Lesson Three: Developing Tools for Effective Searching

Introduction

The next set of skills for EBP that we will focus on is learning to use the resources available to find the evidence you need. Like me, some of you probably remember the cumbersome process that used to be required to find articles before the days of the Internet. It could take hours to search for the abstracts of potentially relevant articles, locate the bound volume in the library stacks (unless someone had taken that volume!), and then copy the article you wanted to read. The process is very different now with an increasing amount of research information available electronically. The amount of information can be overwhelming, however, unless you know how to search efficiently and effectively to find what you need. This lesson will walk you through a series of steps to make sure you can locate and begin to use these resources.

Learning Objectives

At the completion of this lesson, you will:
1. Be able to conduct a basic search in PubMed and PsychInfo.
2. Be able to access full-text resources available via the BU library system.
3. Have begun to compile a personal resource directory of websites with information relevant to your practice area.
4. Create a RefWorks account through BU to store your references from literature searches.
5. Be able to use the APA style guidelines for research article references.

Becoming Acquainted with the BU Library

As a Boston University student, you are able to use the extensive electronic resources available through the University library system. For example, you can access electronic databases such as PubMed and PsychInfo, as well as electronic journals that allow you to retrieve journal articles from your home computer. We are going to explore and practice using those resources. Also, it is recommended that you complete the BU Library Tutorial. Please visit www.bu.edu/showme/ to access this tutorial now.

Note: Boston University Library as well as the various electronic databases and services are constantly revising and improving their websites. Please keep in mind that because of this constant change some elements of the sites described may have changed in appearance or available options by the time you visit them. We do our best to keep up with the changes and hope you will let us know when they happen. Adapting to the changes will be good practice for your computer problem-solving skills.

Exploring Electronic Indexes and Journals

Searching for articles based on a specific topic

To find journal articles based on a specific topic, you need to start with an index. Indexes provide information (a citation, an abstract, sometimes even the full text) about articles from many different journals, usually within a broad field, such as medicine or history. Using an index is easier and more efficient than flipping through hundreds of journals looking for relevant articles. Some examples of indexes commonly used by occupational therapists include CINAHL, PubMed, PsychInfo, ERIC, and Ageline.

Sometimes it can be confusing because these indexes are ‘run’ by different software providers- for example, at BU, both PsychInfo and CINAHL are run by something called “EBSCO Host”. It's important to remember that you are searching the index, not EBSCO Host!

Searching indexes

1. Go to http://www.bu.edu; click on Research, and then the subcategory, Libraries.

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2. You will now be in Boston University's Library website (http://www.bu.edu/library/).

3. Select a quick find tabs to locate a book or see if BU library system subscribes to an electronic version of a journal. You can use these tabs to find articles you locate during your search.

4. Clicking on "Databases" on the right hand side of the page will allow you to navigate to a page of all indexes available through Boston University.

5. To find out what what type of research these different databases, or scholarly indexes, contain, click on the “About” link next to each index name. For example, this link contains information about the type of research indexed in CINAHL: http://www.bu.edu/dbin/ejournals/esources/display6xy2.php?&ix=966&type=index

Using scholarly indexes effectively: Index specific search strategies (1 of 3)

Scholarly indexes do not work like "google" and other modern search engines. Modern search engines use smart text to correct your spelling, identify potentially relevant topics, and find related materials. Individual scholarly indexes may have some of these features, but overall, do not work in this way. Instead, scholarly indexes use their own organizational structure to review research articles, assign research articles to specific topics, and then index topics. It seems obvious, but the most difficult part of searching is finding research articles relevant to your PICO/clinical question in any one database!

In order to do this, you will need to identify the specific terms each databases uses to to “talk about” the topics embedded in your clinical question (such as your population, your intervention or issue, etc). As an example, consider the diagnosis of autism as a descriptor of the ‘population’ in your PICO question. Practitioners and researchers may use many different terms to talk about autism including: Autism Spectrum Disorder, Autism, and Autistic. That’s already three different ways of talking about the same thing! And that’s not including related or ‘nested’ terms, such as Asperger Syndrome or High Functioning Autism! If you used “autism” as a general, all text keyword in a search engine, you may not find all the articles relevant to autism!

