An Introduction to PubMed

[Presenter]   February 2020

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[Introductions]

Today, I'm going to talk to you about PubMed, which is a free online tool provided by the National Library of Medicine (or NLM), which you can use to find published biomedical and health science research.

Agenda

- What is PubMed?
- Using PubMed
  - Searching for an author
  - Researching a topic
  - Finding a specific article
- How to get help

- We'll start today with a little introduction to PubMed: what it is, and what's in it.
- Then we'll go into a more hands-on demo to show you how to accomplish some of the most common tasks of PubMed users.
  - Feel free to follow along!
- Finally, we'll wrap up with a brief discussion of how to get help, in case you get stuck.

What is PubMed?

- A database of more than 30 million citations to articles in the fields of biomedicine and health.
- Used by millions of users each day, including health professionals and others engaged in:

| research | health policy development | patient advocacy |
| public health | clinical care | related educational activities |

NIH U.S. National Library of Medicine
National Network of Libraries of Medicine

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- PubMed is the National Library of Medicine's free, authoritative, database of more than 30 million citations to articles in the fields of biomedicine and health, with a specific focus on collecting original scientific research.
- It's used by around 2.5 million users each day, including clinicians, researchers, students, and other folks from a variety of fields who need access to authoritative health science research.
- You can use it to find a specific research article based on some known information, such as finding the original research that prompted a news story, or to find articles written by a particular author.
- You can also use PubMed to help familiarize yourself with a new topic, and, because of its vast scope, you can also use it to dive deep into a wide variety of topics.

Where is the Full Text?

- Available from the Publisher
  - Full text is not always free
  - Check for access to your institution's subscriptions
- Included in PMC (PubMed Central)
  - Manuscripts deposited to comply with public access policies
  - Journal and publisher deposit agreements
  - NLM digitization projects

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- As we mentioned on the previous slide, PubMed is a database of citations, not a database of full-text articles.
- However, about two-thirds of PubMed citations include links to help you access the full text.
  - And if you look at just articles published in the last 10 years, it's closer to 90% of citations that have links to full text.
- Not all of these links are to FREE full text.
  - Some link to the journal publisher, which may require a subscription or one-time fee.
- When available, PubMed citations will link to the full text in PMC (or PubMed Central), which is NLM's free full-text repository.
  - Under the NIH Public Access Policy, adopted in 2008, any publications whose research was supported by a National Institutes of Health grant must be made available to the public.
  - To comply with this policy, authors deposit their manuscripts in PMC, ensuring that the public can access the results of the research paid for by taxpayer money.
  - Journals and publishers also deposit content to PMC, and
 - NLM adds content to PMC through a variety of digitization projects

Introducing the New PubMed

- Launched in November 2019
- Clean, modern look
- Easy-to-use interface
- Improved search engine designed to help find the best match for your query
- Same trusted citation data
- Running in the cloud

[OPTIONAL]

- In just a few moments, I'm going to show you how you can use PubMed to find biomedical research.
- In fact, I'm going to show you a new version of PubMed that launched in November 2019, after an extensive development process.
    - If you're at all familiar with the old PubMed, you'll hopefully find the new PubMed to be just as effective (if not more so), but a little bit easier to use.
    - It's got an updated, cleaner look, with an easy-to-use interface
    - The search engine has been modified to make it easier to find the articles that best match your query.
        - If you're familiar with the old PubMed, you can search the same way you're used to, but hopefully you'll get even better results.
    - The new PubMed still contains the same trusted citation data as the old database.
    - And new PubMed runs in the cloud, to increase long term stability and sustainability of the platform.
- So let's take a look at PubMed!

