Nutrition and health informatics

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Abstract

The Internet is playing an increasingly important role in the lives of people across the globe. The areas of nutrition and health are among the fastest growing areas of interest on the Internet, and are the main topics many people search for when 'surfing' the Internet. As the information age progresses, consumers will become more health literate and health professionals will have to ensure they can provide advice as to how their patients can find reliable web sites among the many misleading and biased sites on the Internet. This paper predicts the role the Internet will soon play in everyday life, and provides a guide to assessing the reliability of health and nutrition web sites. © 2001 Elsevier Science Inc. All rights reserved.

1. Introduction

The defining characteristic of the "information age" is the fusion of computing and communications [1]. The simplest demonstration of the information age and its impact is the digitization of information and the globalization of digital communications through the

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arrival of the Internet and the World Wide Web (WWW) [1]. Consumers can now gain free access to an expanding volume of information that previously was inaccessible.

The precursor of the Internet was APRAnet, which was created by scientists working at the US Department of Defense. Their goal was to construct a network that would continue to function even if parts of it were destroyed in a nuclear attack. This premise enabled the Internet to be 'born'. The Internet is a computer network that connects millions of computers globally. It has evolved into a robust decentralized system where new networks can be added as required and the resulting load on the system is leveled without bringing the total network to a halt. It is comprised of academic, commercial, government, non-government and military networks, has no central location and is not owned by a particular entity. The newest Internet service, the WWW (since 1992), is the front end to the Internet allowing people to combine text, graphics, audio, and video into a rich communications medium or multimedia environment, making it more accessible and user friendly.

One principal effect of the WWW has been to "democratize" information by shifting the emphasis from institutions (public or private), to individuals as publishers of information [1]. The Internet is fast becoming the world's greatest repository of readily accessible information, although this information is not catalogued in any conventional manner [1]. An estimate in mid 1999 indicated that there were 800 million pages of information on the Internet. At any time, a single search engine can cover no more than 16% of these pages [2]. The number and type of websites (in particular health and nutrition based web sites) is increasing exponentially - some contain information of little educational worth, but many could prove useful. At present, however, there are no agreed protocols for renewal and evaluation of the information on the Internet.

Medical, Nutrition or Health Informatics are the names given to the study of information and communication processes, principally via the computer and Internet, but also via the telephone, video, television and others still to come. In this century, the study of informatics will become as fundamental to the practice of medicine and other related disciplines, as anatomy has been to the last century.

1.1. How many Australians are surfing the Net?

The Australian Bureau of Statistics conducted a survey in February 2000, collecting information from 3,200 adults randomly selected from private households, excluding those in remote and sparsely settled areas. From February 1999 to February 2000, half (50%) of the households in Australia, or 3.5 million households, had access to a computer at home. The number of households with home Internet access rose to 1.9 million, or 28% of all Australian households [3]. In comparison, 45% of Australian households had a home computer and 18% had home Internet access in February 1999 [3]. The increase in the number of households with home Internet access (662,000 households) was more than double the increase in the number of households with home computers (322,000) over the 12 months to February 2000.

While the proportion of households with home access continues to rise for both computers and the Internet, the difference is decreasing. Higher levels of access occur in households with higher incomes, in households with children under 18 years, and among households

Table 1
Household access to computers or the Internet in Australia

	Households with access to computer at home			Households with access to the Internet at home		
	February 1998 %	February 1999 %	February 2000 %	February 1998 %	February 1999 %	February 2000 %
Household income						
$0–$49,999	29	30	34	7	9	14
$50,000 or more	63	60	69	21	33	45
Households						
With children under 18 yrs	64	64	68	19	25	37
Without children under 18 yrs	29	35	39	9	14	22
Region						
Metropolitan areas	46	50	54	16	23	33
Other areas	36	38	42	7	10	19
Total	42	45	50	13	18	28

Proportions are of all households in each category. Source: Use of the Internet by Householders, Australia, February 2000, ABS (Cat no. 8147.0).

located in metropolitan areas. Adults with incomes of $40,000 or more were more likely to be Internet users than adults with incomes under $40,000 (66% compared to 37%). Employed adults were twice as likely as unemployed adults (56% versus 23%) to be Internet users, while adults residing in metropolitan areas were more likely to be Internet users than adults residing outside metropolitan areas (47% compared to 37%) [3].

