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The Internet and evidence-based decision-making: a needed synergy for efficient knowledge management in health care

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The Internet is introducing new ways for humans to interact with machines and to communicate with each other. In health care the Internet is providing unprecedented opportunities to access information, improve decisions, and enhance communication among decision-makers and the people affected by their decisions. However, the Internet is also creating many new problems. Seeking information on the Internet is often time-consuming. Internet users, regardless of their role, background or knowledge, can experience confusion and anxiety because of the virtually unlimited amount of information available, information that is often poorly organized and of highly variable quality and relevance.¹ The Internet can also lead to conflict among decision-makers if they have access to different and contradictory information. A person's health might even be worsened if inaccurate information found on the Internet were used by decision-makers.

Evidence-based decision-making involves the explicit, conscientious and judicious consideration of the best available evidence in making health care decisions.² It is supported by a rapidly evolving set of methods and tools but its eventual adoption will depend on whether the barriers it still faces³ can be minimized or eliminated.

In this paper we postulate that if the Internet and evidence-based decision-making are to reach their full potential and contribute to improvements in health care, a powerful and efficient synergy must develop between them.⁴ The Internet could benefit evidence-based decision-making by giving decision-makers cheap, fast and efficient access to up-to-date, valid and relevant knowledge at the right time, at the right place, in the right amount and in the right format. Conversely, the tools and principles of evidence-based medicine could be used to gain a better understanding of the role of the Internet in health care, helping us to anticipate opportunities and prevent potential problems.

This article briefly describes some of the efforts that are already fostering convergence and synergy between the Internet and evidence-based decision-making, as well as the opportunities available and the challenges to be overcome.

Use of the Internet to enhance the role of evidence-based decision-making in health care

The Internet can be used as a powerful tool to facilitate the generation, synthesis, dissemination and exchange of research evidence. A good example that covers all of these potential benefits is the Cochrane Collaboration,⁵ an international organization that aims to help people make informed decisions about health by preparing, maintaining and ensuring the accessibility of rigorous, systematic and up-to-date reviews (and where possible, meta-analyses) of the benefits and risks of health care interventions. The rapid growth and recognition of this organization have depended, to a great extent, on the way in which it has used the Internet not only to make available manuals, tools and training materials that facilitate the design and conduct of the reviews, but also to allow easy access to the reviews and continuous open peer review.⁵

The Internet is helping busy practitioners to participate in generating evidence-

based information. The CATmaker⁶ is an Internet-based tool that helps clinicians to produce short summaries of articles on clinically relevant topics. These summaries are known as “critically appraised topics” or CATs.⁶ The CATs can be used and enhanced by the clinician who produced them or by colleagues who come across the same clinical issues and relevant publications elsewhere.

The Internet is being used by governments and professional organizations to facilitate dissemination of and access to specialized evidence-based guidelines. Good examples are the National Guideline Clearinghouse,⁷ an Internet-based public resource that offers access to evidence-based clinical practice guidelines and allows comparisons of recommendations produced by different organizations in North America; the Canadian Medical Association’s CPG Infobase,⁸ which provides free access to evidence-based guidelines produced in Canada; and the Practice Guidelines Initiative of Cancer Care Ontario,⁹ which provides access to evidence-based cancer treatment guidelines produced in Ontario.

The Internet fosters the use of evidence by providers and consumers at the point of care. Some tools, called Internet Web site “calculators,” are designed to match unique patient information with an underlying evidence-based knowledge repository and sources of potential feedback. Examples include tools for assessing the risk of cardiovascular morbidity for individual patients, information about potential drug interactions and drug dosing, and recommendations about appropriate screening interventions for a given patient. Systems that would allow a patient to complete disease-specific Internet-based surveys are also being developed and evaluated. Special programs would then provide up-to-date evidence-based care recommendations to the patient, according to his or her unique circumstances. These care recommendations could also be sent, by means of the Internet, to the patient’s health care practitioners for follow-up of important aspects of care.¹⁰ To increase compliance with the recommendations, the Internet could also be used to deliver reminder messages to health care providers and consumers. An increasing number of Internet sites, such as those for the Centre for Evidence-Based Mental Health¹¹ and the School of Health & Related Research (ScHARR) at the University of Sheffield, UK,¹² offer simpler decision aids such as calculators for interpreting studies of treatments and diagnostic tests. However, for these tools the user must dig the basic figures out of original and secondary sources, such as journal articles and reviews.

