSH terms, two with subheadings, and one MeSH term that was Majored.

You will notice there are fewer results here than in possible strategy #1, but these results are more precise.

History and Search Details

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Search	Actions	Details	Query	Results	Time
#7	•••	›	Search: **(("Finasteride/therapeutic use"[Mesh]) AND ("Risk"[Mesh])) AND ("Prostatic Neoplasms/prevention and control"[Majr])** Filters: **Randomized Controlled Trial, English, Humans** Sort by: **Most Recent**	16	17:38:43
#4	•••	›	Search: **(("Finasteride/therapeutic use"[Mesh]) AND ("Risk"[Mesh])) AND ("Prostatic Neoplasms/prevention and control"[Majr])** Sort by: **Most Recent**	66	17:38:30
#3	•••	›	Search: **"Prostatic Neoplasms/prevention and control"[Majr]** Sort by: **Most Recent**	2,815	17:38:12
#2	•••	›	Search: **"Risk"[Mesh]** Sort by: **Most Recent**	1,406,783	17:37:24
#1	•••	›	Search: **"Finasteride/therapeutic use"[Mesh]** Sort by: **Most Recent**	1,728	17:37:13

Practice Question #3

3. Can better communication among staff in the operating room prevent medical errors?

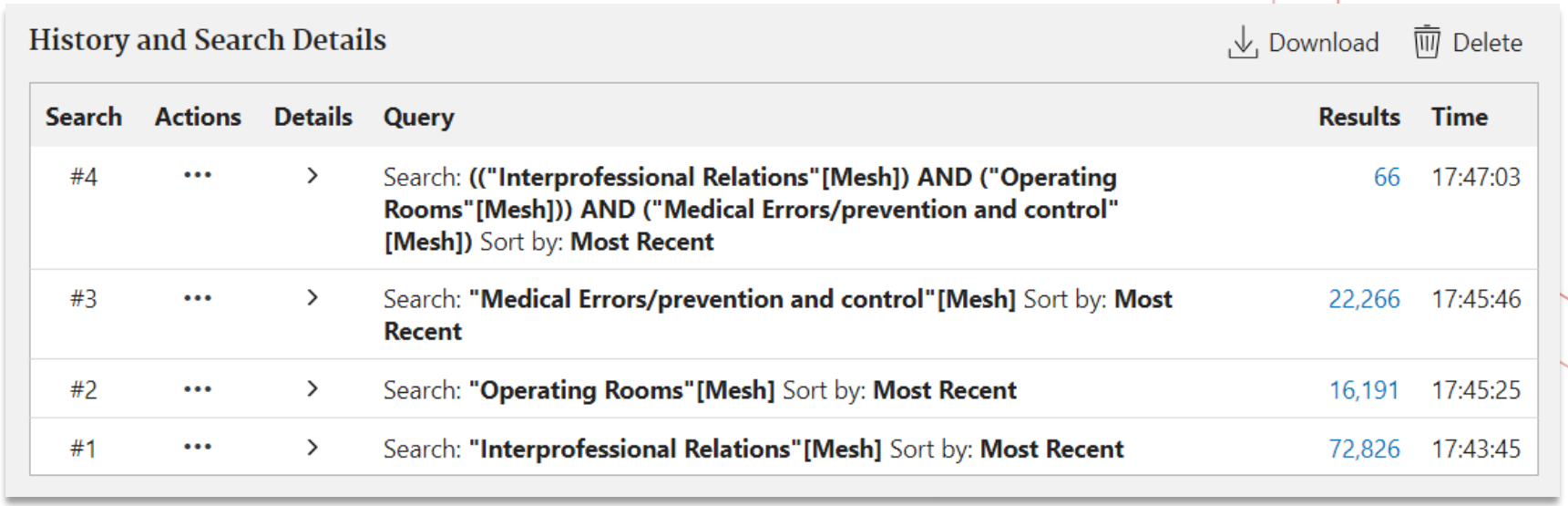
Possible answer is on the next page.

You may want to try searching for this topic before moving on.

Answer: Practice Question #3

3. Can better communication among staff in the operating room prevent medical errors?

Sometimes locating the best subject heading is not easy. Consider other synonyms that have similar meaning.



History and Search Details

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Search	Actions	Details	Query	Results	Time
#4	•••	›	Search: **(("Interprofessional Relations"[Mesh]) AND ("Operating Rooms"[Mesh])) AND ("Medical Errors/prevention and control"[Mesh])** Sort by: **Most Recent**	66	17:47:03
#3	•••	›	Search: **"Medical Errors/prevention and control"[Mesh]** Sort by: **Most Recent**	22,266	17:45:46
#2	•••	›	Search: **"Operating Rooms"[Mesh]** Sort by: **Most Recent**	16,191	17:45:25
#1	•••	›	Search: **"Interprofessional Relations"[Mesh]** Sort by: **Most Recent**	72,826	17:43:45

Summary: Final Points

- Using database tools appropriately increases relevancy and accuracy of results.
  - Boolean operators
  - Subject headings (MeSH)
  - Subheadings
  - Major headings
  - Filters