Locating, Assessing, and Indexing Reliable Oncology-Related Drug Information on the Internet

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ABSTRACT

The Internet is a potentially useful and vast source of drug information for pharmacists in oncology practice, one that has yet to be fully utilized. The exponential growth in the quantity of information available on the Internet presents 2 main problems: how to find relevant, appropriate information and how to assess the credibility of any such information, given that much of the health information on the Internet lacks the rigorous peer review that is applied to the primary literature. Pharmacists in oncology practice must be aware of the type and quality of information found on the Internet. Pharmacists must also have a quick and easy method, tailored to their individual practice areas, of locating and reviewing appropriate sites. Once located, each site should be assessed on the basis of its reliability and quality, and good sites should be indexed for future use. This article provides information about using Internet search engines to find oncology-related Web sites and outlines an effective method of assessing these sites, on the basis of criteria such as authorship, attribution, disclosure, and currency. Guidelines for bookmarking useful sites for future use are also provided.

RÉSUMÉ

L'Internet constitue une source d'information sur les médicaments potentiellement utile et vaste pour les pharmaciens en oncologie, et dont on ne tire pas encore pleinement profit. La croissance exponentielle de la quantité d'information disponible sur l'Internet pose deux grands problèmes : comment trouver l'information adéquate et pertinente et comment évaluer la crédibilité de cette information, en tenant compte du fait que l'information sur la santé qui est publiée sur l'Internet n'est pas soumise à une rigoureuse révision par les pairs, contrairement à la documentation de source primaire. Les pharmaciens en oncologie doivent connaître le type et la qualité de l'information qu'ils trouvent sur l'Internet. Ils doivent aussi disposer d'une méthode de recherche et d'évaluation des sites rapide et facile, adaptée à leur domaine d'exercice. Chaque site trouvé doit être évalué en fonction de la fiabilité et de la qualité de l'information qu'on y trouve. Les bons sites devraient être marqués pour référence future. Cet article contient des renseignements sur l'utilisation des moteurs de recherche pour l'Internet permettant de trouver des sites Web liés à l'oncologie et décrit une méthode efficace permettant d'évaluer ces sites, en fonction de critères tels que le générique, les références, l'obligation d'information, et l'actualité des renseignements. Des lignes directrices sur le marquage de sites utiles pour référence future sont également fournies.

INTRODUCTION

The amount of information available on the Internet is growing exponentially, as is the literature available on the subject. At last count, more than 200 000 documents about cancer had been posted on the World Wide Web,[1] making the Internet a major source of health information for patients and professionals. The problems brought on by this unprecedented information revolution are 2-fold: finding relevant, appropriate information and assessing the credibility of information obtained through the Internet. The article by Davis and Arndt[2] on oncology-related Internet sources provided a comprehensive review of the Internet, its applicability to the field of oncology, and the accessibility it affords to valuable sources of on-line drug information for pharmacists and other health-care professionals.

It has been noted that much of the health information on the Internet lacks the rigorous peer review that is applied to the primary literature. Thus, the information may be false,[1] misleading,[3] or even dangerous.[4] Patients seeking genuine alternatives in the treatment of their diseases are inundated with the latest breakthrough treatments, be they scientifically proven or pure quackery.[3] According to Internet philosophy, anyone can set up a Web site[5]; therefore, consumers and health-care professionals alike should be concerned with the informality and quasi-technicality of many sites that purport to provide accurate medical information. Although there is an abundance of information, there is often no guarantee of its quality. In this respect the Internet poses a serious concern and, because of its scope, has the potential for serious negative impact. People seeking on-line information, for example, may be convinced to ignore their symptoms or rely on unproven treatment strategies in lieu of professional medical treatment.[4,6] This potential problem highlights the need for pharmacists to be aware of the type and quality of information found on the Internet.