Luckily, all indexes provide a ‘dictionary’ of the special terms they use to index these topics. These special terms are called different things in different databases:

- PubMed uses “MeSH” terms
- PsychInfo uses “subjects” indexed in a “Thesaurus”
- CINAHL uses “subject headings”.

When searching an index, I always input my ‘PICO’ question topics into the ‘dictionary’ and find the terms used to index and categorize this topic in the database. I then can search using these specific topics, rather than general keywords. This makes my search more efficient and effective! Remember, the terms used to describe topics are different in each database.

We will review this important step of how to identify index-specific terms using PsychInfo and PubMed. Be sure you become familiar with the ways that other databases index their included research.

Using scholarly indexes effectively: Index specific search strategies (2 of 3)
Psych Info

1) First go to the Thesaurus by clicking on “Thesaurus” in the upper left corner.

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2) Enter your topic term into the “Thesaurus” search box- be sure you enter in the lower line, not the top “database search” line. Indicate if you would like PsychInfo Thesaurus to find the subject headers that begin with this term, contain this term, or are relevant to this term. Practice by entering the term “autism” and selecting “term contains”.

3) The PsychInfo Thesaurus tells us that the subject “Autism” is used in this index. However, there is another subject term “Pervasive Developmental Disorder”. What is the difference? Which PsychInfo subject term is most closely related to our clinical topic of ‘autism’? To check, click on each term. Notice that the Thesaurus also provides suggestions for the most appropriate subject header for potentially related topics, such as “autistic children” and “Autism Spectrum Disorders”.

4) When we click on these headers, the Thesaurus tells us that “Autism” means: “A pervasive developmental disorder diagnosed in early childhood that is characterized by an inability to develop social relationships, impaired language and communication skills, abnormal responses to stimuli, and repetitive patterns of behavior.” Conversely, “Pervasive Developmental disorder” is a “broader” term that means: “Broad term for disorders, usually first diagnosed in children prior to age 4, characterized by severe and profound impairment in social interaction, communication, and the presence of stereotyped behaviors, interests, and activities. Compare DEVELOPMENTAL DISABILITIES.” We also see that “Asperger syndrome” and “Autism” are “narrower terms”. We can imagine this like a sort of outline or tree:

Mental Disorders
  Pervasive Developmental Disorders
    Autism
Asperger Syndrome
Rett Syndrome

Understanding the relationship between these topic “subjects” can help us search more efficiently and effectively. You may decide that you want to search just using the subject “Asperger Syndrome”, or that you want your search to contain all these topics under the subject ‘Pervasive Developmental Disorder”. To do the later, you will want to select “explode” while searching. When you **explode** a term, you create a search query that “explodes” the subject heading. The headings are exploded to retrieve all references indexed to that term as well as all references indexed to any narrower subject terms. (For more information, use the “help” button in PsychInfo).

5) Now it’s time to search using these carefully identifying subject terms. To do this, go back to the main search page. Enter the term *exactly* into the search box, and then from the drop down menu, select “DE Subjects (exact)”. Now you can be sure that you are going to identify every research study that the staff working at PsychInfo have determined includes research subjects diagnosed with PDD, Autism, Aspergers, or Retts.

As you can read in the ‘advanced’ search option and limits, there are many other ways to enhance the effectiveness and efficiency of your search. This takes time and practice- don’t worry that you don’t know everything right away! You will find that your practice area guides you to use 1-2 indexes most frequently- as you uses these indexes more and more, you will learn more of the little ‘tricks’ to maximize your search!

