

PATIENT INFORMATION

Educating patients to evaluate web-based health care information: the GATOR approach to healthy surfing

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Aims and objectives. Teaching patients to assess web resources effectively has become an important need in primary care. The acronym GATOR (genuine, accurate, trustworthy, origin and readability), an easily memorized strategy for assessing web-based health information, is presented in this paper.

Background. Despite the fact that many patients consult the World-Wide Web (or Internet) daily to find information related to health concerns, a lack of experience, knowledge, or education may limit ability to accurately evaluate health-related sites and the information they contain. Health information on the Web is not subject to regulation, oversight, or mandatory updates and sites are often transient due to ever changing budget priorities. This makes it difficult, if not impossible, for patients to develop a list of stable sites containing current, reliable information.

Design. Commentary aimed at improving patient's use of web based health care information.

Conclusions. The GATOR acronym is easy to remember and understand and may assist patients in making knowledgeable decisions as they traverse through the sometimes misleading and often overwhelming amount of health information on the Web.

Relevance to clinical practice. The GATOR acronym provides a mechanism that can be used to structure frank discussion with patients and assist in health promotion through education. When properly educated about how to find and evaluate Web-based health information, patients may avoid negative consequences that result from trying unsafe recommendations drawn from untrustworthy sites. They may also be empowered to not only seek more information about their health conditions, treatment and available alternatives, but also to discuss their feelings, ideas and concerns with their healthcare providers.

Key words: consumer-driven healthcare, health database, patient education, patient self-care, web/internet health resources

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Introduction

Eighty-six per cent of adult patients use the internet for answers to health-related questions (Bylund *et al.* 2007). However, the percentage of patients who consult with primary health care providers about information gleaned from the internet is estimated at approximately 28%–41%. This discrepancy may suggest that a majority of users accept web-based health recommendations in lieu of professional ones due to convenience; private access that decreases stigma associated with certain ailments and decreased health care costs. Some patients may even be embarrassed to admit to

health care providers they have been seeking additional information. The purpose of this article is to provide health care professionals with a strategy for educating patients about the suitability of internet websites containing health information.

Patients visit (or 'surf') an overwhelmingly large number of website addresses, 'blogs', 'listservs', 'chat rooms' and 'newsgroups' (Ahmann 2000, Risk & Petersen 2002, Dickerson 2006, Flynn *et al.* 2006, Larner 2006, Schwartz *et al.* 2006, Ayantunde *et al.* 2007, Bylund *et al.* 2007, James *et al.* 2007). A Google™ search of the term 'health information' yielded an estimated 940 million websites and

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approximately 464 thousand web-based blogs (albeit these numbers change daily making this number arbitrary to the professional, but real to the health care consumer).

Although, many websites are commonplace and well known by a substantial percentage of US residents, 'blogs' and 'wikis' are relatively new types of web resources. 'Blogs' are online personal journals that deal with specific topics, many of which are health-related. Available to anyone who wants to be a web-based author, blogs are usually free to maintain and view and may present the author as an expert on the topic, despite the absence of authority or credentials. Likewise, wiki sites allow users to add, remove or change content, making it possible for anyone to make anonymous postings or change existing postings. Wiki sites may contain reliable and useful information, but most have no oversight to ensure accurate or even ethical content.

The unregulated nature of the internet means that not all information is genuine, accurate, trustworthy, originates from an authoritative source, or is presented in a manner readable or understood by all (Oermann 2003, Biermann *et al.* 2006, Biermann & Aboulafia 2007). Although there are numerous comprehensive guidelines for evaluating web-based sources of health information, they are typically published in scientific and professional literature. Many patients may not realise this literature exists, may not have access to it, or may not be able to fully comprehend the content if it was not written with both the scientist and the lay person in mind (Kim *et al.* 1999, Oermann *et al.* 2003, Culver & Chadwick 2005, Dornan & Oermann 2006, Kang *et al.* 2006, Liu & Liu 2006, Gerber *et al.* 2007). Consequently, patients may not be equipped to evaluate website sources of information and this could lead to ill-informed decisions in critical health areas, sometimes with dire results (see Untoward Consequences section).

