



Practical Evidence-Based Internet Resources

If you've got a clinical question and want an immediate answer based on the most current and valid information available, check out these Web sites.

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Although there was plenty of medical information on the Internet five years ago, searching through it to find sound information to support clinical decisions was difficult. Today, several Web-based resources make this work quicker and easier. Five of the most useful are Clinical Evidence, DynaMed, InfoRetriever, PDxMD and UpToDate. This article will familiarize you with these resources and compare their advantages and disadvantages. (For a quick overview, see "A comparison of featured sites" on page 51.)

Not all "evidence" is created equal

The term "evidence-based" has been used to describe a variety of resources. Some provide only reviews developed from systematic literature searches. Others maintain an ongoing surveillance of the literature as it is published. And still others simply encourage their authors to cite references. Each of these approaches has its own advantages and disadvantages, but the variety of approaches does mean that the term evidence-based is not enough in itself to describe what a given resource provides.

"Systematic literature searching" involves starting with clinical questions or topics, conducting thorough literature searches to identify all relevant information on the topic, and selecting relevant and valid information based on explicit criteria. A key advantage to systematic literature searching is that important information regarding the clinical questions selected by the searcher is

unlikely to be missed, while a key disadvantage is that search results may not address topics that were not specifically searched.

"Systematic literature surveillance" involves starting with a defined set of literature (such as leading journals and journal review services that cover clinically relevant and valid research), selecting articles based on explicit criteria, and cataloging or summarizing selected information for subsequent retrieval. A key advantage to systematic literature surveillance is that new information on a broad range of topics can be incorporated into clinical references efficiently and appear shortly after publication, while a key disadvantage is that search results may not provide all research available to address specific clinical questions.

Without such rigorous processes, "well-referenced" resources (i.e., those that provide citations for specific assertions) offer some level of validity compared with the myriad unreferenced resources and resources that provide a list of references but no clear way to link assertions to specific references. A key advantage to this approach is the relative ease with which broad coverage can be achieved. A key disadvantage is the lack of explicit methodology to ensure thorough coverage of the relevant literature and minimize bias.

Evidence-based-medicine purists focus on the validity of information and prefer resources that use explicit systematic methods for identifying and evaluating research articles. Such resources may tend to provide more reliable answers than others, either

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The term "evidence-based" is used to describe a variety of Internet-based clinical resources.



Some resources use "systematic literature searching" to find answers to clinical questions while others use "systematic literature surveillance." Others simply use reference citations or include reference lists.



Systematic literature searching involves starting with clinical questions or topics and conducting literature searches to identify all relevant information on the topic.



Systematic literature surveillance involves starting with a defined set of literature and cataloging or summarizing selected information for subsequent retrieval.

because they include information that would not have been found without systematic searching or surveillance or because they add analyses of published research with less biased conclusions than the original articles. But scientific rigor and volume of information covered are frequently competing factors, even among "evidence-based" resources. Well-referenced resources with broad coverage will often be more likely than rigorous evidence-based resources to provide answers to specific questions.

Ideally, when you have a question, you want an immediate answer containing the most valid and most current existing information written in a format that is easy to follow and covers everything you need to know, nothing more, nothing less. The five resources described in this article come closest to that ideal, each offering its own balance of evidence quality and breadth of coverage. Although the Cochrane Library (www.cochranelibrary.com) contains the most rigorous systematic reviews, it is not listed in this article because all but one of the sites reviewed (UpToDate) integrate Cochrane reviews with other reference information.

Clinical Evidence

Clinical Evidence (www.clinicalevidence.com) identifies important clinical questions and answers them by systematically searching for randomized controlled trials and then summarizing the best evidence. The initial literature search includes the Cochrane Library, MEDLINE and Embase.

Studies selected for inclusion are based on validated criteria, and information is summarized using a simple top-down approach, starting with a listing of interventions shown to be beneficial and followed by interventions shown to be harmful and interventions with uncertain effectiveness. For each intervention, findings and type of evidence are briefly summarized. Additional short paragraphs describe benefits, harms and include any related comments.

