

Medical Research *for the Legal World*

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Professional Perspectives—Tools and Techniques of the Trade. The Professional Development Committee encourages members to continue to explore topics after presentations at the local, regional, and national levels. We welcome your comments and article suggestions. Please contact Carol Avery Nicholson at 919/962-1199 or carol_nicholson@unc.edu.

The Internet has brought about an explosion of free information resources for health professionals, librarians, and the general public. Law librarians are called upon to supply medical information to attorneys with client-related questions about medical issues. Major reference tools that used to be primarily the domain of medical libraries are now freely available on the Web. Even the National Library of Medicine's (NLM) MEDLINE, initially accessible to non-medical personnel only through commercial vendors, is free through a new Web interface. Librarians and lawyers are able to search these important resources from their desktops using standard Web browsers. While it is not possible to discuss all the health resources available on the Internet, this article will try to cover the major resources and refer researchers to major compilations of Web sites and health information.

Sources for General Information about Disease and Treatment

There is an abundance of general medical information available on the Internet to begin your research. MEDLINEplus is part of the NLM's program to provide consumer information. One good source of background information is the *Medical Encyclopedia* available on MEDLINEplus (<http://medlineplus.adam.com/>), which provides information on diseases, injury, nutrition, poisons, surgery, tests, and symptoms. MEDLINEplus also has links to consumer health information, dictionaries, lists of hospitals and physicians, and information about clinical trials.

The *Merck Manual of Diagnosis and Therapy* is a book commonly used by health professionals for quick basic information. The *Manual* discusses diagnosis and treatment of a wide range of disease states. Merck provides this manual and a less complex home edition available for free on its Web site (<http://www.merck.com/pubs/>).

The most familiar way to search the Internet is the use of a search engine. In some cases, the search engines are successful, but in others they deliver a long list of irrelevant hits. A better method may be to use one of the large number of health-oriented Web sites that have reviewed and indexed other sites. Using objective review criteria to ensure quality, Medical Matrix and HealthWeb list sites for the health professional and consumer.

Healthfinder is a government-sponsored Web site that taps into health information from government agencies. The search engine at Med Web Plus (<http://www.medplus.com>) uses NLM's Medical Subject Headings (MeSH) to search a catalog of biomedical resources on the Internet. The Rare Diseases site provides access to information that is often difficult to find on uncommon diseases and disorders.

Other authoritative sites have been created by specific institutions (e.g., Mayo Clinic oasis at <http://www.mayohealth.org/index.htm>) and library groups (NOAH at <http://www.noah.cuny.edu/>). These are a good place to begin a broad topic search. Most of these sites are indexed by people rather than by robots and are subject to evaluation by the indexer. A good place to find current lists of these and other directories is the Web pages of medical libraries—for example, the pages at the University of North Carolina (<http://www.uncle.unc.edu/>) and Duke University Medical Center Library (<http://www.mc.duke.edu/mclibrary/respub/refres/>). Another source is OMNI (<http://www.omni.ac.uk/>), a gateway to biomedical Internet resources in the United Kingdom.

WESTLAW (via Dialog), LEXIS-NEXIS, the National Library of Medicine, and several commercial vendors offer versions of MEDLINE. The differences between these sources of MEDLINE are the quality of the search engine, ease of use, number of years covered, availability of full-text links, and the cost of the service.

Finding Current Literature

While general resources are helpful for background information and definitions, the definitive resource for health professionals is journal literature. Law librarians can also take advantage of these resources. The National Library of Medicine's MEDLINE database is the best resource for searching for this type of information. It covers over 4300 journals, about 30 to 40 languages, and goes back to 1966. MEDLINE is updated weekly with approximately 7300 new references. MEDLINE has 10 million bibliographic citations in the fields of medicine, nursing, dentistry, veterinary medicine, health care systems, and preclinical sciences. About 88% of the references are to English language publications, and many of the foreign citations (76%) have English abstracts. The types of articles range from reports of clinical trials, to specific patient case studies, to state-of-the-art reviews of medical topics, and editorials, letters and other types of publications. NLM's controlled vocabulary for indexing, known as MeSH (Medical Subject Headings) provides precise search terms for this complex literature.