The Internet is a potentially useful and vast source of drug information for pharmacists in oncology practice, one that has yet to be fully utilized. In an informal survey, Marra and colleagues[7] found that only 5% of hospital pharmacists had used the Internet. As well, many were unclear about the mechanisms of connecting to the World Wide Web and how they could use this resource in their practice. There is a need for general Internet information, and several comprehensive reviews have been written for health-care professionals to address this concern.[2,5,7-12]

In the practice of oncology, pharmacists must remain cognizant of any new chemotherapeutic and treatment regimens that will affect the care provided to their patients. The Internet is a potential source of high-quality information and, if handled appropriately, can be a powerful tool for both pharmacist and, inevitably, patient. Pharmacists in oncology practice must have a quick and easy method, tailored to their individual practice areas, to locate and review appropriate sites, assess the reliability and quality of the sites, and index good sites for future use. The objective of this article is to outline a brief, effective method of assessing and indexing oncology-related Internet sites for use by oncology pharmacists in their day-to-day operations. The Internet serves as both the focus of this article and the primary source of data.

SEARCHING FOR A WEB SITE

Before you can evaluate oncology-related Web sites, you need to locate them. Several mechanisms are in place for finding and retrieving from the Internet information pertinent to oncology practice. These are the popular and well-used tools for search and retrieval commonly referred to as search engines.[2,8] Search engines could form the basis of your initial search of the Internet for oncology-related information. Yahoo! (http://www.yahoo.com) is one such search tool. It is a hierarchic subject-oriented guide for the World Wide Web. Infoseek (http://www.infoseek.com) is another search engine that indexes an estimated 6% of the Internet.[7] Other search engines include AltaVista (http://altavista.digital.com), Excite (http://www.excite.com), and Hotbot (http://www.hotbot.com). The primary search engines that we used in our initial investigation were Yahoo, Infoseek, and Alta Vista. Yahoo was selected because of its ease of use, its truncation and Boolean operator (and, or, not) capabilities, and its links to over 370 000 pages.[8] AltaVista and Infoseek were selected because of their comprehensiveness and ease of use, as well as their massive index bases — 30 million for AltaVista and 50 million for Infoseek.[8] There are several search terms that can be used to find information relevant to our topic. These include "cancer", "oncology", "pharmacy" and "oncology", and "cancer pharmacy". Once a Web site has been accessed, the pharmacist can then use the hypertext links embedded within the site to access related sites.

Another way to find Web sites is through the traditional literature. We conducted a search of MEDLINE (from January 1995 to May 1998) with the terms "Internet", "World Wide Web", "Internet and pharmacy", and "Internet and pharmacy and assessment" to identify additional Internet-related articles and journals. Many of these primary resources refer to Web sites that may be of use. The relevant sites we found in the primary literature[2,9,12-14] were then cross-referenced with those appropriate to oncology pharmacy practice. All of these searches were conducted with an emphasis on oncology pharmacy.

There is a significant amount of information about cancer available on the Internet. Typing the search term "cancer" in the Yahoo search engine returned 1748 Web pages containing this term. Infoseek found 844 701 sites and AltaVista 2 499 030 sites. The other terms entered also yielded a large number of sites (Table 1). Even when truncation and various other refining techniques were used, a plethora of oncology-related sites remained. You can narrow down the list of sites considerably by the cross-referencing technique described above, as by no means would you be able to assess every site identified by your search.

Table 1. Number of Sites Retrieved by Various Search Strategies

Search Term	Search Engine and No. of Sites Retrieved		
	Yahoo	Infoseek	Alta Vista
Oncology-related terms			
Cancer	1748	844 701	2 499 030
Cancer pharmacy	8	46 538	405 300
Pharmacy oncology	None	155 693	418 520
Bookmarking-related terms			
Bookmarking a site	None	16	36
How to bookmark	None	294	473
Internet bookmarking	40	3 061	1 615

ASSESSING A WEB SITE

Once a site has been found, its appropriateness, usefulness, and reliability must be assessed. Core criteria[6,15] can be used to determine whether the site is appropriate for use in an oncology practice setting. The criteria that our department uses were derived from a total of 27 articles in the primary literature (found by a search of

Table 2. Application of Core Criteria to Selected Oncology-Related Internet Sites