The likelihood that an adult is an Internet user decreases dramatically with age. In the 12-month period from February 1999 to February 2000, 77% of 18–24 year olds accessed the Internet compared to 13% of adults aged 55 years or over. About 30% of adults aged under 55 accessed the Internet at home and 25% accessed the Internet at work; 62% of 18–24 year olds also accessed the Internet at other sites (e.g. university, Internet cafes) compared with about 20% of adults aged 25–54 years (Table 1, 2). Less than 15% of Australians aged 55 or over accessed the Internet at home, work or other site compared with more than 50% of adults aged 18–54 during the 12 months to February 2000. Access to computers at home, work or other site was about 30% for adults aged 55 and over compared with about 80% for adults aged 18–54 years.

1.2. Is surfing good for your health?

It has been predicted that the Internet will essentially change the way health and medicine are practiced—one important change is that consumers will have more control.

Health and nutrition is becoming big business on the Internet, just as it is in all other forms of mass communication. In the US the most common reason people use the Internet is to look for health and nutrition information [2]. Australia is well behind the US in terms of consumer health and nutrition sites. The large volume of health information resources available on the Internet has great potential to improve health [4]. But amid the plethora of health and

Table 2
Adult computer use and Internet access in Australia, by site during the past 12 months to February 2000 (a)

Age (years)	Site of computer use (b)				Site of Internet access (b)			
	Home %	Work %	Other %	Any site %	Home %	Work %	Other %	Any site %
18–24	57	43	80	92	36	21	62	77
25–39	49	57	44	80	30	29	26	55
40–54	53	51	31	72	26	26	11	43
55 or over	20	16	11	28	9	6	3	13
Employed	54	63	41	81	31	32	24	56
Unemployed	27	na	28	40	13	na	15	23
$0–39,999	38	31	36	59	19	12	21	37
$40,000 or more	60	75	40	88	38	46	23	66
Metropolitan areas	47	44	37	67	28	22	22	47
Other areas	36	38	34	61	16	19	18	37
Total	43	42	36	65	24	21	20	43

a. Proportions are of all adults in each category; b. Adults can nominate more than one site if applicable na = not applicable; Source: Use of the Internet by Householders, Australia, February 2000, ABS (Cat no. 8147.0).

nutrition related web sites are many sites that provide less than reliable information. For the average consumer, sorting through this information for credible sites can be daunting and the potential for harm from misleading and inaccurate health information is of concern.

The Internet has been described as the largest collection of misinformation the world has ever seen. One of the biggest disadvantages is the difficulty of sourcing and authenticating information, and this can be particularly dangerous when it comes to health. Virtually anyone can set up a web site, which increases the risk of misinformation due to bias or ignorance. Web site authors can often hide commercial or other interests, which makes it all the more difficult for consumers to distinguish between credible and not-so-credible information.

The Internet brings information directly to the consumer, cutting out the 'middle-man' so to speak—which in this case happens to be the health professional. If a General Medical Practitioner, Dietitian or Physiotherapist, for example, hands their patient a pamphlet, the patient will trust the contents of the pamphlet. But the Internet gives access to information without the same checks and balances in place; it makes what is known more available, but also introduces the risk that what is found is untrue.

So how does the average web 'surfer' become well informed rather than ill informed? Health consumers must first try to ensure that the information source is credible and to exercise caution. Some web sites have an icon indicating that the site ascribes to the principles of the Health On the Net (HON) Foundation (http://www.hon.ch/HONcode/). HON aims to protect consumers from misleading health information by establishing a voluntary code of conduct for medical and health web sites. Subscribers to the code pledge that the information provided on their site is given by medically trained and qualified

professionals. The code also guarantees that confidentiality of visitors' information is respected and that any sponsorship will be clearly identified (see Fig. 1).

Despite these problems, the Internet has many advantages, one of which is that published information on the Internet can be updated more regularly and with greater ease. As a result, consumers and professionals expect that the information they are receiving is up-to-date and correct.

There is also no disputing that the Internet provides wonderful opportunities for people who are not ambulatory, or who live in remote communities, to access nutrition and health information. Spending some time on the Net before a patient/consumer goes to see their health professional may help them get more from the consultation. The Internet should by no means replace a face-to-face consultation with a doctor or health professional, but this information may prompt the consumer to ask more questions, and also to ask the right questions.