**Using scholarly indexes effectively: Index specific search strategies (3 of 3)**

**PubMed**

PubMed’s special way of organizing topics is called “MeSH terms”. There are several nice video tutorials that can help explain how to identify and search using the MeSH terms. Visit the link: [http://www.ncbi.nlm.nih.gov/mesh](http://www.ncbi.nlm.nih.gov/mesh) and view the “Searching with the MeSH Database” video. You should at least view this video- but the other video tutorials on this page are excellent.

**More help with searching**

The Library has a series of on-line tutorials to help you develop efficient skills for searching databases. Unless you have had extensive instruction in searching before starting this program, we **STRONGLY RECOMMEND** that you complete these tutorials. Time spent ahead of time familiarizing yourself with and practicing the search process will save you much frustration and many hours of work later on when you are asked to locate literature as part of a course assignment.

To locate the tutorials:
- Go to the main library site and move your cursor over SERVICES and click on “Classes & Tutorials”.

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Searching journals

After performing a search, you will have a list of results. Now you will need to check whether the BU library provides electronic access to full text articles in those journals.

IMPORTANT NOTE: Finding an article referenced in a database such as Medline or CINAHL does not guarantee that you will be able to obtain a copy through the BU library system. Availability of the article will depend on whether the BU library has an electronic subscription to that journal or to a source (host) such as EBSCO that provides access to the journal. In order to determine whether that is the case, you must follow the steps below.

1. Go to http://www.bu.edu; click on Research, then Libraries. You will now be in Boston University's Library website (http://www.bu.edu/library/).
2. Select the “E-Journals ” tab on the home page.
3. Type in the title of the journal you are searching for into the small window, or click Alphabetical List to view a list of full text electronic journals. In the Alphabetical List screen, you can locate your journal by selecting the first letter of the journal name.
4. Click the journal name. This should bring you to another page by going directly to the journal’s home page, or via another service such as EBSCO or ScienceDirect.
5. Search for the article based on its name, page number, volume, and year.
6. If you find an article and it is not available in full text, your next option is to see if you can locate a hard copy of the article at the actual library site (i.e. you must go to Mugar).

Library support

For help with any of the library features or for assistance searching library resources, send an email or chat live through the web page at http://www.bu.edu/library/ask/index.html, or call the reference desk at (617) 353-2700.


Implementing a Search: Practice

You should always have a specific question in mind when you are conducting a search of the literature. This question will help you identify the appropriate sources to search and to narrow your search so that you retrieve only the most relevant references. For this practice session, we will be guided by the following clinical scenario and question:

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Clinical Scenario
You have recently moved to a new part of the country and have taken a position in a facility that provides rehabilitation services to clients with a wide variety of conditions. In your previous position you had only limited experience treating people with TBI, however this population is likely to be about 1/3 of your caseload in your new setting. You need to develop more expertise in current approaches in this area, and decide to begin with cognitive rehabilitation because you have heard many colleagues talking about this approach.

After clarifying your clinical scenario and PICO, you will need to begin to identify the most important ‘topics’ within that scenario. This will help you identify your search terms. When searching, we want to have a search term for the population (either a specific diagnosis or age group; in the above example, traumatic brain injury) as well as the issue we are interested in (for instance, in the above example, cognitive rehabilitation).

Step One
Go to the Databases page and click P (for PubMed). In general, I recommend using PubMed for several reasons:
- It is free access, meaning that you can use it from any computer that has Internet access (i.e., you do not have to go through the BU system).
- It provides several user-friendly features, such as “related articles” and a feature that can convert ‘free text’ (similar to how you may search in google) to PubMed search terms (like MeSH terms).

Step Two
For our first effort, we will use text words or key words. These are words that we believe are highly likely to be contained in the article title or abstract of literature we are interested in. Type “cognitive rehabilitation AND traumatic brain injury”, then click Go.

How many citations did this yield? Write down your search terms and the number of citations. Scan the titles briefly. Note that this approach to our search yielded many articles that are not relevant to our specific focus on effectiveness. Look at “Recent Activity” in the lower right and you will see a screen that summarizes this search.