Site Name	URL*	Criteria[†]			
		Authorship	Attribution	Disclosure	Currency
American Brain Tumour Association	http://www.abta.org	Yes	Yes	Yes	Yes
American Cancer Society	http://www.cancer.org	No	Yes	Yes	Yes
Canadian Cancer Society	http://www.cancer.ca	No	Yes	Yes	Yes
Cancer Therapy Evaluation Program	http://ctep.info.nih.gov	Yes	Yes	Yes	Yes
International Union Against Cancer	http://www.uicc.org	Yes	No	Yes	Yes
MedHelp	http://www.medhelp.org	Yes	Yes	Yes	Yes
MedWeb Oncology	http://www.medweb.emory.edu/MedWeb/	Yes	Yes	Yes	Yes
National Alliance of Breast Cancer Organizations	http://www.nabco.org	Yes	Yes	Yes	Yes
National Cancer Institute Web sites		Yes	Yes	Yes	Yes
CancerNet	http://cancernet.nci.nih.gov	Yes	Yes	Yes	Yes
PDQ	http://cancernet.nci.nih.gov/pdq.htm	Yes	Yes	Yes	Yes
National Ovarian Cancer Coalition	http://www.ovarian.org	Yes	Yes	Yes	Yes
Oncolink	http://oncolink.com	Yes	Yes	Yes	Yes
Pharmaceutical Information Network	http://pharminfo.com	Yes	Yes	Yes	Yes
PharmWeb	http://www.pharmweb.net	Yes	Yes	Yes	Yes
Talaria	http://www.statsci.com/talaria/talaria.html	Yes	Yes	Yes	Yes
Telescan	http://telescan.com	Yes	Yes	Yes	Yes

* URLs (uniform resource locators) are up to date as of September 1999.
† Yes = evidence of criterion demonstrated, No = no evidence of criterion demonstrated.

MEDLINE for the period January 1995 to May 1998), as well as a search of the Internet using the same search engines with the search terms "Internet and evaluation", "assessment", and "Web site evaluation". Once the criteria had been collected, they were organized and systematically used in assessing any Web sites that were deemed appropriate for review. The criteria were applied to 29 Web sites in total. Table 2 provides a sample of these sites.

The criteria are clear and helped us to decide which sites were appropriate and which ones may have contained misleading, inappropriate, or erroneous information. Listed below are 4 of the primary criteria.[15]

Authorship

The primary source of the information and the background of the authors and contributors to the site should be provided. The credentials of the authors and any potential conflicts of interest or the ability to discover such conflicts should be available. Anonymity of information published at a Web site should be viewed with suspicion, as there are no easy ways to verify disclosed credentials.

Attribution

All references and the sources of all content should be listed clearly. All copyright information should be available.

Disclosure

All salient aspects of the Web site should be disclosed, including ownership, sponsorship, advertising, underwriting, commercial funding arrangements or support, and further possible conflicts of interest. Arrangements by which links to other sites are posted as a result of financial considerations should be included. Similar standards should hold in discussion forums. The purpose of the site should be displayed or prominently noted. The pharmacist must also assess the possibility of a political or ideological bias in the site. The Internet has become a prime marketing and advertising tool,[16] and it is advisable to question the motivation of an author in posting information on the Internet. Quite often, the information is posted to advertise or support a particular point of view.

Currency

Currency in health-related Web sites relates to keeping the site up to date with the present state of medical and clinical knowledge.[6] This criterion includes the date of the original documentation and the date of the content posting, as well as the most recent site update.

Secondary criteria

Secondary criteria that can also be considered in the overall assessment of a Web site are listed in Table 3.