Welcome to PubMed!
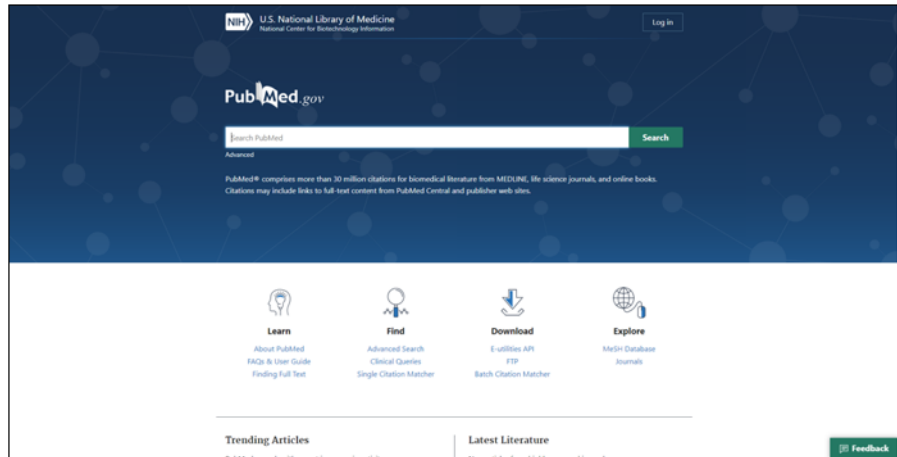
- Let's start by taking a quick look at the PubMed home page.
- The most important thing is the big search box, as that's mostly what you'll be using PubMed for: searching!
- However, there are a few other things we should take a quick look at.
- If you scroll down a bit, you can see a number of advanced or specialized features that we have linked here.
  - For now, I just want to direct you to the "Learn" section, and specifically the FAQ & User Guide link.
  - This link will take you to the PubMed User Guide, which includes detailed help documentation.
    - More important than that, though, is a Frequently Asked Questions section at the top of the User Guide, which walks you through common PubMed tasks, including some that we won't be covering today.
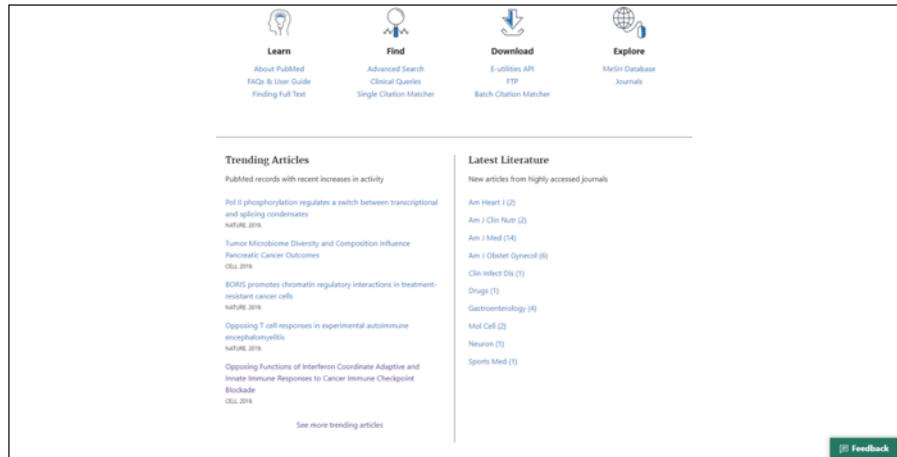
- If you scroll a bit further, you'll see this "Trending Articles" section on the left.
  - Just like Twitter or other social media "trending" features, this section highlights articles that have had a recent uptick in user activity.
    - It showcases articles that aren't necessarily the newest, but have had a sudden increase in interest.
    - These can be articles that have been in the news recently, or have gone "viral" in some way or another.
    - One time this is interesting to check out is right after the Nobel Prize has been announced.
      - Old papers by the winners often pop up in Trending Articles.
- For now, let's go back up to the top of the page, where the search box is, so we can get started searching and exploring in PubMed.

Finding the original research

Study Questions Mainstay Treatment For Mild Asthma

YOUR HEALTH

2:34

+ PLAYLIST

DOWNLOAD

EMBED

TRANSCRIPT

August 26, 2019 · 5:06 AM ET
Heard on Morning Edition

APRIL DEMBOSKY

FROM KQED

Source: https://www.npr.org/sections/health-shots/2019/08/26/752815573/study-questions-mainstay-treatment-for-mild-asthma

- Our goal today is to showcase some of the most common tasks people use PubMed to accomplish.
- We're going to start with a very common use case, which is finding a specific article you're looking for, based on some known information about the article.
- Say you come across a news article like this one.
    - [Show article: https://www.npr.org/sections/health-shots/2019/08/26/752815573/study-questions-mainstay-treatment-for-mild-asthma]
    - This is an NPR story, reporting on research that shows that the common treatment for asthma may not be as effective as previously believed.
    - Fortunately, this article has a convenient link back to the original research, but this is not always the case.
    - It can sometimes be difficult to track back to the original research that is being reported on.

Finding the original research (cont'd)

Steroid inhalers commonly used to prevent asthma attacks may not work any better than a placebo for many people with mild asthma, according to recent research.

Synthetic corticosteroids mimic the steroid hormone cortisol, reducing inflammation in the airways. But the drug targets a type of inflammation that may be found in far fewer patients than previously thought, research in a recent issue of the *New England Journal of Medicine* finds. Among patients age 12 and older in the study who had mild, persistent asthma, more than half did just as well, or better, on a placebo as they did on a steroid inhaler.

"We're suggesting that it's time to reevaluate what the standard recommended form of treatment is for these milder patients," says Stephen Lazarus, a pulmonologist at the University of California, San Francisco, and the study's lead author.

SHOTS - HEALTH NEWS
Testosterone May Help Protect Men From Asthma

Source: https://www.npr.org/sections/health-shots/2019/08/26/752815573/study-questions-mainstay-treatment-for-mild-asthma

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- We do know a few things:
  - It was published in the New England Journal of Medicine
  - It's a "recent article" so probably published in 2019
  - One of the authors is "Stephen Lazarus"
- Honestly, just that little bit of information should be enough for us to find this very easily in the new PubMed.

Search: lazarus nejm 2019
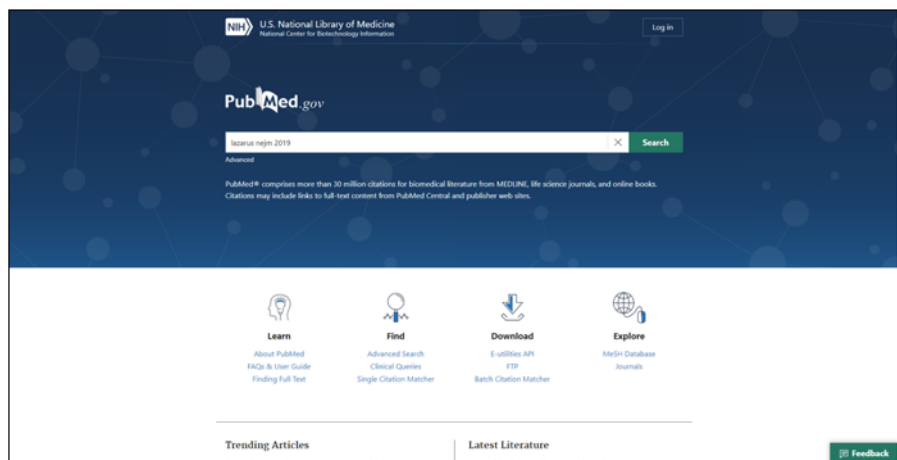
- One of the key design focuses of PubMed is sensors built into the search box.
  - These sensors analyze your search query and try to detect what exactly it is you're looking for.
  - If we enter the information we have:
    - The author's last name: Lazarus
    - The abbreviation for the journal New England Journal of Medicine: nejm
    - And the year: 2019.
  - The Citation Sensor should detect that we've provided some basic citation information, and will help us find the article we're looking for.
  - [Demo Search: lazarus nejm 2019]

