

Creating your own medical Internet library



Alan Stewart, MD

Abstract

MANY PHYSICIANS STRUGGLE TO KEEP UP WITH NEW DEVELOPMENTS in their fields. The Internet can provide a solution to this problem by allowing rapid access to a broad spectrum of reliable information. Becoming familiar with a few clinically relevant and freely available medical resources on the World Wide Web may enhance a physician's efforts to provide evidence-based care on a daily basis. This article outlines a simple strategy for physicians to make the Internet a useful tool.

Keeping up to date is one of the greatest challenges facing today's clinicians. The translation of recent clinical research into practice is slow, despite the ready availability of published data.¹ Although traditional, didactic continuing medical education (CME) events remain popular as educational tools, their impact in altering practice patterns has been disappointing.² The Internet provides instant access to the most current medical literature through MEDLINE and online journals, clinical practice guidelines, systematic reviews and resource lists. It has become a welcome resource for a growing number of physicians, and there is justifiable optimism that it may represent the missing link between research and practice.³ However, even though the CMA's 1997 Physician Resource Questionnaire found that 41% of respondents were using the World Wide Web, fewer than 10% were logging on daily.⁴ Possible explanations for this relative underuse include a degree of technophobia, limited free time to develop "Web literacy," doubts about the quality of online health information and the Web's inherent disorganization.

In this article, I suggest a framework for locating useful Web sites that can be "bookmarked" to serve as a starting point in developing a personal Internet library.* Given the difficulty of reliably rating medical Web sites,⁵ those identified here are either from, or referred to by, mainstream publications or organizations known for stringent peer review and a commitment to evidence-based practice.

The basic idea is to identify a limited number of easily accessible Internet resources providing up-to-date, accurate and practical information. Then, using your Web browser's "bookmark" or "favourites" feature, you can create an organized framework, tailored to your needs, to classify and use the Web sites. Once you have identified a Web page of interest, click on the bookmark or favourites tab to reveal a simple menu for creating and naming folders where the address of the Web page can be saved. With this system, Web sites can be categorized and stored according to the type of information they provide. For example, two general bookmark headings that encompass most information needs are "searching" and "browsing" (Table 1).

Unfortunately, Web site addresses (also called URLs, for "uniform resource locators") are frequently changed without warning. Usually, an updated link from the old address is provided, but if not, try the root location or home page (for example, www.cma.ca) and look for a link to the particular page of interest or use a global search engine such as Yahoo! (www.yahoo.com) or Infoseek (www.infoseek.com).

Searching

A wide variety of Web sites are available to assist you in searching for information relevant to your practice (Table 2).

*The electronic version of this article (www.cma.ca/cmaj/vol-161/issue-9/1155.htm) includes links to all of the sites mentioned in this article.

Education

Éducation

Dr. Stewart is with the Department of Medicine, King Faisal Specialist Hospital & Research Center, Riyadh, Saudi Arabia.

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MEDLINE

Since 1997, Internet access to MEDLINE has been provided free by the National Library of Medicine (NLM). MEDLINE is also packaged in a variety of formats by various institutions and licensed commercial vendors. An annotated list of free MEDLINE sites can be found at www.beaker.iupui.edu/dr/felix. Although it's hard to beat free access, some users favour the subscription products for their novel interfaces.

The Grateful Med (igm.nlm.nih.gov/) search interface from the NLM allows access to MEDLINE as well as 14 other databases, including AIDSLINE. It utilizes the PubMed search service (www.ncbi.nlm.nih.gov/entrez/query.fcgi), which has recently introduced a variety of useful search filters, in addition to its related articles feature. PubMed includes PreMEDLINE, which contains recent references not yet catalogued in MEDLINE. PubMed is therefore the database of choice for the most up-to-date search. The introductory "Internet Grateful Med User's Guide" is informative for novice searchers and those looking to brush up on their searching technique.

