TAKE-HOME POINTS FROM LECTURES BY CLEVELAND CLINIC AND VISITING FACULTY

Finding evidence-based answers to clinical questions online

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ABSTRACT

You can find evidence-based answers to clinical questions quickly by searching online medical databases. The key is to be selective, on the basis of the type of information you need. Online textbooks, consensus guidelines systematic reviews, and MEDLINE are all available.

DURING A TYPICAL week of seeing patients, a physician generates about 60 clinical questions,[1] and wants to find evidence-based answers to at least some of them within the confines of a 15-minute office visit, between patients, or at the end of the day.

Searching the medical literature online can easily take an hour.[2] Traditional searches using MEDLINE, the online database of biomedical periodicals indexed by the National Library of Medicine, are often difficult[3] and fruitless.[4]

Even after finding an article that seems to provide an evidence-based answer to the question at hand, we cannot be sure that we have found all the relevant articles, and that a retrieved article is representative of the literature.

Strategic use of a few powerful online tools often finds what we need quickly. We offer a simple strategy for using these new resources to help put evidence-based medicine into daily practice.

MEDICAL EVIDENCE SEARCH OPTIONS

In general, we have four options when searching for evidence-based medical information online (TABLE 1):

- Online textbooks
- Systematic reviews of medical literature
- Consensus guidelines
- MEDLINE, including new features to make searching easier and more complete (eg, PubMed, Ovid).

The option we select depends on whether the clinical question is general or specific.[5]

FOR GENERAL QUESTIONS: ONLINE TEXTBOOKS

For general questions, online textbooks are best

For example, in the examination of a postmenopausal woman with risk factors for osteoporosis, a physician without recent experience with this condition might ask, "What are the risk factors, pathophysiology, diagnosis, and management of postmenopausal osteoporosis?"

Answering this general question by finding original studies that address each facet would take too much time and even then would not provide a consensus. For general questions, referring to an overview such as an online textbook is the best approach.

Advantages of online vs printed textbooks are that online textbooks are the most recent edition, tend to be updated more frequently, and are more likely to encompass recent medical evidence. Useful online textbooks include:

UpToDate (www.uptodate.com), a practical source of original topic reviews selected by a faculty of recognized experts who review more than 200 journals each month to update the contents. A 12-month individual subscrip-

TABLE 1

Clinical information on the Internet

WEB SITE	URL
Online textbooks	
UpToDate	**www.uptodate.com** (CD-ROM or network availability)
Scientific American Medicine	**www.samed.com**
Harrison's Online	**www.harrisonsonline.com**
eMedicine	**www.emedicine.com**
Consensus guidelines	
National Guideline Clearinghouse	**www.guidelines.gov**
Canadian Medical Association	**www.cma.ca/cpgs**
Agency for Health Care Policy and Research	**www.ahcpr.gov**
Primary Care Clinical Practice Guidelines	**medicine.ucsf.edu/resources/guidelines**
Systematic reviews	
Best Evidence	**www.acponline.org/search/index.html**
Cochrane Database of Systematic Reviews	**www.updateusa.com/cochrane/cochrane-frame.html**
Database of Abstracts of Reviews of Effectiveness (DARE)	**agatha.york.ac.uk/darehp.htm**
MEDLINE	
Ovid	**www.ovid.com**
PubMED	**www.ncbi.nlm.nih.gov/PubMed**
Knowledge Finder	**www.kfinder.com**
SUMSearch	**sumsearch.uthscsa.edu/searchform4.htm**

tion for $495 includes four quarterly CD-ROM diskettes and access to the online version.

Scientific American Medicine (www.samed.com), which is continuously updated by a team of experts from leading North American universities. Online access is free to subscribers of WebMD Practice, which is presently provided at no cost to practicing health care professionals for a 12-month period. Subscribers to either the print or CD-ROM version can also access the online version. Others can subscribe to the online version separately for $159 for 12 months.

Harrison's Online (www.harrisonsonline.com), the online version of the popular textbook. Its advantages over the print version include a powerful cross-referenced searchable index, frequent updates to core content, reporting of recent clinical trials, self-assessment questions, and links to related web sites. Individual subscriptions cost $89 for 12 months.

eMedicine (www.emedicine.com), which provides a number of online textbooks that can be browsed free of charge.

CLINICAL PRACTICE GUIDELINES

Practice guidelines put forth by professional societies, national organizations, or governmental bodies are consensus recommendations based on a systematic review of current medical evidence, and they answer a variety of common clinical questions. However, recommendations published by different groups may differ and tend to change over time as new medical evidence comes to light. Attempting to retrieve, analyze, and compare all relevant guidelines is impractical within the context of practice.