Search Results: lazarus nejm 2019
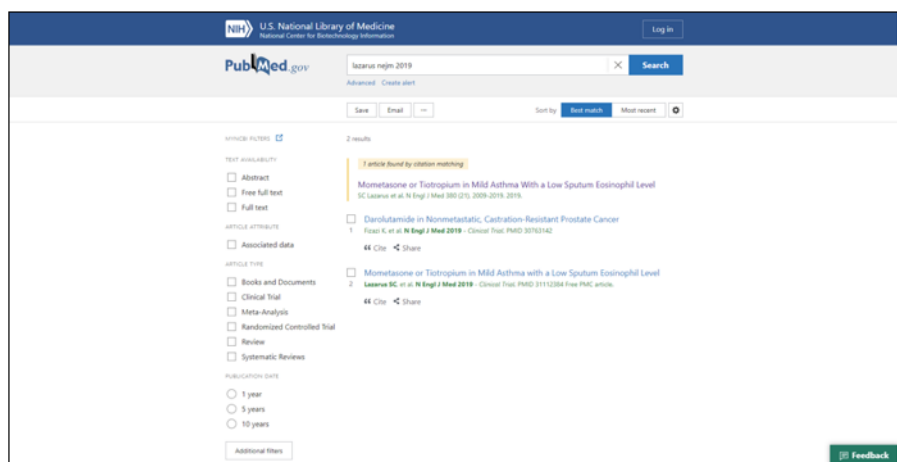
- Here's our search results page.
    - As you can see, the citation sensor tried to find a citation that matched that information we put in the search box.
        - PubMed also does our search "normally" and gives us an alternative set of results, just in case we weren't actually trying to search for a specific citation.
            - This can be useful when you put in a topic term that's also the name of a journal, like "Cancer" or "Virology" (or "Science")
                - The Citation Sensor will probably suggest some articles from the journal, assuming you were searching for a journal name.
                - However, you also get more search results below, in case you were actually searching for articles about cancer or virology (or science).
    - We'll look at the rest of what's on the search results page later on, but for now, we'll click on "1 result find by citation matching," to take a look at this citation in more detail.

Abstract View

- This is the abstract page, which shows a lot more about the citation than the summary view on the results page.
    - We have our basic citation info here, including which journal, issue, and page number (if applicable)
        - We also have tags that indicate what type of article the citation is for.
            - In this case, we're looking at a Randomized Control Trial.
            - Not every type of article has this tag, but it is meant to highlight some commonly looked-for types of publications, including Reviews, Clinical Trials, Errata.
    - Below this, we have the article title.
    - Immediately to the right of the title is where you'll find links to the full text of the article.
        - This citation has a link to the publisher's website.
        - If the article was available in PMC, NLM's full-text repository, you would also see a link to the PMC copy, as well.
        - [OPTIONAL, IF YOUR LIBRARY PARTICIPATES IN LINKOUT FOR LIBRARIES USING OUTSIDE TOOL: You can also see our library's icon, which will link you to the full text of any article we our subscribed to, or will help you request the full text of the article through Interlibrary Loan.]

- Below the title, you can see the author information, which you might need to expand in order to see the rest of.
    - If you expand the author information, you can also see the authors' institutional affiliations, if present.
- Below the authors you can find the PMID or PubMed ID, which is a unique identifier for each PubMed citation.
    - If you have the PMID, you can always find a citation by typing the PMID in the search box and clicking search.
- Further down, we have the full abstract text.

Similar Articles

- If you scroll even further down, you'll see some additional information that's added by NLM.
  - Most of these are connections or links to other articles in PubMed or to information in other NLM databases.
    - Similar Articles is an algorithmically generated list of other PubMed citations that are similar to the one you're looking at.
    - There can also be a list of articles in PMC that cite the article you're looking at.
    - And the list of References for the article comes from the publisher as well.

Author Searching

- Searching by author can be tricky
  - Multiple authors may publish under the same name
- Best practice: start with last name and initials
  - For example: collins fs
  - No need to tag, capitalize or punctuate
- Avoid searching using full author names
  - Not all PubMed records include full author names
  - Using full first names may miss articles where only initials were provided

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- One of the most frequent tasks users do in PubMed is searching for an author, to try and find all of the publications by that author.
    - Searching by author can be tricky in PubMed, as in other databases, when multiple authors have the same name, or when one author publishes under different variations of their own name.
    - There are a few techniques you can use to help ensure that you find articles by the author you're looking for, and not a different author with a similar name.
- The most effective way to search for an author is to search for the author's last name initials.
    - No need to tag, capitalize or punctuate; just the last name, then a space, then the initials.
    - For example, if you are looking for articles by Francis Collins, the director of the National Institutes of Health, you would search "collins f"
        - We recommend this instead of searching for the authors full last and first names.
        - Not all PubMed records include full author names, so searching with a last and first name might miss results where only the initials were provided.