1.3. Website fitness check-up

A good place to start when seeking health information is government websites, such as Australian Health Online, HealthIn*site* (Australian Federal Government), Better Health Channel (Victorian Government), and the Healthy Eating Information Web-Centre: Eat Well Live Well (Fig. 2). The content of these websites is provided through partnerships with selected organizations and is assessed by an editorial board before publication to ensure the site maintains credibility.

Aside from being linked to well trusted organizations, web sites can also inherit their credibility. Web sites based on popular peer reviewed journals such as the British Medical Journal and The Lancet Interactive (based on the Lancet journal), or web sites of widely recognized professional bodies such as the Dietitians Association of Australia, are such examples. The Mayo Clinic is a US health related web site that provides comprehensive health information from qualified professionals.

Some websites have been set up in an attempt to eliminate misleading health information from the Internet. A US site, Quackwatch, set up by retired psychiatrist, Dr Stephan Barrett is one such site. It is a non-profit organization that fights health-related fraud, myths, fallacies and fads. It also provides useful information about recommended websites, and those not so highly recommended.

Users of the Internet must recognize some Internet-specific caveats. In seeking out new information on the web, while at the same time attempting to separate hearsay, anecdotal reporting, and quackery from authentic information, the reader should ask him- or her-self a series of questions, such as those outlined in Fig. 1. Upon answering these questions the consumer should have a good idea as to whether or not the website in question is credible.

1.4. The Net and implications for the patient-health professional relationship

1.4.1. Implications for the patient and consumer. There is at least one major caution to be acknowledged in the rush to master the Internet—basic computer skills are not the same as

Figure 1: Web site fitness check-up.

- **Who are the contributors?** Nutritionists and health care professionals should be prominently listed as contributors to a Web site.

- **Does the web site identify its publisher properly? What institution/affiliation supports the authors?** Most Web sites have owners and or sponsors who may have a proprietary interest in promoting a product or agenda. It should be clear, from the home screen or by a direct link from the home screen, who owns the site, who they are affiliated with, and who the significant investors are. Copyright ownership should also be indicated.

- **Information about registration?** Registration requirements, any necessary payment and privacy protection should be provided and easy to find.

- **Is there an editorial process, is information up-to-date and is the site efficiently managed?** A description of the editorial process and method of content review should be posted on the site, as should a list of staff members and other individuals responsible for content quality. The site should be frequently updated. Generally the most recent updates are posted. There should also be a "search" component to access all the resource information of the web site. The dates that content is posted, revised, and updated should be clearly indicated, and time-sensitive content should be periodically reviewed.

- **Is the information balanced?** Does the author present two sides of an argument, are possible biases discussed, and are the authors' and publishers' interests in the topic declared?

- **Does the information contain traceable references to support the evidence presented?** Sources of specific content should be clearly identified (i.e. author byline, or the name of the organisation providing the content; affiliations and relevant financial disclosures for authors and content producers should be clearly indicated.

- **Does the web site identify its sources of revenue? Is the information designed to sell you something?** Any commercial sponsorship should be clearly indicated, and content should be easily distinguished from advertising.

- **What links to other web sites and databases are provided?** There should be links to other reputable professional sources of information such as the National Library of Medicine's MEDLINE, which holds records and abstracts of over 3,500 medical journals and other publications.

Figure 2: Health, Food & Nutrition Web-sites

Health/Medical/General

- **National Library of Medicine's Medicine** (http://www.nlm.nih.gov) **& PubMed** (http://www.ncbi.nlm.nih.gov), **Medscape** (http://www.medscape.com) to search scientific papers/abstracts in journals

- **Internet Public Library** (http://www.ipl.org)

- **Health On the Net Foundation** (http://www.hon.ch/HONcode/)

- **Health *InSite***—Australian Federal Government (http://www.healthinsite.gov.au)

- **Better Health Channel**—Victorian Government (http://www/betterhealth.vic.gov.au)

- **Mayo Clinic** (htpp://www.mayohealth.org)

- **ABC Radio National 'The Health Report'** Dr Norman Swan (http://www.abc.net.au/rn/)

- **International Diabetes Institute** (downloadable reports on diabetes/obesity) (http://www.idi.org.au)

- **Encyclopedia Britannica** (http://www.britannica.com)

- **Australian Heart Foundation** (http://www.heartfoundation.com.au)

- **Quackwatch** (http://www.quackwatch.com)

- **Drkoop** (http://www.drkoop.com)

- **On Health** (http://www.onhealth.com)

Food

- **Australian Consumers Association** CHOICE magazine on-line articles (http://www.choice.com.au)