Fortunately, searching for clinical practice guidelines is made easier by another group of web sites. Of particular use is the National Guideline Clearinghouse **(www.guidelines.gov)**, which brings up all guidelines on particular topics, then creates a comparison table that allows the clinician to decide which guideline is the most relevant.

For example, before examining a postmenopausal woman with risk factors for osteoporosis, the physician may want to see the guidelines on the use of bone mineral density measurements in postmenopausal women. Searching for osteoporosis at the National

For clinical guidelines, see www.guidelines.gov

Guidelines Clearinghouse site turns up a link to the 2000 National Institutes of Health consensus statement on osteoporosis prevention, diagnosis, and therapy (**odp.od.nih.gov/consensus/cons/111/111_intro.htm**), which discusses this specific question.

SYSTEMATIC REVIEW DATABASES

Another challenge to the practical application of evidence-based medicine is how to evaluate the quality of a relevant article, once found. A major concern is whether the article is representative of the literature on the topic. Online databases of systematic reviews of the medical literature are very helpful.

Online systematic reviews are the work of experts who evaluate articles or groups of articles on certain clinical topics using stringent criteria. These databases can be searched like MEDLINE. Here are three examples:

Best Evidence (www.acponline.org/search/index.htm) is a compilation from ACP Journal Club (ACP-ASIM) and Evidence-Based Medicine (BMJ Publishing Group).

Cochrane Database of Systematic Reviews (www.updateusa.com/cochrane/cochrane-frame.html) is published by the Cochrane Collaboration, an international network of individuals and institutions committed to preparing, maintaining, and disseminating systematic reviews of the effects of health care. They use stringent criteria for reviewing a collection of published studies on a particular topic and then develop a consensus statement.

Newer MEDLINE features improve its sensitivity and specificity

Database of Abstracts of Reviews of Effectiveness (DARE) (agatha.york.ac.uk/darehp.htm) is produced by the National Health Services Centre for Reviews and Dissemination (NHS CRD) at the University of York, England. This database of structured abstracts presents critical assessments of systematic reviews from a variety of medical journals, covering topics such as diagnosis, prevention, rehabilitation, screening, and treatment. In short, this is a database of critical reviews of published meta-analyses.

Finding an answer to a clinical question by systematic reviews found on one of these three databases not only cuts the searching time, but also ensures the quality of the articles we select. It is a good alternative to searching MEDLINE. Customers of Ovid, a MEDLINE interface, can use its Evidence-Based Medicine Reviews Collection (EBMRC), a searchable database, to access all three of the above databases.

Using systematic reviews is particularly valuable when a MEDLINE search for an answer to a clinical question is likely to bring up a long list of published articles that would be difficult to appraise. For example, in a postmenopausal patient the physician may want to know the role of exercise to prevent the progression of osteopenia. Using the DARE collection in Ovid (by clicking on the link to EBM Reviews—Database of Abstracts of Reviews of Effectiveness) and searching for "osteoporosis and exercise" brings up just seven results, of which four directly address this specific question.

NARROWING THE QUESTION: MEDLINE SEARCHES

If the above strategies do not produce satisfactory results, or if there are only a few trials that have attempted to answer the clinical question, it may be best to try a traditional MEDLINE search. Using the above patient as an example, a physician might ask, "In a postmenopausal woman with osteopenia who is not a candidate for hormone replacement therapy, can nonhormonal medications prevent progression to osteoporosis?"

This is a specific question that requires referring to a relevant original study and an evaluation of its merits. A number of MEDLINE interfaces are available, some of the more advanced ones are as follows:

Knowledge Finder (www.kfinder.com) offers the ability to perform "fuzzy logic" searches. Users can subscribe to an update service: automatic searches are run per specific criteria and are e-mailed to the subscriber.

PubMed (www.ncbi.nlm.nih.gov/PubMed) is a free MEDLINE site available through the National Library of Medicine. It offers a clinical query feature that allows you to search using methodologic filters.