Author Search: collins fs
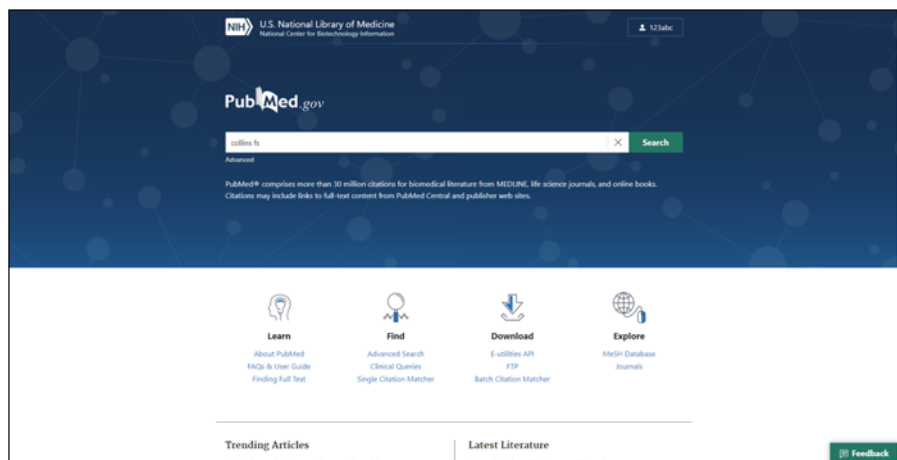
[Demo: Search "collins f"]

Search Results: collins fs
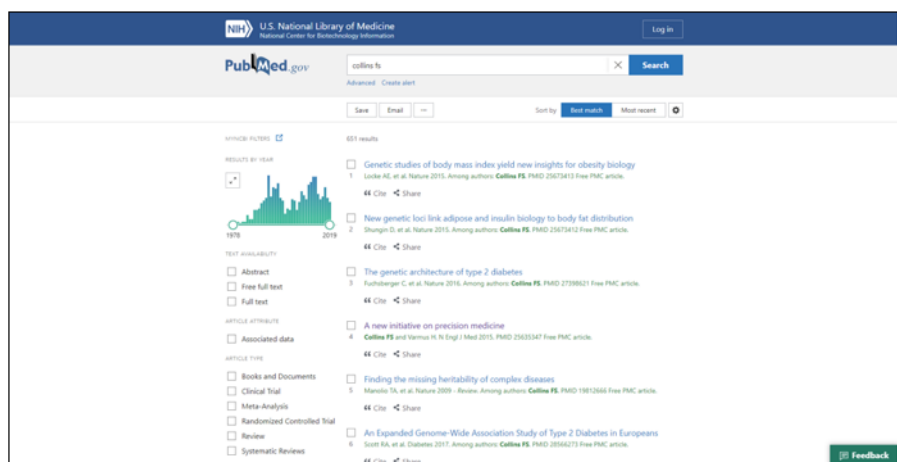
- As you can see in the results, we have a number of articles by FS Collins.
  - In the summary view, PubMed will try to highlight your search terms where they appear.
    - In this case, "Collins FS" appears among the authors of a number of these results.
      - We won't know for a fact that the "Collins FS" on any of these records actually refer to "Francis S. Collins," or that they specifically refer to the Francis S. Collins who is NIH Director without taking a look at the individual records.

Author Search Results Detail

- We can click on one of the results and see if we can be sure that this is the "right" Collins FS.

[Demo: Click on PMID 25635347, "A New Initiative on Precision Medicine]

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[Demo: Click on PMID 25635347, "A New Initiative on Precision Medicine]

Computed Author Sort

- Identifies other articles written by the same author
- Uses an algorithm based on patterns in authorship
- Takes advantage of ORCID identifiers (when available)
- Puts most likely author matches first

- Computed author uses an algorithm based on patterns in authorship to identify other articles where an author with the same name is actually the same author.
    - Computed author also takes advantage of ORCID identifiers, when present, to help sort out multiple authors with the same name.
        - ORCID identifiers are on a small, but rapidly increasing number of PubMed records.
        - Authors can create an ORCID ID and submit it to the journal with their papers.
        - Publishers can then send the ORCID along to PubMed with the rest of the citation data.
        - More ORCID information in PubMed helps make these efforts to differentiate between authors with the same name more effective.
        - If you are an author, work with authors, or expect to become an author in the future, help us get more ORCID identifiers into PubMed by creating an identifier for yourself and making sure you attach it when submitting to publishers.

Finding More Articles by the Same Author

- To use Computed author sorting, pull up any PubMed Citation in Abstract view.
- In the Abstract View, click on an author's name.
  - PubMed will now search for articles with the same author name, and cluster at the top of your results the articles that the algorithm has determined are likely by the same author.