Table 3. Secondary Criteria Applied in the Assessment of Selected Web sites

Criterion	Description
Links[6]	Links are connections to other Internet domains and addresses and are usually accessed by hypertext links. The links should be to high-quality, well-established government sites or well-renowned and well-established cancer agencies and organizations. There are potential copyright issues with sites that, for instance, enclose an external link in frames so that the source of the information is unclear.[17]
Ease of use and design[6,18]	The layout of the site is crucial to establishing a work-friendly environment for the user. A design that is easy to use and facilitates information retrieval will ensure effectiveness in the delivery and use of health information. The site should be logically organized for ease of navigability, and the site should posses an internal search engine.
Content	This is arguably the most important aspect of a Web site, particularly in the field of oncology. Pharmacists should be wary of sites that purport to describe "amazing" results and breakthroughs. All scientific claims should be verified either through the primary literature or by some other reputable source of health information. As well, clinical or scientific evidence used to support information should always be stated with appropriate references. Ongoing cancer trials with contact names and phone numbers are relevant, as well as comprehensive disease screening, detection, and treatment guidelines for all types of human cancers.[2]
Watchdog affiliations	The Geneva-based Health on the Net Foundation (HON) is a nonprofit organization dedicated to "realizing the benefits of the Internet and related technologies in the fields of medicine and healthcare" and "actively promotes effective Internet use and demonstrates best-in-class implementation and application."[19] Web sites that subscribe to this organization's mandate show a degree of concern and accountability for the information on their sites. By following HON's code, they ensure reliability and validity.
Other	Other less salient but nevertheless relevant aspects for assessing a Web site include the availability of a toll-free number, the number of hits, the interactivity, and the presence of chat rooms.

These criteria address the issue of accountability, which is important in ensuring the reliability of information at the site.

INDEXING A WEB SITE

After you have accessed a site and deem it appropriate, you need a method of indexing it for future use. Most Web browsers will allow the pharmacist to create a list of sites that are visited frequently or to which he or she may wish to return later. The listing is referred to as a set of bookmarks.[17] We looked for clear bookmarking instructions by using the aforementioned search engines and appropriate search strategies. The terms we used were "how to bookmark", "bookmarking a site", and "bookmarks". The information retrieved was clear and explicit. As well as finding clear instructions for the 2 most popular browsers (Netscape Navigator and Internet Explorer) you can retrieve instructions for a host of other Internet browsers.

DISCUSSION

The amount of oncology information available on the Internet is staggering. The sheer number of sites that we retrieved gave us a glimpse of what patients face when looking for information about treatments on the Internet. Many of these were excellent government, academic, organizational, and commercial sites with accurate, up-to-date cancer information, whereas others were, at best, unreliable. The sites that we found in several review articles were all very good sources of oncology information for either the patient or the professional. All of the sites met at least one of the criteria that we established and could easily be recommended to other health-care professionals or patients. We encourage pharmacists to modify these criteria as appropriate for their practice areas.

Bookmarking is an invaluable listing technique that we encourage strongly for 2 reasons. First, the need to type long uniform (universal) resource locators (URLs) (the addresses of the Web pages) of commonly accessed sites is avoided. This is especially important in a time-sensitive environment such as an oncology department. Second, the URL of a previously visited site can be logged. It is easy when surfing the World Wide Web to forget what you found where. This problem is most relevant when information is updated frequently or when you did not have a chance to fully examine the site.[20] When indexing the sites with any of the bookmarking techniques described, you may want to classify the bookmarks in appropriate folders. For example, a Web site on pain management in cancer could be classified in a folder called "pain", and a national organization's site might be best classified in a folder called "nonprofit".

There are several excellent sites with reliable information that oncology pharmacists should consider bookmarking, as well as a host of other sites that they may find valuable (Table 2). Each of these sites provides accurate, comprehensive cancer information, and all pursue their own individual approaches to the disease.

The potential benefits of using the Internet within an oncology pharmacy practice setting are obvious. Information is available on a vast array of oncology-pertinent information as well as other, more general, health-related topics. A knowledge of the Internet and, specifically, oncology sites can improve the pharmacist's knowledge and his or her ability to answer patients' queries. However, you should approach this wealth of information with equal parts delight and caution. The majority of cancer-related information on the Internet has not undergone rigorous peer review and thus may contain serious flaws and inconsistencies.[13] Despite this limitation, the Internet is a useful medium for exchanging information and sharing medical knowledge.[21]

It is essential for oncology pharmacy departments to keep pace with new technology, especially the Internet, if they intend to remain effective caregivers. The Internet is a good source of information and one that pharmacists must learn to use effectively to keep pace with growing patient demands and expectations. The techniques presented in this article are intended to arm oncology pharmacists with an effective tool to harness this new drug information medium.

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