Ovid MEDLINE (gateway.ovid.com) is a popular commercial product to which many health sciences libraries subscribe. It includes stepwise search filters, automatic displays of headings and subheadings from the MeSH (Medical Subject Headings) system, a "combine sets" option and a separate database allowing searches of full-text journals, which is not available through PubMed. Such options can make searching and retrieval fast and efficient. Ovid MEDLINE also provides access to databases not available in PubMed, such as CANCERLIT. You may be able to access Ovid through a connection with your local health sciences library. Both the CMA and the British Medical Association offer free access to Ovid to their members. The CMA's OSRLER initiative (Ovid Search: Link to Electronic Resources) includes online search assistance by medical librarians.⁶

Ovid's popularity is due not only to the simplicity of its interface but also to the ready access to full-text publications. These can be located by using a combination of

MeSH headings and the full-text filter or by searching only Ovid's Core Biomedical Collection with text words. Text words, or keywords, are words or phrases that are not MeSH headings but that may appear in the article title or abstract. The full-text database consists of about 90 publications, including such notables as the *British Medical Journal*, *The New England Journal of Medicine* and *The Lancet*. This approach usually yields a manageable number of good, up-to-date English-language articles in their entirety (including tables and graphics). Full-text searching can be quick but imprecise, so you will need to try synonyms for some diseases (e.g., not only deep venous thrombosis, but also thromboembolism and DVT).

A recent example bears mentioning. A journal club discussion on diabetic management raised the possibility of troglitazone, an oral hypoglycemic agent, as a cause of hepatitis. None of those present knew much about the drug, but within 30 seconds a text word search into the full-text database located the article "Troglitazone associated hepatic failure," which directly linked to an editorial in *The New England Journal of Medicine*, "A novel antidiabetic drug, troglitazone — reason for hope and concern".⁸ Within a few minutes the group had learned about an important patient care issue. Consider using full-text searching as a primary strategy for answering common questions.

The National Cancer Institute's bibliographic database, CANCERLIT (cnetdb.nci.nih.gov/cancerlit.shtml), contains over a million citations and abstracts from a variety of sources beyond those in MEDLINE.

AIDSLINE

AIDSLINE (accessed through Grateful Med) is the most comprehensive collection of searchable resources devoted to AIDS.

Appraisal literature

The appraisal literature consists of collections of concise, statistically accurate summaries of the recent literature. Appraisal journals, described by some as secondary literature, are fast becoming primary information sources. The online versions of the *ACP Journal Club* (www.acponline.org/journals/acpjc/jcmenu.htm) and *Evidence-Based Medicine* (www.acponline.org/journals/ebm/ebmmenu.htm), a collaborative effort of the *British Medical Journal* and the American College of Physicians – American Society of Internal Medicine, publish rigorous summaries of recent articles from over 120 peer-reviewed medical journals. The former is exclusive to internal medicine, whereas the latter covers all specialties. The brevity, clarity and accuracy of data presentation combined with the pedigree of expert commentary set these journals apart from similar resources found elsewhere. Each issue contains a glossary of statistical terminology described in plain language, as well as numerous general-interest editorials on topics such as

Table 1: A sample collection of bookmarking categories

Searching

MEDLINE sites

Cancer

AIDS

Appraisal literature

Guidelines

Reviews

Browsing

Updates

Links

Journals

Associations



MEDLINE searching, the Internet and statistical terminology. Both journals are searchable at a single Web site (www.acponline.org/cgi-bin/search).

The following appraisal sites deal mainly with popular issues (e.g., screening for breast or prostate cancer; *Helicobacter pylori* and ulcers), and their accurate, bottom-line presentations mean very little wading through extraneous material once the topic has been found. However, the databases are small, and none matches the scope of MEDLINE.

The TRIP (*Turning Research Into Practice*) database (www.gwent.nhs.gov.uk/trip/test-search.html) is a novel site produced by the National Health Service in the United Kingdom. It contains about 4400 articles and merges 23 other evidence-based sites into one searchable database with well-researched summaries of recent, clinically relevant research. For example, a recent search for an update on the role of routine fetal ultrasonography with only the term "ultrasound" yielded 23 hits, one of which was a recent Canadian clinical practice guideline on the exact subject of interest.

The CAT (*Critically Appraised Topics*) Bank (cebm.jr2

.ox.ac.uk/cats/catsearch.html) contains about 65 brief evidence-based summaries prepared at the Centre for Evidence-Based Medicine at Oxford. Sample topics include anticoagulation in atrial fibrillation, the use of albumin in paracentesis and the risk of seizure within the first year after a stroke.