Computed Author: Francis S. Collins
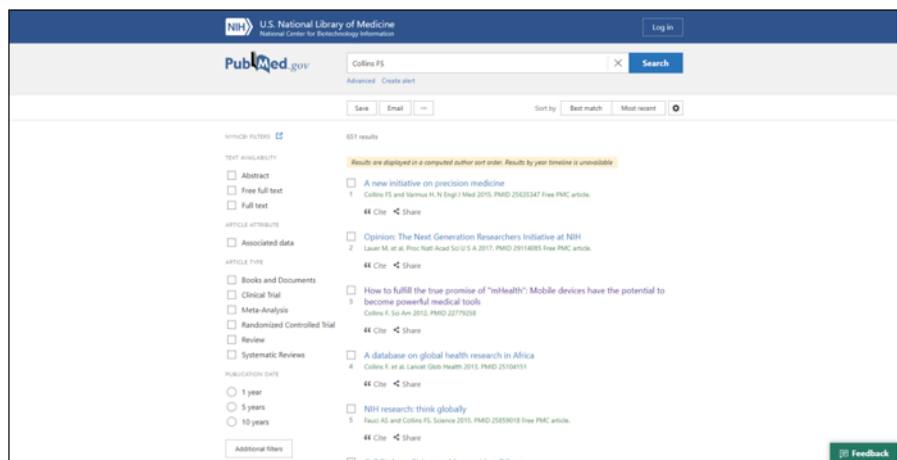
- The results are displayed in "computed author sort order," meaning the articles most likely to be by the author you clicked on show up at the top
    - This explains why the article we started from "A new initiative on precision medicine" is result
    - As you can see in the results, the algorithm has found articles by "Collins FS" but also by "Collins F"
    - Computed author helps you find articles by the same author, even if they aren't publishing under the exact same name.

- Now let's click on the "PubMed.gov" logo at the top of the results page to get back to the home page.
    - We're going to change gears a little bit and talk about subject searching.

Subject Search: acid reflux
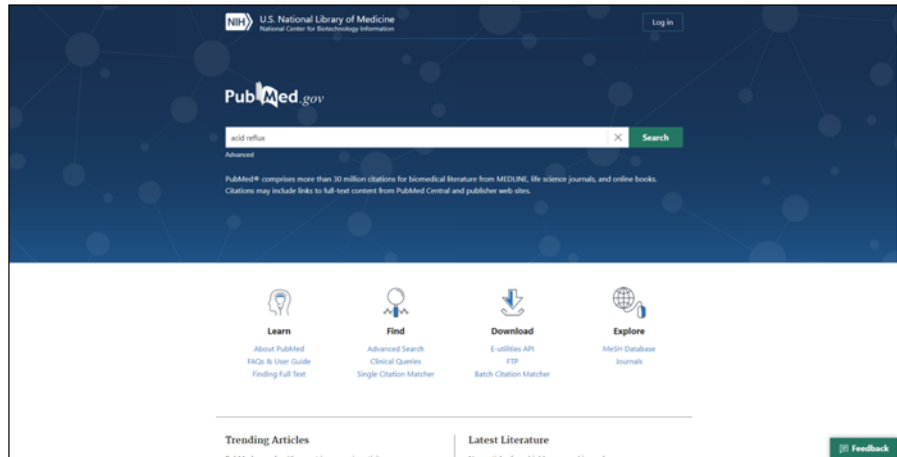
- Another common use case for PubMed is trying to search for articles on a specific topic.
  - Maybe it's a topic that you don't know much about and need to familiarize yourself with.
  - Maybe you're doing a deeper dive into a particular topic.
- PubMed has a few features that, when put together, make it easy for you to just type what you're looking for in the search box and get back the results you need.
  - One of the new priorities in PubMed is something we call Best Match
    - The idea is sort of similar to some other search engines:
      - Based on analytics and usage statistics, it is clear that the overwhelming majority of users only look at the first few results of their search, and rarely, if ever, go past the first page.
    - One of the goals of the new PubMed is to make sure the best, most relevant and current research shows up right at the top.
  - On top of this, the PubMed search engine for many years has been developed to take simple queries and translate them into more elaborate, comprehensive searches.
    - The goal is that you can just type in what you're looking for, and

PubMed will make sure you get what you need.
- Additionally, PubMed has tools to specifically designed to let you do a broad search, and to then further refine your search to focus on just the results you need.
- With all of that going on in the background, we can just type our topic into the search box and click Search!
    - I'm going to search for "acid reflux"
        - I don't need to worry about punctuation, capitalization, or Boolean operators.
        - I don't even need to know the proper scientific name for "acid reflux."
        - Just put it in and click search.

[Demo: Search "acid reflux"]

Search Results: acid reflux

- That basic search gave us a bunch of search results.
  - Because we have a good number of results, we can take this opportunity to take a longer look at some of the features on the search results page.
  - In the center of the page, we have our list of results.
    - As before, we are just seeing a summary of each result, which includes some key information about each article:
      - The article title and citation info are displayed, including the PMID.
      - The article type "tags" (as we saw before for Randomized Control Trial, and for Review, Clinical Trial, etc.) are also displayed, when applicable.
    - A portion of the abstract is shown, with your search terms highlighted.
      - Notice that there are some words here that are highlighted, even though we didn't search for them.
        - We'll get into why that is in a minute.

