# How to Apply Basic Principles of Evidence-Based Practice

May 2011

# How to Do a Basic Search for Evidence

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## Introduction

This part of the tool kit demonstrates how to do a basic search for clinical evidence. In particular, the steps of conducting a search are illustrated with screen shots and brief explanations. The purpose of this tool kit is to help pharmacists to find information to support an evidence-based practice.

## Why is searching for evidence important?

As pharmacists, we need to find and interpret clinical evidence every day in the course of providing patient care. For example, we may be asked to determine whether a new medication is indicated for a patient in our clinical area. At a more general level, we may have to decide whether the new medication should be added to our hospital's formulary. Such decisions should be based on available evidence.

Broadly speaking, the medical literature can be divided into primary, secondary, and tertiary sources of information. The primary literature reports the results of original research. The secondary literature, which includes review articles and books, summarizes and interprets (i.e., "digests") these research findings. The secondary literature is a good starting point for background information and progress to date. The tertiary literature builds upon the primary and secondary literature and includes handbooks, electronic drug databases, and textbooks.

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## Where do I start?

Open OVID SP; select MedLine → Enter search terms → Refine search with mapping tools → Review search results → Impose limits on search → Review new list
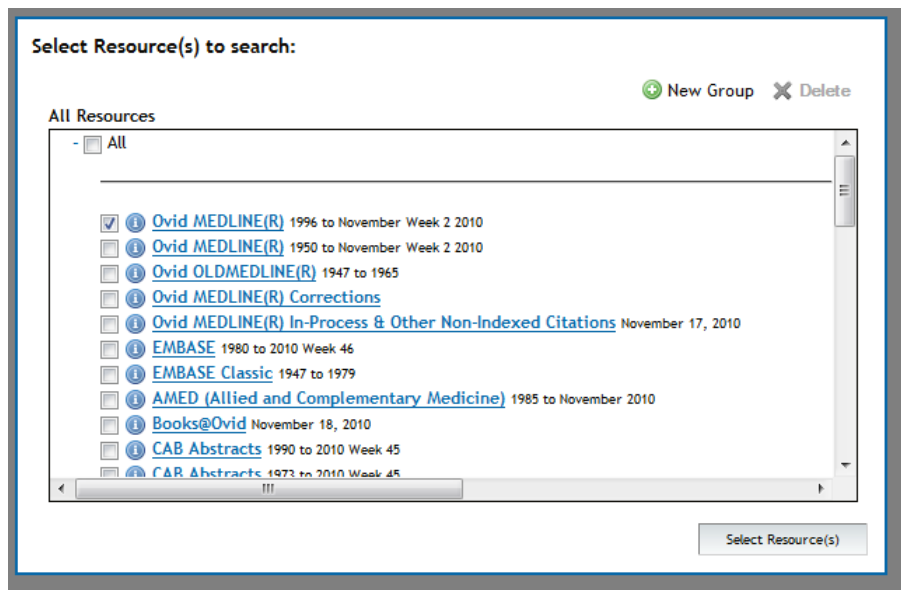
MEDLINE®, a bibliographic database of citations and abstracts, is a good starting place for searching the literature. At many institutions, this database is available through OvidSP (a database that aggregates a variety of resources), although access to specific individual journals will vary by institution. To assist users in their searches, all citations in MEDLINE® are assigned a set of Medical Subject Headings (MeSH®) from the controlled vocabulary of the US National Library of Medicine (NLM).[1] The user enters single search terms and can combine multiple searches with Boolean logic operators such as "AND", "OR", and "NOT". The search may be narrowed by imposing various limits. For example, a search may be fine-tuned by publication type (e.g. guideline, review article, randomized controlled trial, or letter), by publication date (e.g., the past 10 years), or by language (e.g., English only). MEDLINE® is the largest component of PubMed®, an NLM resource that provides free access to MEDLINE® and other search tools on the Internet. Some consider PubMed® easy to use because the user simply enters the search topic to obtain a listing of abstracts that contains the term. A PubMed® search may be made specific to MEDLINE® by limiting the retrieval to MEDLINE® citations.[1] This is done by selecting "MEDLINE®" from the "Subsets" menu on the "Limits" screen.[1]

Here is a scenario in which you, as a clinical pharmacist, might need to search for evidence. A physician on your adult general medicine unit wants to prescribe a **probiotic to prevent antibiotic-associated diarrhea**. He thinks there is new information available and requests your opinion on the issue. What would you do?