- **Food and Agriculture Organisation** of the United Nations (http://www.fao.org)

- **Australian New Zealand Food Authority** (http://www.anzfa.gov.au)

- **National Agricultural Library** (http://www.nal.usda.gov/)

(continued)

Figure 2: *(continued)*

<u>Nutrition</u>

- **Healthy Eating Information Web-Centre: Eat Well Live Well** (Directors: Dr. A. Kouris-Blazos & Professor M. Wahlqvist): nutrition content provider for Health*InSite* and Better Health Channel; includes a 'Virtual Library of Nutrition/Health Articles and Reports' on the Web; on-line nutrition books "Food Facts" and "Food Questions and Answers" (http://www.healthyeating.org)

- **Nutrition Australia**—formerly known as the Australian Nutrition Foundation (http://www.nutritutionaustralia.org)

- **American Dietetic Association** (position papers) (http://www.eatright.org)

- **Dietitians Association of Australia** (http://www.daa.asn.au)

- **CSIRO Human Nutrition** facts sheets (http://www.dhn.csiro.au/)

- **Tufts University Nutrition Navigator** (http://www.navigator.tufts.edu)

- **Mayo Clinic Nutrition Centre** (http://www.mayohealth.org)

- **Colorado State University Cooperative Extension**—(http://www.colostate.edu/Depts/CoopExt/)

- **Arbor Nutrition Guide,** Dr Tony Helman editor-in-chief (http://www.arborcom.com)

- **Alan Borushek's** (nutritionist) on-line food data base and library of nutrition information (http://www.idietclub.com.au)

- **Dr Rosemary Stanton's** (nutritionist) on-line pamphlets (http://www.woolworths.com.au)

- **Katherine Saxelby's** (nutritionist) on-line nutrition information (http://www.foodwatch.com.au)

- **Matt O'Neill** (nutritionist) nutrition, body image and fitness information (http://www.bodyscoop.com.au)

- **Nutritiongate** (CABI publishing); on-line community for specialists in nutritional science (http://www.nutritiongate.com)

- **Nutrition News,** Professor Klurfeld (from Wayne State University Detroit and Editor-in-Chief of the Journal of the American College of Nutrition) (http://www.nutritionnewsfocus.com)

- **Sanitarium Nutrition Education Service** (http://www.mynutritionist.sanitarium.com.au)

being skilled in the 'management' of information. The ability to surf the Web does not imply that one understands the principled use of information, just as the ability to suture does not make one a surgeon [5]. Searching for and locating information are only starting points, after which the Internet users themselves must choose appropriate resources to guide their decisions. Judging whether the information is applicable and credible may present a greater challenge than just searching for information. Therefore, the Internet should not be used in place of doctors and health professionals. Health professionals are trained to collate, distill and apply clinical research and to manage uncertainty in clinical knowledge.

The Internet could also prove to be a valuable tool for consumers and their friends and relatives. This may be particularly so in the case of newly diagnosed life-threatening diseases, where electronic mailing lists, online support groups and websites committed to the disease in question may provide valuable knowledge and support [6].

1.4.2. Implications for the health professional. Computer use is constantly increasing with more people spending a greater part of their day sitting in front of a computer. This has important implications for physical activity and obesity levels. Increased computer use will undoubtedly reduce activity in a large proportion of the population, which in turn, may contribute to an increase in obesity and related health disorders such as cardiovascular disease, diabetes, and osteoarthritis. As a result, future health promotion initiatives may need to focus more on increasing activity levels (both exercise and incidental). Although, the computer, is contributing to the decline in activity, it can become an avenue through which these programs can be run. This may be through a computer program that alerts users to take a break and get up each hour, or through a website that can be utilized in the workplace which encourages employees to include more movement (incidental activity) in their day.

The Internet is an information resource that is accessible, and in many cases contributed to, by an increasing number of consumers, which has implications for medicine, nutrition and related areas. It is important to recognize that patients will increasingly turn to such sites for medical and other information over the next few years. Patients are likely to become more medically and nutritionally literate. As a result, there will need to be a shift in the health professional-patient relationship that focuses on sharing resources and negotiating treatments [1]. Health professionals will need to review and evaluate relevant sites regularly and offer advice on locating accurate and up-to-date information. In future, the waiting room may well move from the surgery to the home, as people consult their health and nutrition professionals on-line.

Acknowledgments

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