Cite Button
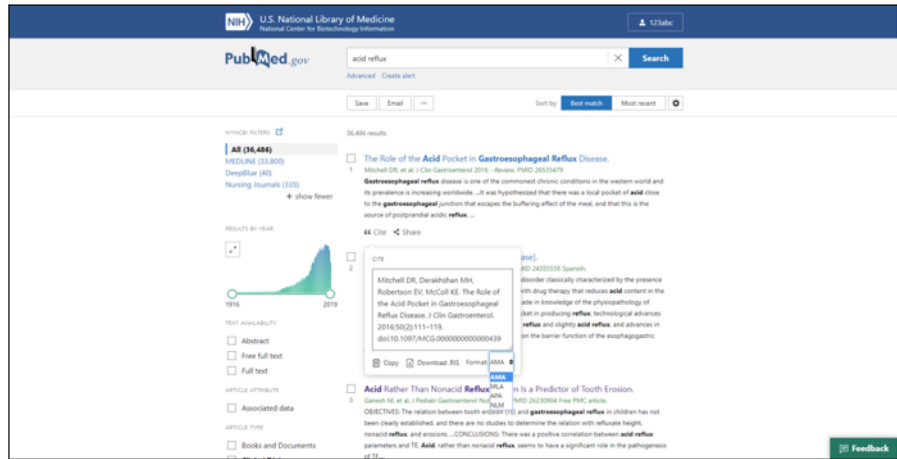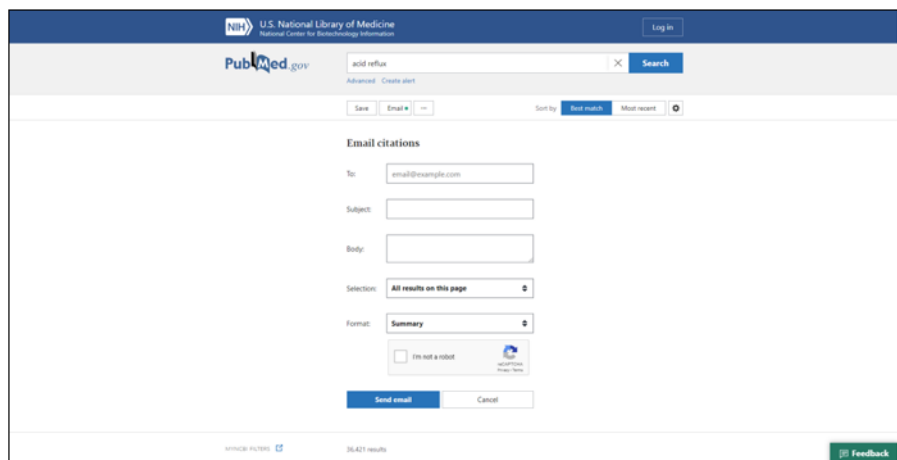
Each result has a Cite button, which lets you grab a properly-formatted citation in the citation format of your choice, to copy-and-paste or to download to your computer to be imported into citation manager software.

Save Button
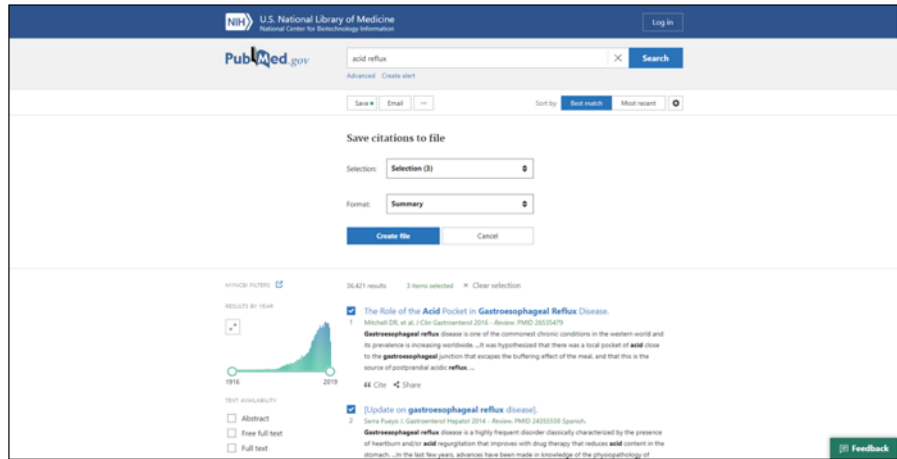
- If you want to save multiple citations to your computer, you can use the Save button at the top of the page.
  - Mark the citations you wish to save by clicking the checkboxes next to them.
  - You can then download those citations in a variety of formats.
  - You can also opt to download the entire page of results at once, or your entire results set, though this can result in some very large files.

Email Button

Rather than downloading them, you can e-mail results as well, to yourself or someone else, using the Email button at the top of the page.

Create Alert

- Another feature you might be interested in is Create alert.
    - You can save a search, and PubMed will automatically e-mail you new results for your search query as they become available.
    - In order to create alerts, you need a free My NCBI account in order to set up alerts.
        - If you don't have a My NCBI account, we encourage you to get one.
        - In addition to allowing you to create alerts, it also gives you access to additional customization options, and lets you save collections of citations to share with others.
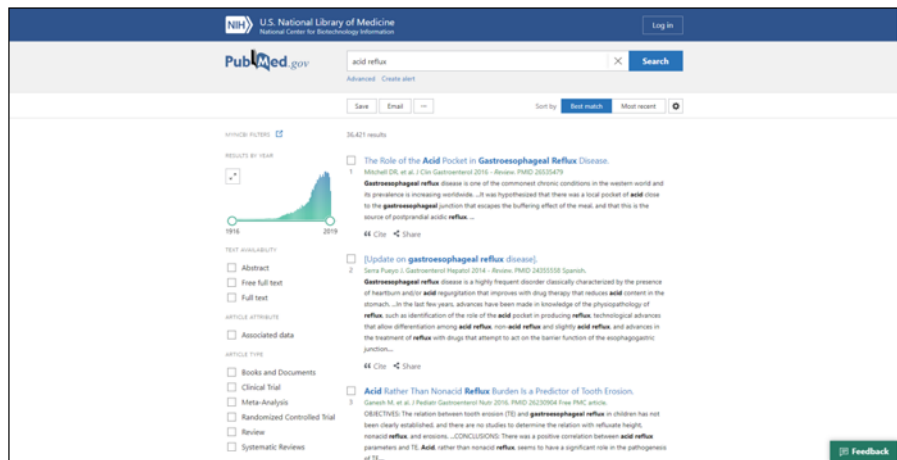
- Earlier, I mentioned other ways to refine your search.
    - Many of those filters are on the left sidebar of your results page.
    - At the top is the "Results by Year" graph.
        - This provides a nice way to visualize trends in research, as you can see when publications on a particular topic increase or decrease over time.