Step Three
Clear the search window and type “cognitive rehabilitation AND effectiveness”, then click Go. How many citations did this yield? Write down your search terms and the number of citations. Scan these titles. Note now that this search focused on effectiveness, but the papers are not restricted to studies of persons with TBI. Look at recent activity again, and you will see that this search has been added to the list.

Step Four
Click on “advanced search”. You will see a ‘search history’ and your previous two searches listed as #1 and #2. In the “search” box, enter “#1 AND #2” to combine these two searches.

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Step Five
Locate the following article in the list of retrieved references:

Why select this article first? Here are several reasons:
- Because I am just starting my investigation of this topic, a review article can be especially valuable because it will summarize the results of multiple studies.
- The term evidence-based in the title suggests that the authors are applying the appraisal criteria developed for evidence-based practice, which gives me some confidence in the quality of the article.

One limitation of this article is that it was published in 2000. This means that it is unlikely that it reviewed evidence published after 1998 or 1999 (it usually takes around six months to a year for an accepted article to appear in print). We wonder if there is anything more recent we should review, however, that is the most recent review on the current list. Should we assume that we have done a thorough search? NO!

Let's keep exploring.
First, however, we want to save the citation for this article so we don't lose it.
1. Check the small box to the left of the citation
2. Click Clipboard in the Send to window (above the citation list).

Step Six
Identify the MeSH terms this article was indexed under.
1. Click the abstract for the review article and then locate the Display window in the PubMed toolbar.
2. Click this option to get a drop-down menu.
3. Select Citation.
4. Scroll down and you will find a list with the header MeSH terms.

You will note that these terms are active links. For example, if you click brain injuries/rehabilitation it will retrieve a new list of citations. The new list is based on the MeSH headings, so it may retrieve articles not found under the earlier search using keywords.

Helpful Resource
AOTA has compiled a helpful dictionary to match MeSH terms with the corresponding terms commonly used by occupational therapists. You may find this a quicker way to identify potential MeSH terms for your area of interest. Save a copy of this resource where you can access it easily.

Note: in the online version, a pdf of the AOTA terms is posted here.

Step Seven
PubMed indexes materials from an extensive list of journals, however it would be a mistake to think that all important literature can be found by searching this index alone. To illustrate, do the following:

1. Go back to the list of Databases at Mugar Library, and this time click P, then PsychInfo.
2. Do a search with the same terms in PsychInfo. A few hints:
   - Capitalize your terms
   - If you get a message saying no records matched, try using one term at a time (E.g., “Cognitive Rehabilitation”).
   - Explore using the Limits feature to restrict the search, but don't overdo it or you may not retrieve anything.

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3. Note that there are sources included in PsychInfo that you did not find in PubMed, for example, Dissertation Abstracts and book chapters.

4. Confirm the difference between the two databases by doing an author search as follows:
   - Search "Cicerone" in the Author field AND "Cognitive Rehabilitation". Did this search retrieve the two review articles located with PubMed?

We could do a similar exploration of the other major databases such as CINAHL and ERIC. However, I hope you now realize that these sources are not redundant. If you are going to do a truly thorough search, you will need to search multiple databases. However, let's move on to see if we can actually get access to one of the articles we located in our search.

**Step Eight**

From the Library main page click the "e-journal locator" link. In the search Window that appears on the next page type "Archives of Physical Medicine & Rehabilitation". This should give you a link to the journal, which will be retrieved through Science Direct.

1. Locate the issue of the journal that has the most recent of the two review articles and retrieve a full-text copy (i.e. Download a .pdf version of the paper. You will need Adobe Acrobat to do so).
2. Save a copy of this paper. You will need it later in the course.

**What if BU Libraries don't have a Journal I Want?**

The BU libraries have extensive holdings; however they do not have everything. Reasons why the library may not have an electronic subscription to a particular journal vary and may include the following:

- The Journal is not yet available in electronic format.
- The Journal has a very small or specialized circulation.
- The library must allocate its resources to subscriptions that are used by the largest audience.