To find the most recent publication addressing the physician's query, we start with MEDLINE®. Note that the screen shots below represent examples only; the specific search strategies that you use in your own practice will change according to the clinical question, and the search results will vary according to the search terms used and the availability of new publications in the databases. These screen shots are based on direct access to MEDLINE® through OvidSP (not through PubMed®).

**Open OVID SP; select MedLine**

**Step 1**: Go to OvidSP, and select MEDLINE® (other databases, such as EMBASE and AMED, may be selected at the same time):

**Select Resource(s) to search:**

⊕ New Group   ✕ Delete

**All Resources**

- ☐ All

- ☑ ⓘ Ovid MEDLINE(R) 1996 to November Week 2 2010
- ☐ ⓘ Ovid MEDLINE(R) 1950 to November Week 2 2010
- ☐ ⓘ Ovid OLDMEDLINE(R) 1947 to 1965
- ☐ ⓘ Ovid MEDLINE(R) Corrections
- ☐ ⓘ Ovid MEDLINE(R) In-Process & Other Non-Indexed Citations November 17, 2010
- ☐ ⓘ EMBASE 1980 to 2010 Week 46
- ☐ ⓘ EMBASE Classic 1947 to 1979
- ☐ ⓘ AMED (Allied and Complementary Medicine) 1985 to November 2010
- ☐ ⓘ Books@Ovid November 18, 2010
- ☐ ⓘ CAB Abstracts 1990 to 2010 Week 45
- ☐ ⓘ CAB Abstracts 1973 to 2010 Week 45

Select Resource(s)

**Enter search terms**

**Step 2**: Depending on your familiarity with the subject matter, you may search by author names, title of article, journal name, or MeSH® terms. This example uses the MeSH® term "antibiotic-associated diarrhea". Click "search".

| Search | Journals | Books | My Workspace |

▼ Search History (0 searches) *(Click to close)*    View Saved

| ☐ | # ▲ | Searches | Results | Search Type | Actions |
|---|-----|----------|---------|-------------|---------|
| - | -   | -        | -       | -           | -       |

Remove Selected | Save Selected | Combine selections with: And | Or

Save Search History

Advanced Search | Basic Search | Find Citation | Search Tools | Search Fields | Multi-Field Search

▼Change Ovid Resources
  Ovid Resources: ⓘ **Ovid MEDLINE(R)** 1948 to February week 1 2011

  ⦿ Keyword  ○ Author  ○ Title  ○ Journal

  [antibiotic-associated diarrhea]    Search

  ▼ Limits *(Click to close)*    ☑ Map Term to Subject Heading

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**Refine search with mapping tools**

**Step 3**: The search takes you to the mapping screen, where several features are available to help you refine your search:

- Auto Explode: Select this option to retrieve results based on the selected term and all of its related, specific terms.

- Focus: Select this option to limit your results to articles in which the subject of interest is a major point.

- Scope Note (indicated by the "i" sign on the far right for each of the subheadings): Select this option to obtain more information about the term. The scope note provides the NLM definition of the term, along with the year in which the term was added to the controlled vocabulary, other terms that may be related to this term, and previous indexing terms used for the same concept.

- MeSH® tree: Select this option by clicking on the MeSH® term itself to display a list of broader, narrower, or related terms. If appropriate, select some of these terms to expand your search results.

  If your search does not map (or correspond) to a desirable subject heading, select "antibiotic-associated diarrhea.mp. search as keyword".

  In this example, Diarrhea, Anti-Bacterial Agents, Clostidium difficile, and Probiotics, were selected with the Auto Explode feature, and they are to be combined with the Boolean operator "AND". Click "Continue".

| Search | Journals | Books | My Workspace |

Your term mapped to the following Subject Headings:
Click on a subject heading to view more general and more specific terms within the tree.

