Guide to Building Your Research Skills

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- Tools that you must have before you start with your research include a PubMed My NCBI account (https://www.ncbi.nlm.nih.gov/myncbi/), and a Zotero account (https://www.zotero.org/). A My NCBI account will allow you to customize your PubMed experience and Zotero will allow you to manage your citations.
- Once you have a My NCBI account, find the customization link and customize your PubMed search experience so you have highlighting, and customize your search display so it displays 50 records per page, sorts by Best Match, and displays abstracts.
- Download Zotero 5.0 to your computer (the Word connector is included), and install the Browser Connector.

SEARCHING FOR CITATIONS AND EXPORTING THEM TO ZOTERO

Once you have the above tools, you can now begin the research process. Let’s say you are researching barriers that reduce uptake of the HPV vaccine in rural communities. A very simple way of searching this topic is linking the four concepts with the Boolean operator AND. Here’s what the simple search would look like: barriers AND uptake AND HPV vaccine AND rural communities. (Please copy and paste that search into PubMed.) The search should retrieve about 6 citations. As you look through the citations you will see that they are on topic; however, normally you would need more than six citations, so you will need to revise your search.

To retrieve more citations, you either need to reduce the number of concepts or add to the concepts related terminology by using the OR Boolean operator. Let’s start by reducing a concept. Of the four concepts, barriers, uptake, HPV vaccine, and rural communities, either barriers or uptake could be removed. Let’s remove uptake and rerun the search in PubMed. We now have 18 citations, which is a much better number to work with.

While in PubMed, look at the right-side column of the page for Search Details, and click on See more …
Look carefully at the search details and you will see how PubMed interpreted your search. Note the words in brackets, either [All Fields] or [MeSH Terms]. [All Fields] means that PubMed searched those terms in all fields of the citation (e.g. title, author, author affiliation, and abstract).

MeSH (Medical Subject Heading) is a very important element of your search, as it broadens the concept to include different ways to describe your concept.

When you are happy with your PubMed search, go to Zotero and create a Collection for your topic. Then, create a sub-collection for PubMed. Go back to PubMed and use the Zotero Browser Connector to export the citations to Zotero. (All citations will be exported into your PubMed sub-collection.)
The next database to search is CINAHL. In CINAHL, you have three ways to search. The most simple way is to perform a Boolean search (barriers AND HPV vaccine AND rural communities) using Basic Search. Basic Search can be found underneath the Advanced Search fields.

Your CINAHL Basic Search should retrieve about eight citations. Unlike PubMed, CINAHL indexes non-peer reviewed literature, so to limit your search to peer reviewed articles, click on Academic Journals on the left side of the page.
Another way to search CINAHL is using the Advanced Search. Advanced Search requires you to search one concept at a time – resist filling in the three search fields that are provided. When you enter a concept, CINAHL will present you with a list of potential subject headings. Check any relevant subject headings and check the search keyword option at the bottom of the list, and then click on Search Database. If you see no applicable subject headings, just click on search keyword. Perform that task for each concept.

Once you have searched for subject headings for each of your concepts, you can now combine the concepts manually using the AND operator.
In this case, you retrieve the same set of citations; however, it’s a more structured search and more similar to PubMed, as it applies subject headings to your concepts.

When you are happy with your CINAHL results, go to Zotero and create a sub-collection for CINAHL. Use your Zotero Browser Connector to export all items to Zotero.

Next, paste your Boolean search into the Web of Science default search box. At this point, you are just searching keywords and you don’t need to find subject headings. When you are happy with your Web of Science results, go to Zotero and create a sub-collection for Web of Science. Use the Zotero Browser Connector to export the citations into Zotero.

At this point, you can decide whether to search additional databases (see list below) or search grey literature (anything not published in journals) by doing a Site search in Google. For instance, I might decide to augment my search by using PsycINFO or a social sciences database. For grey literature, I might search Google using the following strategy: barriers AND HPV vaccine AND rural communities site:.org. (Typing site:.org after my search retrieves content only from .org sites.) I could then re-run the search using site:.edu and then site:.gov in place of site:.org. I might also search in usa.gov or the Agency for Healthcare Research & Quality for additional grey literature. Please be sure to create a sub-collection for each database in Zotero.

**MANAGING CITATIONS IN ZOTERO**

Once you have exported all your citations to Zotero, copy all citations from the sub-collections into the parent collection (HPV). Click on the parent collection and then click on Duplicate Items, which can be found in the left column under Collections. Merge all duplicate items.
At this point, you have a parent Collection with merged citations and several sub-collections that contain the original search results from each database.

Create two new sub-collections, one for INCLUSION FIRST PASS and one for EXCLUSION FIRST PASS.

Review the title and abstract for each citation in the parent Collection, and move them into either the INCLUSION FIRST PASS or EXCLUSION FIRST PASS sub-collection. For each citation you move into the EXCLUSION FIRST PASS sub-collection, tag it with the reason you are excluding it, for example, NOT ENGLISH. Note that if you right-click on the tag title in the bottom right corner of the screen, you can color code each tag.

Once you've gone through each citation, create two new sub-collections for your INCLUSION FIRST PASS sub-collection. The two new sub-collections should be named INCLUSION SECOND PASS and EXCLUSION SECOND PASS.
Review the full-text for each citation in the parent INCLUSION FIRST PASS folder, and move them into either the INCLUSION SECOND PASS or EXCLUSION SECOND PASS sub-collection. Tag each citation that is moved into the EXCLUSION SECOND PASS sub-collection with the reason you are excluding it.

When writing your paper, use Zotero to insert in-text citation and to create your final bibliography.

Congratulations! You have now worked your way through the research process. Download the Modified PRISMA Article Review Chart and plug in your numbers by referencing your Zotero collections.

Please don't hesitate to contact me if you have any questions. My email address is danwilson@virginia.edu.