However, we strongly encourage you to begin to explore the other resources that may be available in your community. These include:

- Your local public library, which can often obtain single copies of articles for you.
- Nearby college or university libraries, especially those that have health-proessions programs.
- Your workplace, especially if it is part of a large health-care system. Some facilities have their own librarians who may be able to help you.

**Helpful Hint**

Students report that they sometimes have success retrieving individual articles using Google Scholar. You may want to explore this resource as well.

**What Other Resources are Available to Support EBP?**

There is a wealth of other electronic resources now available to millions of people. You will rely on many of these resources to support your evidence-based practice. For example, professional organizations are using the Internet to provide practitioners with summaries of evidence relevant to their discipline. For example, AOTA provides evidence briefs that summarize evidence in a particular topic area. In addition, many research groups post information about evidence generated by their researchers: for example, the MOHO Clearinghouse (www.moho.uic.edu), the Beach Center on Disability (http://www.beachcenter.org/default.aspx?JScript=1) and the CanChild Centre for Childhood Disability Research (http://www.canchild.ca/en/). Many of these sites also have links to other helpful web resources and other information about evidence-based practice. The links provided at these sites (or identified by doing a simple Google search for "evidence based practice") introduce you to extensive additional resources. You should plan some time to investigate these, so that you are familiar with what they have to offer, and which sites seem especially useful for your area of practice.

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Organizing Your Resources

Before you go exploring on the Internet, you need to develop your own resource file of materials to support you as an evidence-based practitioner. By creating your own resource file, you can facilitate rapid access to information (websites; tutorials; evidence reports) that addresses your specific interests. Given below is one example of how you might begin doing this with web-based materials.

- Prepare a summary form to keep track of what you find. Use the summary form consistently as you compile a personal directory. Keep the directory in an electronic file so that you can cut and paste information easily for other purposes. Below is an example of one possible format. This step may seem a little compulsive, however if you skip it, it is just too easy to lose track of where you found various materials.
- Think about categorizing your resources by type: separate resources for doing EBP (e.g., guides to interpreting statistics) from resources to access the literature.
- Start your explorations with some of the sites given in your text or in the list below. Each of these, in turn, will give you links to other sites.

Here is a short list of websites to get you started. If you want to find a whole lot more, just do a Google search for “evidence-based practice” - make sure you've set aside some time to explore before you do so, however.

RefWorks

Another way to get organized is to develop a RefWorks account through BU. RefWorks gives you the ability to import references from library databases that you access during your searches, organize them, and then use them when writing up reports (as you will be doing later on this summer). Please visit www.bu.edu, click on libraries, and the click on Refworks in the ‘Quick Links’ section of the page. You will be automatically directed to the main page, where you can create an account and access more information about this new and exciting resource available to BU students.

Learning and Using APA Style

Earlier in this lesson you were given an example of the APA (American Psychological Association) format for citations. APA format refers to a set of guidelines for written professional publications. Turn to page 198-199 of the 6th edition of the APA manual - this provides important details about how to list authors and journals in references. A number of professional organizations including the AOTA follow these guidelines for their publications. The box below gives an overview of some of the features of a research article that are covered by the guidelines.

Take some time now to skim through your copy of the Concise Rules of APA Style. Once you are oriented to its contents, complete the self-quiz below to practice identifying common errors. As a final check, complete the APA Quiz.

Summary

In this lesson you added several very important tools to your EBP toolbox including a beginning knowledge of various sources of research information, the ability to conduct a search in a topic area of interest, and familiarity with APA style guidelines for references. You will continue to refine these skills with practice so don't worry if they don't feel very solid at the moment. As you continue to explore using your search skills, you will be amazed at how much information is now available to you over the Internet. Over time, you will start to compile a directory of sources that are most relevant to your own practice, so that you can quickly turn to consult one or more of them when the need arises in practice. Be sure to share the best sites you find with your colleagues!

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