Results By Year (expanded)
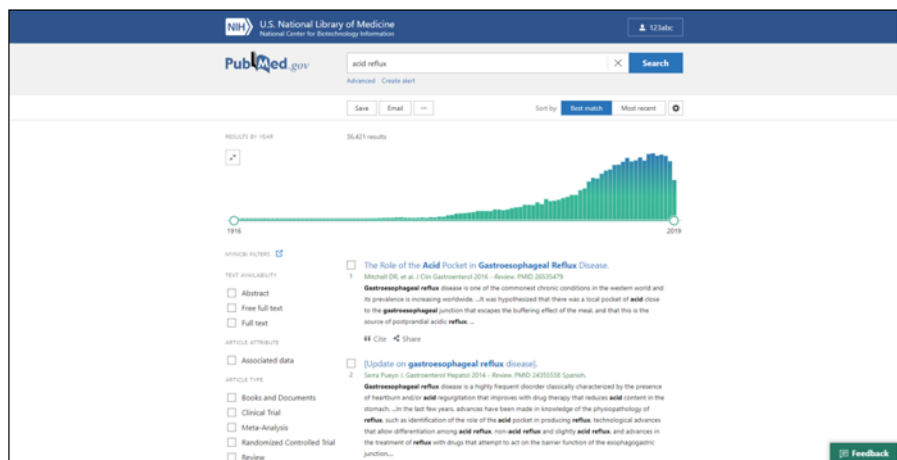
- To make using the Results By Year graph a little easier, you can expand the graph by clicking the expand icon (the square with two outward pointing arrows).
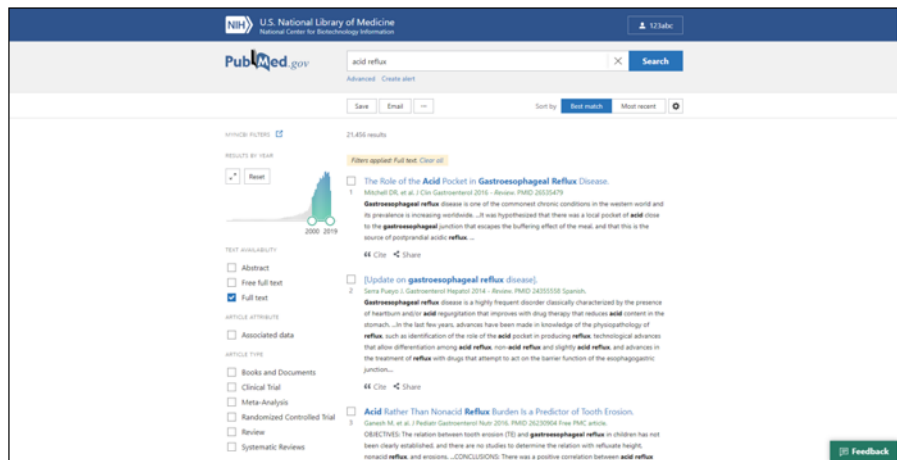
Using Results By Year as a Filter
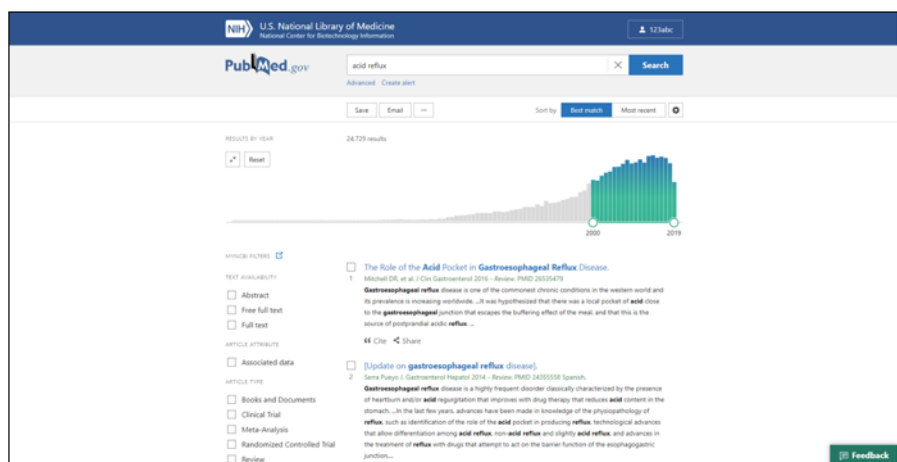
You can also use the graph to filter your results based on publication date, by dragging the handles on each side of the graph inward.

Text Availability Filter

- Below the Results By Year filter, we have the "Text Availability" filters
    - By selecting one of these checkboxes, you can restrict your search results to only articles with links to full text, or even to free full text.