> ℹ️ Any term you select will automatically be exploded to include all narrower terms. To select a term without exploding, clear the Explode checkbox for that term.

☐ Include All Subheadings
Combine selections with: [ AND ▾ ]   [ Continue » ]

| Select | Subject Heading | Auto Explode | Focus | Scope |
|--------|-----------------|--------------|-------|-------|
| ☑ | Diarrhea | ☑ | ☐ | ℹ️ |
| ☑ | Anti-Bacterial Agents | ☑ | ☐ | ℹ️ |
| ☐ | Enterocolitis, Pseudomembranous | ☐ | ☐ | ℹ️ |
| ☑ | Clostridium difficile | ☑ | ☐ | ℹ️ |
| ☐ | Clostridium | ☐ | ☐ | ℹ️ |
| ☐ | Feces | ☐ | ☐ | ℹ️ |
| ☐ | Enterotoxins | ☐ | ☐ | ℹ️ |
| ☑ | Probiotics | ☑ | ☐ | ℹ️ |
| ☐ | Clostridium Infections | ☐ | ☐ | ℹ️ |
| ☐ | Clindamycin | ☐ | ☐ | ℹ️ |
| ☐ | antibiotic-associated diarrhea.mp. *search as Keyword* | | | |

> ❓ Hints:
> - Click on a Subject Heading to view its tree - related terms that are more general and more specific.
> - Select the Explode box if you wish to retrieve results using the selected term and all of its more specific terms.
> - Select the Focus box if you wish to limit your search to those documents in which your subject heading is considered the major point of the article.
> - If your search did not map to a desirable subject heading, select the box Search as Keyword.
> - If you select more than one term, you can combine them using a boolean operator (AND or OR).
> - If you wish to see the scope note for any term or heading, click on the information ℹ️ icon, when available.

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**Step 4:** The search generates 35 "hits" - continued on next page

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▾ **Search History** (1 search) *(Click to close)*                                        **View Saved**

| ☐ | # ▲ | Searches | Results | Search Type | Actions |
|---|---|---|---|---|---|
| ☐ | 1 | exp Anti-Bacterial Agents/ and exp Diarrhea/ and exp Clostridium difficile/ and exp Probiotics/ | 35 | Advanced | ⤳ Display<br>More » |

Remove Selected | Save Selected | Combine selections with: And | Or          📶 RSS

Save Search History

---

Advanced Search | Basic Search | Find Citation | Search Tools | Search Fields | Multi-Field Search

▾Change Ovid Resources
    Ovid Resources: ⓘ Ovid MEDLINE(R) 1948 to February week 1 2011

        ◉Keyword  ◯Author  ◯Title  ◯Journal

        [                                              🔍]  Search

        ▾ **Limits** *(Click to close)*                    ☑Map Term to Subject Heading

        ☐English Language                    ☐Humans

        Publication Year [ – ▾]-[ – ▾]

        Age Groups
        ┌─────────────────────────────────────┐
        │ –                                    │
        │ All Infant (birth to 23 months)      │
        │ All Child (0 to 18 years)            │
        │ All Adult (19 plus years)            │
        │ Newborn Infant (birth to 1 month)    │
        └─────────────────────────────────────┘

        Publication Types
        ┌─────────────────────────────────────┐
        │ –                                    │
        │ Addresses                            │
        │ Autobiography                        │
        │ Bibliography                         │
        │ Biography                            │
        └─────────────────────────────────────┘

        Clinical Queries
        ┌─────────────────────────────────────┐
        │ –                                    │
        │ Therapy (sensitivity)                │
        │ Therapy (specificity)                │
        │ Therapy (optimized)                  │
        │ Diagnosis (sensitivity)              │
        └─────────────────────────────────────┘

        Additional Limits | Edit Limits

**Impose limits on search**

**Step 5:** Because of time constraints, you may want to reduce the number of publications by imposing limits. In the example presented here, "full text" is used to eliminate articles to which your institution does not have access. You may also limit the selection according to the date of publication, by clicking "additional limit" at the bottom of the screen and then selecting the appropriate timeframe (e.g., past 10 years). When you are satisfied with the limits imposed, click "limit a search".