Bandolier (www.jr2.ox.ac.uk/bandolier) is the online version of a high-quality newsletter-type publication from Oxford University. Systematic overviews and meta-analyses from peer-reviewed journals are critically reviewed. The results are given as insightful, conversational commentary presenting the bottom line on a variety of hot topics of interest to both generalists and specialists. Sample topics include nicotine replacement, tamoxifen trials, albumin in critical illness and alternatives to hormone replacement therapy for menopausal symptoms. In addition, you will find valuable commentary on salient statistical issues such as number needed to treat, number needed to harm and likelihood ratios.

Journal Watch Online (www.jwatch.org), a medical newsletter published by the Massachusetts Medical Society,

Table 2: A personal Internet library: searching

Bookmark	Web site	Address
MEDLINE	Internet Grateful Med PubMed Ovid	igm.nlm.nih.gov/ www.ncbi.nlm.nih.gov/entrez/query.fcgi/ gateway.ovid.com*
Cancer	CANCERLIT	cnetdb.nci.nih.gov/cancerlit.shtml
AIDS	AIDSLINE	igm.nlm.nih.gov†
Appraisal literature	<i>ACP Journal Club</i> <i>Evidence-Based Medicine</i> TRIP database CAT Bank Bandolier <i>Journal Watch Online</i> InfoPOEMs	www.acponline.org/journals/acpj/jcmenu.htm www.acponline.org/journals/ebm/ebmmenu.htm www.gwent.nhs.gov.uk/trip/test-search.html cebm.jr2.ox.ac.uk/cats/catsearch.html www.jr2.ox.ac.uk/bandolier www.jwatch.org www.infoPOEMs.com
Guidelines		
General	CPG Infobase National Guideline Clearinghouse (USA) Scottish Intercollegiate Guidelines Network New Zealand Guidelines Group	www.cma.ca/cpgs www.guideline.gov pc47.cee.hw.ac.uk/sign/home.htm www.nzgg.org.nz
Prevention	<i>Canadian Guide to Clinical Preventive Health Care</i> <i>Clinicians' Handbook of Preventive Services</i> CDC Prevention Guidelines	www.hc-sc.gc.ca/hppb/healthcare/pubs/clinical_preventive/index.html text.nlm.nih.gov/ftsr/tocview www.cdc.gov†
Cancer	National Cancer Institute	canceret.nci.nih.gov/pdq.htm
Locating guidelines	Medical Matrix Ottawa Hospital	www.medmatrix.org/reg/login.asp www.ogh.on.ca/library/cpg.htm
Systematic reviews	Cochrane Collaboration Cochrane abstracts University of York NHS Centre for Reviews and Dissemination Health Technology Assessment Programme (UK)	hiru.mcmaster.ca/cochrane hiru.mcmaster.ca/cochrane/cochrane/revabstr/mainindex.htm www.york.ac.uk/inst/crd/ehcb.htm www.hta.nhsweb.nhs.uk

Note: ACP = American College of Physicians, TRIP = Turning Research Into Practice, CAT = Critically Appraised Topics, POEMs = Patient Oriented Evidence that Matters, CPG = clinical practice guideline, CDC = US Centers for Disease Control and Prevention, NHS = UK National Health Service. All addresses up to date as of September 1999.

*Also available to members of the CMA and the British Medical Association through those associations.

†Click on the appropriate selection.



comes in both general and specialty-specific versions. Eleven editors review 50 journals and present concise summaries of selected articles twice a month. Although not as rigorous as the *ACP Journal Club* and *Evidence-Based Medicine*, these are convenient, current and readable. A subscription is required.

POEMS (*Patient Oriented Evidence that Matters*; www.infoPOEMs.com) is a US equivalent of Bandolier, but it is not restricted to the review literature. Each month 8 articles considered to have the greatest potential impact on primary care practice are selected. Recent reviews have included these titles: "5 or 10 days of antibiotics for acute otitis media" and "Conservative management of non-Q wave MI."

Guidelines sites

Bookmarking clinical practice guidelines (CPGs) allows the busy clinician to quickly seek out concise and accurate recommendations without having to do a formal literature search.