A key advantage to Clinical Evidence is that its comprehensive search method makes it unlikely to miss any trials published as of the initial search date. A key disadvantage is that

KEY POINTS

- Evidence-based clinical resources make searching for medical information on the Web much faster and easier than five years ago.
- The term "evidence-based" is used loosely by many Web sites. It can describe anything from information based on rigorous evaluation of scientific research to "We cite articles."
- The most useful Web-based resources should be easy to navigate, provide trustworthy information and have a high likelihood of answering your clinical questions.

information is generally limited to treatment-related questions for selected clinical conditions. Clinical Evidence is published in print (two issues annually) and online and can also be used on a personal digital assistant (PDA). Several subscription packages are available. For example, an individual subscription to the full print edition including online access costs \$135. A free trial subscription and a pay-per-view option are also available.

DynaMed

DynaMed (www.dynamicmedical.com) systematically surveys original research reports, journal review services, systematic review sources (such as Clinical Evidence and the Cochrane Library), drug information sources and guideline collections as well as accompanying letters, editorials or review articles that may also be clinically useful, selecting information based on relevance and validity. Article summaries start with the "bottom line," followed by key methods, clinically relevant results and references linked to PubMed abstracts or to the full-text articles, if they

are available free of charge online. DynaMed is designed for intuitive browsing; users can jump to a topic of interest (e.g., a disease name) and then click on the

appropriate sections (e.g., diagnosis, prognosis or treatment). Individual article summaries are used to update the overall topic summary. DynaMed seeks to involve the health care community by offering users free subscriptions in return for agreeing to serve as peer reviewers and by encouraging users to submit comments online.

The term "evidence-based" is not enough in itself to describe what a given resource provides.

A key advantage of DynaMed is that it is updated daily, typically within days of publication of the original research. A key disadvantage is that although DynaMed's editors write article summaries from peer-reviewed information, not all resultant summaries have been peer reviewed. The annual subscription to DynaMed is \$200 for a practicing health care professional, and access is also provided for health care professionals who assist with peer review. DynaMed is primarily used via the Internet, but a desktop version is available. A free 30-day trial is also offered.

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InfoRetriever

InfoRetriever (www.infopoems.com) is a search engine that allows you to search multiple databases, including InfoPOEMs (concise evidence-based summaries selected for clinical relevance and validity from more

than 100 journals), Cochrane Database abstracts, selected guidelines, clinical decision rules, diagnostic test calculators and the complete "Griffith's 5-Minute Clinical Consult." Information from these resources is cataloged according to clinical topic. To search InfoRetriever, enter a search term. To refine your search, you will be asked to choose from related terms from the catalog.

InfoRetriever organizes multiple hits first by type of information (e.g., diagnosis, therapy or prognosis) and then by source database and levels of evidence.

A key advantage to InfoRetriever is that it includes clinical calculators, allowing interactive look-ups with numerically dependent data, such as calculating risks for specific diseases. A key disadvantage is the need to read multiple hits from different sources to synthesize the available evidence. A one-year sub-

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◀ ▶
The five resources included in this article each offer their own balance of evidence quality and breadth of coverage.

◀ ▶
Clinical Evidence identifies clinical questions, systematically searches for randomized controlled trials and then summarizes the best evidence.

A COMPARISON OF FEATURED SITES

Information included in the table below is based on descriptions from each resource's Web site.

	Clinical Evidence	DynaMed	InfoRetriever	PDxMD	UpToDate
Uses systematic searching ¹	✓			✓	
Uses systematic surveillance ²		✓	✓		
Cites best available evidence where rigorous evidence is lacking ³		✓			✓
Provides guidance when there is no evidence		✓	✓ ⁴	✓	✓
Provides ICD-9 codes		✓	✓	✓	
Includes patient education materials		✓	✓	✓	✓
Number of topics ⁵	211	1,796	1,036 ⁴	450+ ⁶	See note 7 below
Update frequency	Every 6 months in print; monthly online	Daily	Every 4 months; InfoPOEMs added monthly online	Monthly	Every 4 months
Annual price ⁸	\$135 ⁹	\$200 ¹⁰	\$249	\$149 ¹¹	\$495 ¹²
Other formats available	Print; desktop computer; Palm and Pocket PC personal digital assistants (PDAs)	Desktop computer	Desktop computer; PDA (Pocket PC and Palm)	Desktop computer; PDA (Palm and Pocket PC)	Desktop computer; PDA (Pocket PC only)