Limit A Search

| Select | # | Searches | Results | Search Type |
|---|---|---|---|---|
| ⊙ | 1 | exp Anti-Bacterial Agents/ and exp Diarrhea/ and exp Clostridium difficile/ and exp Probiotics/ | 35 | Advanced |

**Limits**

- ☐ Abstracts
- ☐ Animals
- ☑ Full Text
- ☐ Core Clinical Journals (AIM)

- ☐ English Language
- ☐ Female
- ☐ Review Articles
- ☐ Latest Update

- ☐ Male
- ☐ Ovid Full Text Available
- ☐ Humans

Publication Year [ 2000 ⬍ ] - [ Current ⬍ ]

To select or remove multiple items from a list below, hold down the Shift, Ctrl, or "Apple" key while selecting.

ⓘ Age Groups

```
–
All Infant (birth to 23 months)
All Child (0 to 18 years)
All Adult (19 plus years)
Newborn Infant (birth to 1 month)
Infant (1 to 23 months)
```

ⓘ Journal Subsets

```
–
AIDS/HIV Journals
Core Clinical Journals (AIM)
Bioethics Journals
Biotechnology Journals
Communication Disorders Journals
```

ⓘ Animal Types

```
–
Cats
Cattle
Chick Embryo
Dogs
Goats
```

ⓘ Languages

```
–
Afrikaans
Albanian
Arabic
Armenian
Azerbaijani
```

ⓘ CheckTags

```
–
Animals
Female
Humans
Male
```

ⓘ Publication Types

```
–
Addresses
Autobiography
Bibliography
Biography
Case Reports
```

ⓘ Clinical Queries

```
–
Therapy (sensitivity)
Therapy (specificity)
Therapy (optimized)
Diagnosis (sensitivity)
Diagnosis (specificity)
```

ⓘ Status

```
–
In Data Review
In Process
MEDLINE
OLDMEDLINE
```

ⓘ Subject Subsets

```
–
AIDS
Bioethics
Cancer
```

ⓘ Star Ranking

```
–
***** Five Stars (0)
**** Four Stars (0)
*** Three Stars (0)
```

Review new list

**Step 6:** As a result of the limits imposed, the list is reduced to 15 articles. If you wish to read the abstracts of these articles, click "view abstract" in each entry. Reading the abstract will help you to determine which articles will be most helpful in answering the physician's question before you retrieve and read the complete articles.

| | # ▲ | Searches | Results | Search Type | Actions |
|---|---|---|---|---|---|
| ☐ | 1 | exp Anti-Bacterial Agents/ and exp Diarrhea/ and exp Clostridium difficile/ and exp Probiotics/ | 35 | Advanced | ⊞ Display  More » |
| ☐ | 2 | limit 1 to (full text and yr="2000 -Current") | 15 | **Advanced** | ⊞ Display  More » |

Remove Selected   Save Selected   | Combine selections with: And   Or      RSS
Save Search History

**Next step:** Please see section 3.1.A2, "How to Critically Appraise Evidence".

## Glossary

| **Primary sources of information** | Sources that provide first-hand direct evidence (or research) about a particular topic, without interpretation or evaluation.[2] |
|---|---|
| **Secondary sources of information** | Sources that provide an interpretation or evaluation of information obtained from primary sources.[2] |
| **Tertiary sources of information** | Sources that provide compilations, analyses, or digests of secondary sources.[2] |

## Literature Cited

1.  US National Library of Medicine, National Institutes of Health [internet]. Fact sheet: PubMed®: MEDLINE® retrieval on the World Wide Web [updated 2010 Mar 1; cited 2010 Nov 4]. Available from: http://www.nlm.nih.gov/pubs/factsheets/pubmed.html

2.  Identifying primary, secondary, and tertiary sources. Wilmington (NC): University of North Carolina Wilmington. William Madison Randall Library; 2005 [cited 2009 Mar 16]. Available from: http://library.uncw.edu/web/research/topic/identifysources.html

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