Issues related to web-based health information

Resource implications

Notess (2002) reported that information on average websites is revised or deleted every 44 days and that websites are expensive to develop, deploy and maintain, which contributes to their transient nature. Other researchers reported on the ephemeral nature of websites, with a mean half-life estimated at 6.3 years (range 1.4–24.5 years) (Rumsey 2002, Casserly & Byrd 2003, Koehler 2004). Government, private and organisational budget priorities change and this can affect the stability of a web site, even one thought to be stable and secure. For this reason, many 'stable' websites are in a constant state of transition. For example, on 31 October

2007, HealthWeb (2007) discontinued operations after 13 years on the Internet. A portal for non-commercial and expert-evaluated health information, HealthWeb content was garnered through the collaborative efforts of over 20 academic health science centres, the National Library of Medicine and the University of Chicago. The discontinuance of this site, once considered a highly stable and reliable source of health information, lends further support for empowering patients with their own strategies for evaluating electronic information sources, rather than providing them with a list of sites to access.

Untoward consequences

Patients searching for health information may be at risk of harm related to overrating information, self-diagnosis leading to ineffective/inappropriate self-treatment and drug–drug or drug–food–herbal interactions and overall suboptimal therapeutic effects when following web-based directives (Clark 2005, Severn & Fraser 2006). Adverse events related to substandard or misinterpreted web-based health information have been well-documented, reinforcing the premise that most patients lack the necessary tools to appropriately search, interpret and comprehend web-based information (Hainer *et al.* 2000b, Ernst & Schmidt 2002, 2004, Schmidt & Ernst 2004, Mularski *et al.* 2006, See *et al.* 2006). Some reports further demonstrate that web-based information does not always conform to standards of care (Crocco *et al.* 2002, Severn & Fraser 2006) and can lead to erroneous 'advice' generated through faulty web searches using keywords patients inaccurately 'recalled' from a visit with their health care provider (Challis *et al.* 1996). Outcomes can range from untoward emotional reactions to lethal physical harm, as when patients self-medicate with hepatotoxic or nephrotoxic medications (Black & Hussain 2000, Hainer *et al.* 2000a). Furthermore, appropriate medications may be substituted with a variety of over-the-counter remedies that may or may not help. Some of these are potentially dangerous, particularly if mixed with currently prescribed medicine, and have led to death (Hainer *et al.* 2000a, Mularski *et al.* 2006, See *et al.* 2006).

Where comorbid and chronic health conditions exist, acting on web-based information may be particularly dangerous for older adults with reduced renal drug elimination and decreased hepatic drug clearance. In these cases, the chances of high susceptibility to drug effects and adverse drug reactions are very real concerns (Turnheim 1998, 2004). Given the prevalence of pharmacokinetic and pharmacodynamic changes in older adults (Buxton 2006), it is imperative to recognise that many websites do not provide

specific, discrete information for a population in which four out of five people sustain at least one chronic health problem (Whitbourne 2002, Freedman *et al.* 2007). Among older adults who report multiple health problems, many tend to use herbal products in addition to multiple prescribed and over-the-counter medications (Yoon 2006). During the past two decades, the number of websites devoted to advertising and selling various herbal products has exploded, making it easier for older adults to get these 'miracle cure' products.

Appraisal

Many theories explain, predict and describe patient information-seeking behaviours associated with internet information appraisal, the value/belief patients place in the information gathered from internet sources (further discussion of theories is beyond the scope of this article). Web-based health information cannot, of course, replace professional care, but it is appraised (valued) by many patients. If considered a supplement to professional care, it may (1) alert patients to warning signs and symptoms of complex problems, (2) provide opportunities to establish clear channels of provider-patient communication and (3) provide professional evaluation of information patients obtain from the internet (Sciamanna *et al.* 2002, 2003, Bylund *et al.* 2007). By encouraging patients to share information garnered from the internet, health care providers can augment care through a non-judgmental approach that validates patient concern and need for information.