NLM has now made this powerful medical database freely available to health professionals and the general public through two Web-based interfaces: PubMed and Internet GratefulMed. A major advantage of going directly to NLM's version of MEDLINE is that it is the most up-to-date version available. Another database of NLM, PreMEDLINE, contains brief indexing records for current articles, many within the week of publication. Though the citations in PreMEDLINE have not been fully indexed or been through NLM's quality control procedures, they provide the best and fastest access to the current medical literature and are one to two weeks more up-to-date than any commercial version.

NLM's PubMed (<http://www.ncbi.nlm.nih.gov/PubMed/>) provides a direct user interface to MEDLINE as well as links

A Desktop Learning Opportunity

to the molecular biology databases maintained by the National Center for Biotechnology Information (NCBI). In addition, PubMed provides hot links to publishers' sites for about 400 full-text journals, where they can be accessed for a fee. Most of the publishers require a current subscription or for the user to establish an account prior to the first request. The strength of PubMed is that when you input a search term, the system tries to find an equivalent MeSH for a more precise search. If a match is not possible, then a standard text-word search is performed. You can view "details" to see details of the actual search. The MeSH browser lets you look for the best-controlled vocabulary term if you are having difficulty finding citations. In addition, you may limit your search to general fields and by choice of language, gender, age, animal or human research, type of publication, and date.

When you find a citation, the searching does not have to stop there. NLM has created a special algorithm for comparing keywords and MeSH terms between articles and finding citations that are related to the one that is being viewed. A click on "related articles" brings up these other citations. Additional material in books may also be available and is being integrated into the system. The books link creates a view of the abstract with hotlinks to background information from the books converted by NCBI for Web use. The Linkout feature leads to the full-text version or the publisher's URL. Some medical libraries are also providing links to their electronic subscriptions, but most require user authorization to use the e-journal.

Internet GratefulMed (<http://igm.nlm.nih.gov/>) provides another approach to the PubMed search engine. IGM provides a simple fill-in-the-blank approach to searching. It allows you to quickly check off limits to your search and then formulates your search for PubMed. The search results come back in IGM format and contain the full citation, abstract, and MeSH terms. One helpful tip is to review the MeSH terms and see if there are other subjects that might be useful in your search. Also, when initially formulating your search, a tab at the bottom of the screen quickly takes you to

a MeSH listing that gives the possible subject heading for the term you put in the search box along with a definition (click on the hyperlink). In addition to simpler access to MeSH, IGM provides access to many other NLM databases such as AIDSLINE, BIOETHICSLINE, HealthSTAR (health planning and policy), DIRLINE (directory of organizations) and TOXLINE. NLM plans to add these other databases to PubMed over the next few years and eventually phase out IGM.

These interfaces make the task of searching MEDLINE seem easy. However, the database is very complex and there are lots of tricks to performing a professional-level or comprehensive search. The online help manuals prepared by NLM are a good starting point, but many health sciences libraries have also created FAQs and tutorials to help students and health professionals effectively search the medical literature. A visit to the Web site of a medical library may yield some wonderful search advice. In fact, there is a new tutorial for PubMed from the University of Florida Health Sciences Center Libraries (<http://www.library.health.ufl.edu/PubMed/PubMed2/index.html>).

The National Library of Medicine's collection of books, audiovisuals, reports, and journals can be searched through LOCATORplus (<http://www.nlm.nih.gov/locatorplus/locatorplus.html>). A simple search screen lets you quickly see if the materials can be found in the NLM collection and verifies citations to monographs and reports. This replaces NLM's older CATLINE, AVLINE, and SERLINE databases.

How to Find Journal Articles

Materials may be requested through traditional interlibrary loan services from local and regional medical libraries, and through NLM as a last resort. The obvious source of medical journal articles, going to a local medical library and copying the materials, is the quickest and least expensive method. Because medical libraries frequently deal with urgent patient care requests, they generally provide rapid turn-around for requests. However, because of limited staff, some libraries limit their services to health professionals.