The Internet has also been used to provide easy access to large generic collections of links to evidence-based resources and organizations that promote evidence-based decision-making. For instance, ScHARR¹² regularly updates its menu of links to evidence-based resources around the world. At the Health Information Research Unit at McMaster University, we maintain a list of evidence-based resources related to Canadian initiatives (see Appendix 1).

Commercial groups are also starting to facilitate access to “distilled” high-quality information. For example, Ovid’s Evidence-based Medicine Reviews¹³ provides Internet-based access to general resources, such as the Cochrane Database of Systematic Reviews and Best Evidence, and enables simultaneous searches of other databases, such as MEDLINE, for articles that meet the criteria for evidence-based decision-making. By linking reviews with full-length articles, this resource also capitalizes on the value of hypertext to enhance access to information. Journals are now using Web sites and the power of hypertext to speed up the production process, to complement the contents of their paper-based versions and to improve communication among readers.¹⁴

From these examples it would be easy to conclude that the Internet has already created a wide array of opportunities for the development and practice of evidence-based decision-making. But this is just the dawn of the Internet age. So far, most (if not all) of the Internet-based applications to promote evidence-based decision-making represent merely a transition from paper-based to electronic-based media; the information is still processed and distributed in text form. Furthermore, most of the efforts to date have been developed for and by health care providers. The true “revolution” (in the sense of going full circle) is likely to come from current and future increases in bandwidth, which will allow anyone to communicate through the Internet more effectively. With these developments we will be able to go beyond text to more “natural” or primal ways of representing and exchanging knowledge. Soon we will be able to deliver research evidence integrated with other types of information (e.g., clinical data, anecdotes, rules of thumb or intuitive statements), using more engaging ways to package the messages and multisensory modes of communication.¹⁵ These changes, coupled with developments in wireless, portable (especially palmtop), “wearable” and “ubiquitous” computing,¹⁶ will give us, perhaps for the first time, a clear opportunity to develop true partnership, effective communication and efficient use of research information by different groups of decision-makers in all settings within the health care system, regardless of who and where they are.¹⁶ Reaching “information nirvana” will not be easy¹⁷ and will require unprecedented levels of collaboration among all groups participating in health care decisions.¹⁶ The application of the principles and tools of evidence-based decision-making could help us to meet some of these challenges.

Use of evidence-based decision-making to enhance the role of the Internet in health care

The benefits of the Internet in health care will depend, at least in part, on its ability to give us efficient and effective ways to access, exchange and use the knowledge that we need, when we need it, in the right format.¹⁶ But we will only know whether Internet-related developments in

health and health care are taking us in the right direction through rigorous evaluation.

However, evaluating the effect of the Internet on health and health care has never been easy, nor is it likely to become so with time. Anyone who wants to conduct evaluation studies will face problems already familiar to researchers and supporters of evidence-based decision-making. The lessons learned by the Cochrane Collaboration could be applied to speed up development of the international collaboration that will be required to avoid unnecessary duplication of effort and to optimize use of the limited resources, both human and financial, available for research and development. Those interested in developing, evaluating and using Internet-based applications in health care could also benefit from initiatives that have evolved within the evidence-based decision-making movement. They could benefit, for instance, from guides for formulating well-built questions¹⁸ and from the use of systematic reviews to build upon existing knowledge and to identify gaps in knowledge. The latter have already been used to study different methods of assessing the quality of health information on the Internet.^{1,19}

People interested in studying the effect of the Internet in health care will also encounter new problems. They will find that most creators of Internet-based applications are engaged in a frantic race to outperform their competitors, to secure financial support for their work and to gain the lion's share of the market; to date, the evaluation of such applications has not been a priority. They will also quickly realize that this lack of emphasis on evaluation is driven not only by financial factors. Another major problem is that most of our current research tools and methods cannot produce evaluations in "real-enough time" to avoid disrupting the application development process. To succeed, researchers will need to modify existing methods or create new ones with sufficient flexibility and power to handle the complex, dynamic and rapidly expanding nature of the Internet.