- You can use the "Article Type" filters to restrict your results to only articles of a certain type.
    - For example, if you're looking to familiarize yourself with a topic, you can restrict to just reviews by clicking the "Review" checkbox.
        - You can see that all of these citations are labeled with the "Review" tag.
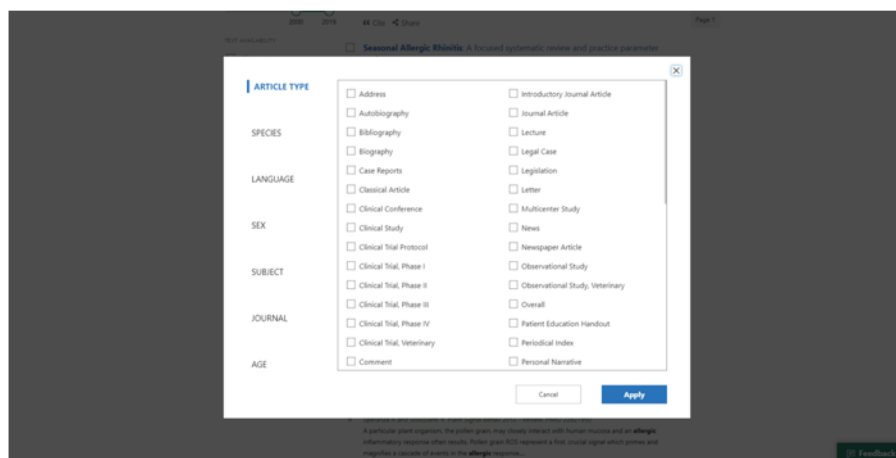
- Finally, there's a button down here for "Additional Filters"
  - If you don't see the Article Type you want to filter to, you can add it.
  - Once you have selected and added additional filters, they will become available for you to use in the sidebar.

Back to the Results Page
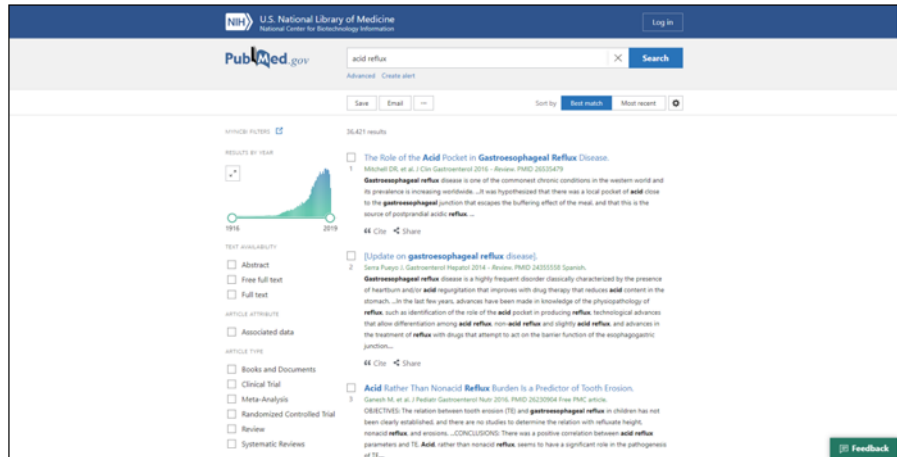
- There is one other feature I want to show you, which is the Advanced Search Page.
  - You can find Advanced Search Builder using the "Advanced" link underneath the search bar on the home page or any other PubMed page.

Advanced Search Builder and History

- The Advanced Search page allows you to search specific fields and build more complex searches. Most of the time you shouldn't need to use it, but it is available, just in case.
- One way you can use the Advanced Search is to find articles from a specific journal, even if you're not sure of the journal's exact name.
- Use the Field selector to select journal, then start typing the name of the journal. The auto-suggest feature will suggest journal names that exist in the database, and you can choose the one you want.
- For example, if you're trying to find New England Journal of Medicine, just select Journal from the drop-down and start typing it. You'll see that the proper name is "The New England Journal of Medicine" which you can then add to your search by clicking "Add" and run that Search by clicking "Search."
- While the Advanced Search Builder can be useful, the really important thing on this page is the History and Search Details section, down at the bottom.
    - This keeps track of what searches you've run, and lets you jump back to the results for any of those searches.

Search Details

- More important, though, is this Details tab, which makes your searching a little more transparent.
  - The Search Details shows you how PubMed is interpreting your search, using Automatic Term Mapping.
  - For our "acid reflux" example, you can see that PubMed is actually searching for the term "gastroesophageal reflux
    - What this means is that, even if we don't know that the medical term for acid reflux is actually "gastroesophageal reflux," PubMed knows what we're looking for, and will search for any citations with that term
    - Finally, PubMed searches for the original search string we entered: "acid reflux."
  - This is why, on the search result page, in the abstract snippets, we saw "acid reflux" bolded, but we also saw "gastroesophageal reflux" bolded:
    - In those snippets, our search terms appear in bold.
      - Our search terms include "acid reflux" which we typed in, but also include "gastroesophageal reflux" thanks to Automatic Term Mapping.

How to get help

- FAQ & User Guide
- Ask a Librarian!
- [INSERT YOUR LIBRARY'S INFORMATION HERE]
- NLM Support Center

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- Like I've already said, PubMed should meet most of your needs by just using it the way I've shown today.
    - This new version of PubMed was designed with that goal in mind.
    - However, for certain specialized research, you might need a little help.
- First, check out the FAQ & User Guide.
    - I pointed this out on the home page already.
    - It's comprehensive, and should answer any question you have.
- If the guide is a little overwhelming, you should ask a librarian!
    - Medical and health sciences librarians are often expert PubMed searchers, and they can help you find what you need.
    - Librarians can also help you access the full text of articles through their institutional subscriptions.
- [NOTE: Insert information for your specific library here, including how you would like your users to reach out when they need help.]
- Finally, at the bottom of every page in PubMed is a link to the NLM Support Center.
    - You can find answers to questions about all of NLM's products and services through the Support Center.
    - You can also write to the Help Desk, who can help answer questions.
        - If you encounter something that isn't working, the Help Desk can

also report issues to the PubMed development team, as necessary.

Questions?

Questions?