The CMA's *CPG Infobase* (www.cma.ca/cpgs), a compendium of more than 700 guidelines, is the most extensive single collection of such guidelines on the Internet. The National Guideline Clearinghouse (www.guideline.gov) of the US Agency for Health Care Policy and Research is an alternative site combining an attractive home page and a user-friendly search interface. Also of note are the Scottish Intercollegiate Guidelines Network (pc47.cee.hw.ac.uk/sign/home.htm) and the New Zealand Guidelines Group (www.nzgg.org.nz).

The Canadian Guide to Clinical Preventive Health Care (www.hc-sc.gc.ca/hppb/healthcare/pubs/clinical_preventive/index.html) from Health Canada presents the 1994 reports of the Canadian Task Force on the Periodic Health Exam (now the Canadian Task Force on Preventive Health Care). This well-indexed site provides readable, high-quality, evidence-based guidelines for preventive medicine. The *Clinicians' Handbook of Preventive Services* (text.nlm.nih.gov/frs/tocview), also from the Agency for Health Care Policy and Research, presents a balanced view of the differences among prevention guidelines from various organizations and has been designed for easy reference.

The prevention guidelines of the US Centers for Disease Control and Prevention (accessed from www.cdc.gov) is a well-maintained and frequently updated site with wide-ranging guidelines focusing on many public health issues, ranging from AIDS and air pollution to bats and yaws.

The National Cancer Institute's PDQ database (cancer.net.nci.nih.gov/pdq.htm) includes a clinical trial registry and peer-reviewed data on cancer screening, treatment and prevention, along with valuable summaries for health care professionals and lay people.

Medical Matrix (www.medmatrix.org/reg/login.asp) and the Ottawa Hospital (www.ogh.on.ca/library/cpg.htm) provide links to an array of other CPG sites.

Systematic reviews

The Cochrane Collaboration (hiru.mcmaster.ca/cochrane), an international network dedicated to the dissemination of reviews about the effectiveness of health care, is a primary source for scientific overviews. A limited amount of the Cochrane Library is accessible online without a fee; a subscription is required to access the full database. Links to all 15 Cochrane centres and subscription information are available at this address. The Cochrane Database of Systematic Reviews is the flagship database of the Cochrane Collaboration; it covers a variety of issues ranging from the unusual (tuberculous pericarditis) to the commonplace (treatment of shoulder pain), with a heavy emphasis on obstetrics data. The abstracts of recent Cochrane Reviews, a listing of all Cochrane Review Groups, and reviews and protocols for ongoing reviews can be found at (hiru.mcmaster.ca/cochrane/cochrane/revabstr/mainindex.htm). The Database of Abstracts of Reviews of Effectiveness (DARE) is a separate compilation of more than 600 appraised abstracts of "non-Cochrane" reviews (nhscrd.york.ac.uk/welcome.htm).

The UK National Health Service's Centre for Reviews and Dissemination at University of York (www.york.ac.uk/inst/crd/ehcb.htm) gives brief evidence-based summaries of "reviews of the effectiveness of healthcare" which can be downloaded from this Web version of the bulletin *Effective Health Care*. Only 20 or so titles are currently available, although more are expected to be added in the near future. The "publications" link at the Web site of the National Health Service Research and Development Health Technology Assessment Programme (www.hta.nhsweb.nhs.uk) provides access to excellent reviews and guidelines on topics ranging from preoperative screening and the effectiveness of hip prosthesis to the use of laxatives in the elderly and interferon treatment in multiple sclerosis.

Browsing

Browsing tends to be a less intense, less precise endeavour than searching. Nevertheless, it consumes time and energy, so a modicum of efficiency is helpful here also. Each of the following resources is cited on the Web site of one or more major medical journals, societies or organizations (Table 3).

Literature updates

A different approach to collating the recent literature comes in the form of regular "updates," which are produced by a number of journals. These can be found in the online version of the *Annals of Internal Medicine* (www.acponline.org/home/findit.htm; type "update" at the "Search for:" line, and select *Annals of Internal Medicine* at the "Search in" line) and the *Journal of the American Medical*



Association's Contempo (www.ama-assn.org/public/journals/jama/ctindex.htm), which consists of "updates linking evidence and experience" and contains selections of articles from other journals summarized by experts and published monthly as part of the regular *JAMA*.