Acronyms

How people process information (encoding and decoding) is important for memorisation and learning (Beitz 1997). Organised, structured and meaningful information is easier to access from memory and use in everyday life and strategies known to facilitate encoding, decoding and organising information are mnemonic devices like the acronyms. Acronyms are 'formed from the initial letters of successive parts or major parts of a compound term' (Miriam Webster 2007). They are most effective when simple to remember, innovative, meaningful, unique enough to aid individuals in storing information in an organised way and produce a mental image that cues the individual to the stored information for quick retrieval (Bednarz 1995).

The GATOR approach to healthy surfing

The acronym GATOR is a short, useful memory aid that incorporates the central criteria identified in the literature as

necessary for assessing health information websites (Kim *et al.* 1999, Oermann *et al.* 2003, Clark 2005, Culver & Chadwick 2005, Dornan & Oermann 2006, Kang *et al.* 2006, Liu & Liu 2006, Gerber *et al.* 2007). The term GATOR (abbreviation for the predatory reptile *Alligator mississippiensis*) may also enhance the strategies it represents by cuing a mental image associated with danger or peril (acting on information without safeguards in place).

Genuine

The meaning of genuine is synonymous with authenticity or undisguised character and behaviour. Health care providers can encourage their clients to question the genuineness or legitimacy of health information gleaned from the internet. Some websites appear genuine, but are solely promoting the sale of products that claim to enhance health and wellbeing or to cure disease. To avoid being misled, patients need to check whether the goals, purpose, or mission of the site is clearly stated. For example, the National Institutes of Health (NIH) site states as one of its goals the improvement of '...the health of the Nation by conducting and supporting research' (The National Institutes of Health 2007). Some websites are also cleverly designed with logos closely resembling well established and trusted sources of web based health information. Web addresses (Universal Resource Locators or URLs) that automatically redirect patients (often without their knowledge) to another URL address are an additional concern. This tactic, although not always deceptive, may conceal ulterior motives or give patients a false sense of security by redirecting them to camouflaged websites. Genuine indicators include the identity of the web site sponsor, the URL and the length of time the site has been operational.

Accurate

Accuracy is synonymous with information that is free from error that may be the result of delayed updates as new discoveries are made and information becomes available. For example, a Google™ search on the keywords 'vitamin E' and 'prostate cancer' resulted in over one million websites. Some of these suggested or stated that daily intake of various vitamins (including vitamin E) was beneficial for the prevention of prostate cancer. Current information from clinical trials, however, indicates these vitamins to be of little or no benefit at all (Lawson *et al.* 2007, Weinstein *et al.* 2007, Wright *et al.* 2007), therefore websites that indicate content has undergone expert peer review provide an important indicator of accuracy. It is often difficult to determine if the information presented is peer reviewed. Therefore, patients

should be encouraged to consult additional sources of information (e.g., another trusted web site) and verify information with their primary care providers. The lay press often sensationalises stories to sell newspapers or magazines and the interpretation of clinical trial results is best left to the researchers involved. Perhaps, if sharing is presented as synonymous with getting a second opinion, patients will be encouraged to share with providers about information gleaned from the internet.

Trustworthy

Trustworthy refers to the true and reliable nature of the health information contained on websites. Medical facts and figures should have references. For example, the American Cancer Society (2007) publishes annual cancer morbidity and mortality estimates updated annually. These include a description of methods used to reach the conclusions and referenced materials that originate from both the American Cancer Society as well as the National Cancer Institute. If determining the validity of many sources of information is a challenge for health care professionals, then how much more for patients? There is no set standard on which to base validity; however, there are factors to consider. These include the author's credentials, the author's affiliation with reputable health organisations such as academic institutions, government agencies, or non-profit agencies (e.g., America Cancer Society) and peer-reviewed information. Knowing if web-based information is peer-reviewed (by experts in the field) is sometimes determined from a review of the particular web site's description. For example, the American Cancer Society highlights the fact that much of the information contained on its site has been peer reviewed. A web site's trustworthiness is questioned when there are no references or the only citations provided are from the website, itself.

Origin

Origin refers to the producer or origination point of the health information presented. Most government, academic, or health care organisations, for example, are managed by reliable sources that provide up-to-date scientific information. Considering the source of information should include a careful examination of possible bias stemming from companies or organisations trying to sell products or services and inspection of the web site author's or publisher's credentials. One essential factor in determining the origin of information is by direct contact with the author of that information, so patients need to determine if there is a way to contact the author/publisher for further information, clarification, or verification.