Although these new problems will initially appear relevant only to researchers, developers and funders, they will, sooner or later, become relevant to those whose primary interest is the study of evidence-based decision-making. The opportunity for people interested in evidence-based decision-making and those interested in the Internet to learn from each other's experiences is so important that one of our priorities should be to foster strong links between these groups.

Conclusion

Evidence-based decision-making and the Internet constitute 2 major forces that could help us deal with the stresses of our evolving health care systems. Although there are already early signs of convergence, we will need stronger links and synergy between them. Only through such links will these 2 fields fulfill their promise of unparal-

leled opportunities for better access to information, to improve decisions and facilitate communication in health care.

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Appendix 1: Canadian organizations that promote evidence-based decision-making*

Organization	Web site address
British Columbia Council on Clinical Practice Guidelines	www.hlth.gov.bc.ca/msp/infoprac/protoguides/cpgpro.html
British Columbia Office of Health Technology Assessment	www.chspr.ubc.ca/bcohta/
Canadian Cochrane Network and Centre	hiru.mcmaster.ca/cochrane/centres/canadian/
Canadian Coordinating Office for Health Technology Assessment	www.ccohta.ca
Canadian Health Services Research Foundation	www.chsrf.ca
Canadian Institute for Health Information	www.cihi.ca/
Canadian Policy Research Networks	www.cprn.com/cprn.html
Canadian Task Force on Preventive Health Care	www.ctfphc.org/
Cancer Care Ontario Program in Evidence-Based Care	hiru.mcmaster.ca/ccopgi/
Centre for Evaluation of Medicines	www.thecem.net/
Centre for Health Economics and Policy Analysis, McMaster University	hiru.mcmaster.ca/chepa/
Centre for Research and Evaluation in Diagnostics	www.crc.cuse.usherb.ca/cred/index_en.html
Clinical Research and Development Program, Regina Health District	www.medi-fax.com/rhd/crdp/
Conseil d'évaluation des technologies de la santé du Québec	www.msss.gouv.qc.ca/cets/
Health Evidence Application and Linkage Network (HEALNet)	healnet.mcmaster.ca/nce
Health Information Research Unit, McMaster University	hiru.mcmaster.ca/
Health Services Utilization and Research Commission, Saskatchewan	www.sdh.sk.ca/hsurc/
InfoWard, Edmonton	www.infoward.com
Institute for Clinical Evaluative Sciences	www.ices.on.ca/
Institute for Health and Outcomes Research	www.usask.ca/medicine/ihor/†
Institute for Work & Health	www.iwh.on.ca/
Manitoba Centre for Health Policy & Evaluation	www.umanitoba.ca/centres/mchpe/1mchpe.htm
McMaster Evidence-Based Practice Center	hiru.mcmaster.ca/epc/
Networks of Centres of Excellence	nce.nserc.ca
Prairie Region Health Promotion Research Centre	www.usask.ca/healthsci/che/prhprc

*Web site addresses up to date as of Dec. 28, 1999. This list was produced by Tom Oliver of the Canadian Cochrane Centre and Jennifer Briand of HEALNet. A more extensive list, including links to international organizations, can be found at hiru.mcmaster.ca/cochrane/centres/canadian/evidence-based.htm

†The Web site of the Institute for Health and Outcomes Research was inactive at the time this article was prepared for publication, but information on reactivation is to be posted at the site listed when it becomes available.