Links to other resources

Journal Club on the Web (www.journalclub.org/) is a successful noncommercial site maintained by Dr. Michael Jacobsen. Recent articles, mainly from *The New England Journal of Medicine*, *JAMA*, the *Annals of Internal Medicine*

and *The Lancet*, are accurately summarized and accompanied by well-informed commentary.

The University of British Columbia's evidence-based *Therapeutics Initiative* (www.ti.ubc.ca/index.html) is a therapeutics newsletter dedicated to "the provision of evidence based, practical and rational drug therapy." To date there have been 30 issues covering topics such as type II diabetes mellitus and lipid-lowering therapy and reviewing new drugs such as alendronate and acarbose.

BioMedNet (www.biomednet.com/) is a broad-based site with many links, including links to MEDLINE and a range of full-text journals.

Table 3: A personal Internet library: browsing

Bookmark	Web site	Address
Updates		
Literature updates	ACP-ASIM Online <i>JAMA</i> Contempo 1998	www.acponline.org/home/findit.htm * www.ama-assn.org/public/journals/jama/ctindex.htm
Internet updates	On_the_Net (eCMAJ) Netlines (eBMJ) He@lth Information on the Internet OMNI	www.cma.ca/cmaj/index.htm † www.bmj.org ‡ www.wellcome.ac.uk/en/1/homlibinfecthii.html omni.ac.uk/
Links to other resources		
General	Journal Club on the Web UBC Therapeutics Initiative BioMedNet CMA WebMed Links ACP-ASIM Library for Internists	www.journalclub.org/ www.ti.ubc.ca/index.html www.biomednet.com/ www.cma.ca/webmed/index.htm www.acponline.org/journals/lifi/computer.htm
Evidence-based medicine	SchHARR Centre for Evidence-Based Medicine	www.shef.ac.uk/uni/academic/R-Z/scharr/ir/netting.html cebml.jr2.ox.ac.uk/
Primary care	Primary Care Resources on the Internet	griffin.vcu.edu/~dimlist/

Note: ACP-ASIM = American College of Physicians – American Society of Internal Medicine, *JAMA* = *Journal of the American Medical Association*, OMNI = Organising Medical Networked Information, UBC = University of British Columbia, SchHARR = School of Health and Related Research. All addresses up to date as of September 1999.
*Enter "update" as title search term.
†See tables of contents for individual issues.

Table 4: A personal Internet library: journals and associations

Bookmark	Web site	Address
Specific journals	eCMAJ	www.cma.ca/cmaj/index.htm
	<i>JAMA</i>	www.ama-assn.org/public/journals/jama/jamahome.htm
	<i>NEJM</i>	www.nejm.org/content/index.asp
	eBMJ	www.bmj.com
	<i>Lancet</i>	www.thelancet.com
Locating journals	AMA	www.ama-assn.org/med_link/peer.htm
	Healthfinder	www.healthfinder.gov/default.htm
	Webdoctor	www.gretmar.com/webdoctor/Framejournals.html
	Highwire	highwire.stanford.edu/
Specific associations	CMA	www.cma.ca
	AMA	www.ama-assn.org
Locating associations	CMA Clinical Resources	www.cma.ca/webmed/hea.htm
	AMA—national	www.ama-assn.org/med_link/nation.htm
	AMA—international	www.ama-assn.org/med_link/wintnatl.htm

Note: *NEJM* = *New England Journal of Medicine*, *eBMJ* = *British Medical Journal*, *AMA* = *American Medical Association*. All addresses up to date as of September 1999.



ScHARR, the School of Health and Related Research at the University of Sheffield (www.shef.ac.uk/uni/academic/R-Z/scharr/ir/netting.html), provides a comprehensive listing of evidence-based medicine sites. This is definitely a good browsing location, especially if you are trying to get a feel for what the evidence-based medicine movement is all about.

The Oxford Centre for Evidence-Based Medicine (cebm.jr2.ox.ac.uk/) is a terrific learning and browsing resource.

Other sites providing direct access to a variety of medical Internet resources, including online journals, organizations, other medical Web sites and evidence-based medicine resources, are listed in Table 3.

Journals

Most medical journals have Internet home pages with various degrees of access, ranging from full text to titles or abstracts only. Some, such as those of *CMAJ* and the *British Medical Journal*, are free, although most require a subscription for full access to the current issue. Many also send out tables of contents regularly by email without a subscription. The sites of popular online journals are listed in Table 3.