Readability

Patients may have difficulty in obtaining, processing and understanding web-based health information if it is too elementary, too technical, or too advanced (health literacy) (Institute of Medicine 2007). Readability generally refers to the degree of ease involved in reading and understanding written material. According to the Institute of Medicine Committee on Health Literacy, 40 million patients cannot read complex text and 90 million patients cannot understand complex text (Elliott *et al.* 2007). Websites containing information written at the high school level are not appropriate for all patients, especially those with less than a sixth grade reading level. Thus, patients may be heartened to know that not all health sites will match patients' literacy level (Friedman *et al.* 2006, Friedman & Hoffman-Goetz 2007) and they should be encouraged to bring web search printouts and questions to office visits for discussion.

Implementing GATOR into practice

Most patients with computer access and rudimentary skills will surf the Web to find answers to health care questions. Those without access or skills will ask others such as family members or close friends to look for them. Therefore, the GATOR approach to web surfing should be implemented as a routine type of health education that nurses can provide. Firstly, the components of GATOR would need to be organised and written in an easy-to-follow format specifically tailored to the clinical population served. This could be distributed to patients at routine visits, while encouraging them to share previous information garnered from sites or friends and any actions taken as a result. Setting aside the time for this may prove to have large dividends, as patients' needs, current knowledge, access issues, abilities and most importantly, changes made to their health regimens may be revealed. Nurses would need to have a current list of community resources (e.g., local public library or adult education classes) available for referring patients who want more help in using the computer as they apply the GATOR strategy. They could also be encouraged to report back their findings and concerns.

Relevance to clinical practice

Due to convenience, anonymity, accessibility and availability, health care patients will continue to use the internet to locate health and medical information. It is not likely health information on many sites will ever be regulated, therefore health care professionals need to remember that patients are

accessing this information, encourage discussion about it and provide some kind of education on evaluating it. The GATOR approach to assessing health information websites is an easy to remember strategy that requires few resources to implement and can be taught to patients in just a few minutes.

Web-based content does not remain static nor should it in the case of health information that requires constant updates. However, decisions to maintain sites are driven by uncertain budget priorities set by government, academic institutions and health organisations resulting in site development and decommission on a daily basis. Currently, there are recommended strategies for evaluating internet-based health information, but these are typically only available to health care professionals in the scientific literature. Moreover, little information is available in any venue that describes how to help patients learn to evaluate Web-based health information. The GATOR approach may empower patients to evaluate with more accuracy the information they seek for understanding their own health conditions and options for treatment (Table 1). This is particularly important regarding self-diagnosis or changes to existing treatment based on information from a health website.

Table 1 Practice points

<p>Asking patients about web-based health information may (1) precipitate them sharing concerns, fears, or actions (including discontinuing/mixing medications or seeking less expensive but potentially dangerous alternative strategies) and (2) provide an opportunity for discussion that leads to nurse-provided information rather than internet-provided information.</p>
<p>Suggesting that patients discuss information gleaned from web-based sources can be couched in terms of providing them a 'second opinion.' This may help encourage them to be forthright about their web-based search for health information.</p>
<p>Empowering patients to use the GATOR approach to assessing web-based health information will provide realistically applicable strategies to access health information and seek a second opinion of their primary care provider.</p>
<p>Discussing the differences between 'less than desirable' and trustworthy websites that follow GATOR criteria can be a teaching strategy. Examples of GATOR web sites include but are not limited to those managed by government agencies (e.g., NIH, FDA, CDC, etc), public and private organisations (.org) that manage specific health conditions such as arthritis, diabetes, stroke, COPD, etc. and sites managed by large educational institutions.</p>
<p>Helping patients to realise through non-judgmental discussion that wikis and blogs should not be consulted for health information due to the nature of origin.</p>

Contributions

Study design: BW, SY, DD, PS; data collection and analysis: BW, SY, DD, PS and manuscript preparation: BW, SY, DD, PS.

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