Ovid (gateway.ovid.com) has one of the most intuitive and refined MEDLINE search interfaces and provides access to other databases such as AIDS, Bioethics, CancerLit,

TABLE 2

Search scenario using Ovid*

1. Select the most recent MEDLINE database from 1997 to the present.
2. Input the keyword "osteoporosis."
3. From the options displayed, select the term "postmenopausal osteoporosis."
4. Select the box "Explode," which broadens the search to all topics related to postmenopausal osteoporosis.
5. From the headings displayed, select the "prevention and control" and "therapy" subheadings. This gives 596 results.
6. Search for bisphosphonates.
7. Again select the "Explode" option.
8. Select the "therapeutic use" subheading. This gives 822 results.
9. Combine the two sets. This gives 81 results.
10. Limit the results to randomized control trials by clicking on the "Limit" icon. Then locate the pull-down menu "Publication Types" and select "Randomized Controlled Trial." This gives 17 results, including 3 major trials on the use of alendronate to prevent postmenopausal osteoporosis and 2 trials on the use of residronate in this population.

*Search performed March 6, 2001

CINAHL, and ClinPSYC. Recent addition of the Evidence-based Medicine Reviews Collection greatly increases the value of Ovid for the busy clinician.

Newer MEDLINE features

If we perform a simple MEDLINE search, we may face the problem of inconsistencies in the way MEDLINE indexes articles.[6] But newer MEDLINE features improve the yield (sensitivity) and relevance (specificity) of MEDLINE searches.[7] PubMed for example has a feature called "Clinical Queries,"[8] a specialized search feature for clinicians, which has built-in search filters based on the work of Haynes et al.[7] Four study categories—therapy, diagnosis, etiology, and prognosis—are provided, and users can indicate whether they desire the search to be more sensitive (ie, to include most relevant articles but probably include some less relevant ones) or more specific (ie, to include most relevant articles but probably omit a few). This simplifies the process of searching for clinically relevant literature.

Ovid also lets one limit the search to specific types of articles. For example, in this situation one is clearly looking for a clinical trial, and the search scenario might proceed as in TABLE 2.

SUMSearch

SUMSearch[9] (**sumsearch.uthscsa.edu/searchform4.htm**), offered by the University of Texas Health Science Center, San Antonio, is a one-step search engine that combines meta-searching (searching several Internet sites) with contingency searching (to come up with an appropriate number of results). It searches through some textbooks (eg, Merck Manual), MEDLINE, the National Guideline Clearinghouse, and DARE. Results are arranged according to the breadth of the discussion, with the broadest discussion from textbooks and review articles listed first, followed by consensus guidelines from the National Guidelines Clearinghouse, followed by systematic reviews from DARE or MEDLINE, followed by original studies from MEDLINE. Unfortunately, the search can take up to 2 minutes and the user sometimes finds the site unavailable. These limitations aside, it is a wonderful tool for efficient retrieval of information for practicing evidence-based medicine.

Using a combined search method eliminates most of the burdens of online searches for medical evidence.

Systematic reviews provide critical appraisal

PATIENT EDUCATION MATERIALS

In certain cases, we need to find peer-reviewed patient education materials, written in language understandable to the lay reader. MDConsult (**www.mdconsult.com**), an online service available by subscription only, lets the subscriber create a personalized patient education handout, with the option of individualizing the information. There are a

number of other sites that contain patient educational material, such as the one offered by the Cleveland Clinic at **www.clevelandclinic.org/health/**.

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8. **PubMed. www.ncbi.nlm.nih.gov/PubMed.** Clinical queries using research methodology filters.
9. **Badgett RG.** SUMSearch. SUMSearch.uthscsa.edu/sgim.

SUGGESTED READING AND BROWSING

American Academy of Family Physicians. familydoctor.org. *Has a searchable and indexed collection of patient handouts and is free.*

Davidoff F, Florance V. The informationist: a new health profession? [editorial]. Ann Intern Med 2000; 132:996–998.

Health A to Z at InteliHealth, a subsidiary of Aetna US Healthcare. www.intelihealth.com/IH/ihtIH/WSIHW000/331/10449.html. *Has a collection of web pages on patient education with links to appropriate organizations for further information.*

Inforetrieve. www3.infotrieve.com/medline/infotrieve.

Knowledge Finder. www.kfinder.com.

Magrulkar R, Whelan C, Williams B. Drawing evidence from the Internet: implementation of a learner-centered medical informatics curriculum. 2000 National SGIM meeting workshop. **www.sgim.org/Publicweb/Meetings/default.htm.**

MDConsult. www.mdconsult.com.

National Guideline Clearinghouse. www.guidelines.gov. *Produced by the Agency for Healthcare Research and Quality, the American Medical Association, and the American Association of Health Plans.*

Primary Care Practice Guidelines at the University of California San Francisco. medicine.ucsf.edu/resources/guidelines.

Physicians Desk Reference. www.pdr.net. *Provides free access to PDR online, PDR of Herbal Medicine, and drug interaction checker.*

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