To start a bookmarked journal collection, try the American Medical Association (www.ama-assn.org/med_link/peer.htm) for a set of 35 of the top peer-reviewed journals. If you are browsing for a less discrete list then look to Healthfinder (www.healthfinder.gov/default.htm) or Webdoctor (www.gretnar.com/webdoctor/journals.html) for full-text publications or Highwire (highwire.stanford.edu/), which includes basic science publications such as *Cell* and *Nature*.

Medical associations

The CMA Web site's Clinical Resources (www.cma.ca/webmed/hea.htm) and the American Medical Association Web site (both www.ama-assn.org/med_link/nation.htm and www.ama-assn.org/med_link/wintnatl.htm) provide links to many Canadian, US and international medical organizations.

Internet updates

After you have located a set of Web sites for your Internet library, there is always the concern that something new may arise without your knowledge. A number of journals frequently publish Internet updates. These are usually written by experienced medical librarians or physicians with a special interest in medical informatics. It makes sense to let these experts do the surfing for you.

"On_the_Net@cma.ca" (in *CMAJ*) and "Netlines" (in the *British Medical Journal*) are regular features best found by checking the indexes of individual issues. On a more rigorous scale, He@lth Information on the Internet (www.wellcome.ac.uk/en/1/homlibinfacthii.htm), from the Royal Society of Medicine, is an entire site devoted to this function. It is available by subscription, but most issues (ex-

cept the most recent) can be seen free at the Web site. OMNI, or Organising Medical Networked Information (omni.ac.uk/), a "gateway to internet resources in medicine," is a much larger database describing international medical Internet resources. It is updated frequently and is searchable; there is also a monthly newsletter.

Conclusion

Although some evidence supporting the Internet's practical application in patient care is emerging, its present lack of structure is a handicap.^{9,10} Physicians' poor understanding of its content, a degree of technophobia and time constraints make it unlikely that the potential of this resource will be realized soon. In the meantime a certain proportion of diligent physicians feel that it should play some role in their daily practice. Because there are many thousands of health-care-related Web sites of markedly inconsistent quality, the key to success would seem to be developing familiarity with specific resources and what they have to offer. Simply put, you need to know where to look!

This article has presented one way to get started by outlining a strategy to create your own personalized Internet library. By bookmarking sites that provide limited quantities of reliable information, a clinician may find it easier to integrate the Web's health-related information into everyday patient care. The potential exists for continuous, rather than stepwise, CME. Experimentation is the only way for individual physicians to determine which Web pages best suit their needs. Meanwhile, it remains to be seen whether the time and energy thus spent will really translate into better patient care.

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References

1. Grimshaw JM, Thomson MA. *J R Soc Med* 1998;91(Suppl 35):20-5.
2. Davis DA, Thomson MA, Oxman AD, Haynes B. Changing physician performance: a systematic review of the effect of continuing medical education strategies. *JAMA* 1995;274:700-5.
3. Coulter A. Evidence based patient information. *BMJ* 1998;317:225-6.
4. Surging computer use by MDs. *CMAJ* 1997;157(2):198.
5. Jadad AR, Gagliardi A. Rating health information on the internet: Navigating to knowledge or to babel? *JAMA* 1998;279:611-4.
6. Green D. Free MEDLINE (and free help) for CMA members! *CMAJ* 1998;158(6):799.
7. Misbin RI. Troglitazone-associated hepatic failure [letter]. *Ann Intern Med* 1999;130(4 Pt 1):330.
8. Imura H. A novel antidiabetic drug, troglitazone — reason for hope and concern [editorial]. *N Engl J Med* 1998;338:908-9.
9. Godlee F. Getting evidence into practice. Needs the right resources and the right organisation [editorial]. *BMJ* 1998;317:6.
10. Johnson DS, Goel RP, Birtwistle P, Hirst P. Transferring medical images on the world wide web for emergency clinical management: a case report. *BMJ* 1998;316:988-9.

Address reprint requests to: Dr. Alan Stewart, Department of Medicine, King Faisal Specialist Hospital & Research Center, PO Box 3354, Riyadh 11211, Kingdom of Saudi Arabia; fax 966-1 442-7499; dralan99@hotmail.com