1. Web site explicitly specifies which resources are searched for every topic summary.
2. Web site explicitly describes a systematic process for reviewing and selecting new research reports.
3. High likelihood of finding research citations when the best available evidence consists of less rigorous studies (e.g., retrospective cohort studies).
4. Includes "Griffith's 5-Minute Clinical Consult," which is not evidence-based, and summaries of more than 250 treatment guidelines.
5. Number of clinical topics, where one clinical topic is typically one disease summary, as of June 2003.
6. Also contains more than 550 differential diagnosis lists.
7. While UpToDate covers more than 6,000 topics, the number is not directly comparable, since one disease is typically listed as many different topics.
8. Annual price for practicing physicians. For pricing for students, residents and groups, see Web site.
9. Provided free to U.S. physicians by the United Health Foundation.
10. 25-percent discount by using "MAFP" group access code (Colorado AFP members use "COAFP" code). Available at no cost to clinicians who participate through peer review, authoring or editing. See Web site for details.
11. \$40/year discount to AAFP members.
12. Price is for first year; renewals are \$395 annually.



DynaMed systematically surveys original research reports, guideline collections and drug information sources, among others, and is updated daily.



InfoRetriever is a search engine that allows you to search multiple databases simultaneously, including InfoPOEMS and Cochrane Database abstracts.



Topics on PDxMD are created using information from Cochrane Reviews, Clinical Evidence and the National Guideline Clearinghouse.



UpToDate contains specialty-focused information and uses "the most eminent physicians" in multiple specialties to write reviews.

scription costs \$249 and includes online access as well as InfoRetriever versions for the desktop computer and either Palm or Pocket PC PDAs. A free 30-day trial is also available.

PDxMD

PDxMD (www.pdxmd.com) is designed for intuitive browsing. Topics are created using information from Cochrane Reviews, Clinical Evidence and the National Guideline Clearinghouse. References are hyperlinked to the home pages of these sites, making it easier to search for the relevant report or article. PDxMD also searches for information in reference books, journals, guidelines and position papers. Content is assessed and updated on a rolling basis, and certain updates (e.g., drug approvals or withdrawals) are posted immediately, if necessary.

A key advantage to PDxMD is its differential diagnosis section, which organizes potential conditions by age and prevalence within a signs-and-symptoms matrix. A key disadvantage is that it does not provide direct references for many assertions, except in the treatment section.

PDxMD may be downloaded to a PDA (Palm and Pocket PC) and a desktop version is also available. An annual subscription to PDxMD costs \$149 for physicians. A free 30-day trial is also available.

UpToDate

UpToDate (www.uptodate.com) is a collection of well-referenced reviews. Beginning as a specialty resource, it has grown considerably by identifying "the most eminent physicians" in multiple specialties. UpToDate is more valid than most textbooks because authors are asked to include evidence where there is any. The UpToDate site does not describe any systematic process for selecting

the research included in the reviews, saying only "its guiding principle is whether the material being reviewed is well supported by data and would be useful in a clinical setting." Updates are made three times a year, and new information goes through a multi-level peer-review process. Although UpToDate presents reviews in a dense text format, using the left-hand navigation frame makes it easy to jump to the text section of interest.

A key advantage to UpToDate is that it contains specialty-focused information and includes multiple specialties. A key disadvantage is the lack of an explicit, systematic method for identifying and analyzing the relevant literature.

An individual subscription to UpToDate costs \$495 for the first year (plus shipping and handling) and includes three CD releases per year as well as online access. Renewal rates are \$395/year. A PDA version (for Pocket PCs only) and a free online demo are also available.

Free resources

Although this article has focused on subscription-based clinical information resources, there are several free resources that may also be of interest to you (see "Some free clinical resources" below).

Take a test drive

Since all of the resources described in this article offer free trial access, why not do some comparison shopping and try them out? Consider some of the clinical questions you've recently encountered in practice and look for answers. You may find not only the answers to your questions, but some useful new resources. **FPM**

Send comments to fpm@afp.org.

SOME FREE CLINICAL RESOURCES

Web site	URL	Description	Comments
Turning Research Into Practice (TRIP) ¹	www.tripdatabase.com	Search engine covering many high-quality sources	Updated monthly
National Guideline Clearinghouse	www.guideline.gov	Summaries of nearly 1,100 guidelines	Updated weekly
Dr. Alper's links	www.myhq.com/public/all/alper	Internet portal designed by the author with several hundred links organized primarily for patient care	Updated when improvements are identified

1. TRIP+, an enhanced version with greater coverage and better features, is available by subscription.