PubMed and Internet GratefulMed both permit users to order full-text copies of articles from a local or regional medical library through their Loansome Doc service. The fees and delivery methods vary and Internet delivery is rare. In order to use Loansome Doc, it is necessary to become a registered user by establishing an agreement with a medical library that uses DOCLINE (NLM's automated interlibrary loan request and referral system). Most of these libraries will mail the articles to you or send them by fax (at a premium). Some libraries will only provide these services to health professionals and will not open accounts or do inter-library-loan for a law library.

Academic librarians should remember that many of these journals are available in full-text databases commonly available at universities. The most common medical journals are also available from familiar vendors such as LEXIS and WESTLAW. But remember that for most users, there is no advantage to searching MEDLINE in LEXIS and WESTLAW instead of using PubMed or Grateful Med.

In the academic environment, there may be a commercial vendor providing full-text services linked to MEDLINE. This is a growing area as schools increase full-text subscriptions in response to the demands of their patrons. Some articles are also available through full-text links in the NLM databases to the publisher or vendor sites. While some publications are free, usually a fee or prior subscription is required to see the full text articles.

Practice Guidelines and Standards

Clinical practice guidelines are statements about the best practices in treating or diagnosing diseases and disorders. Created by government agencies and medical associations, these standards define clinical care. There is a National Guideline Clearinghouse (NGC) at <http://www.guideline.gov>. The practice guidelines found at this site are the product of the movement towards Evidence-Based Medicine (EBM). The NGC Web page provides a basic description of EBM, but a more detailed explanation of EBM is available in the

continued on page 17

EBM tutorial (<http://www.hsl.unc.edu/EBM/index.htm>) developed by the Medical Center Library at Duke University and the Health Sciences Library at the University of North Carolina at Chapel Hill. The Center for Disease Control (CDC) (<http://wonder.cdc.gov/DataSets.shtml>) provides treatment and prevention guidelines in several areas in addition to valuable health statistics. There is also a page called ClinicalTrials.gov from the U.S. Institute of Health (<http://clinicaltrials.gov>) that provides current information about clinical research studies. Remember that practice guidelines do not exist for all conditions and diseases.

Information about People

Although there is a national data bank of all medical malpractice actions against doctors, called the National Practitioner Data Bank, the data are available only to hospitals, health plans, licensing boards, and credentialing bodies. Legislation in Congress to make this information public has been unsuccessful to date. However, there is limited information of this type available from the State Medical Boards (<http://www.docboard.org/index.htm>). The exact amount of information available varies from state to state. Take

a look at the information available in Massachusetts (http://www.docboard.org/ma/ma_home.htm), which places on the Internet the demographics of each physician's practice, education and training, awards and publications, disciplinary history, and paid malpractice claims. Important information can be found at a site belonging to the American Board of Medical Specialties (<http://www.certifieddoctor.org>), where it is possible to find a list of a physician's board certifications and hospital and health plan affiliations. The American Medical Association maintains a list of its membership that can be searched (<http://www.ama-assn.org/aps/amahg.htm>). For information about hospitals, there is a list of hospital Web pages (<http://neuro-www.mgh.harvard.edu/hospitalweb.shtml>). If you need to research questions of health fraud or quackery, take a look at <http://www.pitt.edu/~cbw/fraud.html>.

Conclusion

It is important to decide what resources will most efficiently aid your research. The Internet provides a good source of basic background information, current news, and opinion. It must be remembered that it is not all peer-reviewed and that the

quality of material varies from site to site, regardless of the sponsoring institution. The accuracy of information on the Internet should always be verified.

MEDLINE provides access to citations to peer-reviewed articles. The material may nonetheless be unsettled and subject to further scientific study. Unless you have access to a commercial system with full-text, MEDLINE provides only citations; you will still need to obtain and read the articles. When it is necessary to establish the standard treatment, the practice guidelines may serve you best.

In many cases, books will provide the most extensive and well-organized information on a topic, although they may not be absolutely up to date.

When all else fails, call the reference desk at your nearest medical library and ask for help. Medical literature is extensive and can be confusing.

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