Main messages

- This paper focuses on the consumer-patient’s experience of a changed health landscape, with a particular emphasis on the Internet.
- eHealth is the use of emerging information and communications technology, especially the Internet, to improve or enable health and healthcare.\(^1\)
- eHealth may reduce barriers to health equity by improving people’s understanding of health issues, and facilitating better access to medical services. At the same time, barriers in technology and literacy may increase inequities in health.
- A rise in health literacy facilitated through Internet health education will have significant downstream health and economic benefits. Yet, governments and health care providers have still to find a coordinated response to a development that is being driven by consumer demand.
- The Internet is a global communication tool, allowing a rapid exchange of information at low cost to those who can access it.
- Online health information seekers are more likely to be female, young, have higher incomes and be better educated.
- Convenience of services, the relative anonymity of the Internet and the abundance of information are major reasons why consumers seek health information online.
- Gateway websites, such as HealthInsite, collate a restricted number of health sites selected on a particular topic or of certain quality standards. They are frequently provided by government or health organisations concerned with patient education.
- Health consumers would like health professionals to direct them to relevant websites.
- Although many consumers access health information through unguided channels or are not aware of certified quality markers, some evidence indicates that the potential risk of being misinformed is reduced by peer review-like processes inherent in many search engines or the self policing nature of virtual communities.
- Virtual communities are social networks formed through electronic media that simulate self support groups and operate as listservers, live chat rooms or through instant messaging, and email. They may be unmoderated or moderated by health professionals.
- The Patient Portal system integrates various components of email and Internet applications and can be linked to an electronic medical record (EMR), or to a personal health record (PHR). Patient portals allow patients to participate in administrative actions, clinical issues and in reviewing their record.
Introduction

The Internet offers new pathways by which health services and health information are accessed and delivered outside the traditional face-to-face patient-doctor relationship.

At the same time, health care systems are challenged by an ageing population, increased chronic disease, costly healthcare technologies and increased consumer demand.

Health care providers are also pressured to keep abreast of the information and innovations generated by medical research amid growing pressure to put evidence-based medicine into practice.

Further there is a need to address persistent inequalities in access to health care services, a major concern of universal health care systems.

Changes in health care systems are paralleled by rapid advances in health related information and communication technology (ICT) affecting health service. Examples include electronic health records (EHR), e-prescribing, the provision of decision support systems, the electronic management of chronic disease, and bar coding of drugs and biological products.¹

Potential benefits resulting from these developments include:

- improved access to health related information by both health provider and patients
- provision of care not previously deliverable
- improved access to services and increased care delivery
- improved professional education
- quality control of screening programmes
- reduced health care costs.²

These emerging technologies, frequently referred to as eHealth (Box 1), are met with great expectations by national governments, international health advocates, the general public and health care providers alike. They are seen as being pivotal in improving efficiency and quality of health care services.

This paper focuses on the consumer-patient’s experience of a changed health landscape, with a particular emphasis on the Internet. This experience, however, cannot be disconnected from developments within the health system.

Health management in the future is most likely to depend on a broader communication highway, that will involve on a global level the Internet and at a local level traditional health service providers connected by inter-operable ICT systems.

This paper outlines the possibilities and challenges of eHealth as they relate to the consumer-patient. The focus is on:

- ICT in health services
- The Internet and health care
- Health and health disparity
- Health education online
- Quality of health online
- The empowered ePatient
- Crossroads to telehealth.

ICT in health services

Around the globe Information and Communication Technology (ICT) is seen as a key means of solving problems increasingly experienced by health care systems. In recent surveys in the US 75% of primary care physicians indicated that IT could reduce medical errors and 70% perceived IT as having the potential to increase their productivity. Over 60% indicated that IT could reduce costs and help patients assume more responsibility.³ In addition, it is estimated that adoption of EHRs alone could save the US health system 81 billion dollars annually. There is also evidence that electronic prescribing can reduce prescription errors and improve compliance with managed care formularies.⁴

Further online surveys found that a majority of adults in the US thought electronic medical records had the potential to reduce redundant or unnecessary tests and procedures (76%), reduce health care costs (73%), and decrease the frequency of medical errors (62%). In addition, a large majority of respondents expressed an interest in communicating online with their physician in various different capacities.⁵

The World Health Organization (WHO) recently passed a resolution noting “the potential impact that advances in information and communication technologies could have on health care delivery, public health, research and health-related
activities for the benefit of both low- and high-income countries. Aiming to provide "Member States with strategic information and guidance on effective practices, policies and standards in eHealth" the WHO initiated the global observatory for eHealth (GOe). In an international survey on eHealth conducted by GOe, over 50% of OECD and 70% of non-OECD countries rated the implementation of a wide range of eHealth tools as very or extremely useful, emphasising the global trend towards ICT based health services.

In Australia, Commonwealth, State and Territory Governments have launched various initiatives, notably the national eHealth transition authority (NEHTA) set up in 2005 to facilitate a secure, inter-operable eHealth environment across the nation. Resulting from that is HealthConnect, an overarching national change management strategy with the objective to establish and maintain a range of standardised electronic health information products and services.

To reduce major potential barriers restricting the use of IT in primary care services - the high initial costs and uncertain payoffs to physicians - the Practice Incentives Program (PIP) was implemented in 1998, whereby practitioners could receive direct payments for the implementation of health related IT software allowing for electronic prescription, electronic clinical data transfer and use of an electronic health record (EHR). A simplified and improved version of this program took effect in November 2006 (PIP IM/IT Incentive, 2006). Aided by these incentives, a rapid increase in computerisation took place in general practice. Recent surveys found that Australian general practice is now almost universally computerised with over 90% of practitioners routinely using clinical software.

However, while some applications of clinical packages such as electronic prescribing are widely used in general practice, other functions are not. Having the technology implemented

Box 1: Definitions

eHealth

eHealth is the use of emerging information and communications technology, especially the Internet, to improve or enable health and healthcare. eHealth is an emerging field of medical informatics, referring to the organisation and delivery of health services and information using the Internet and related technologies. In a broader sense, the term characterises not only a technical development, but also a new way of working, an attitude, and a commitment for networked, global thinking, to improve health care locally, regionally, and worldwide by using information and communication technology.

Telemedicine/telehealth

The terms telemedicine and telehealth have been frequently used to describe the application of electronic communication and information technologies to provide or support clinical care at a distance. More restricted telemedicine may refer to the exchange of clinical and confidential data with a limited number of patients and physicians involved. This can also include for example a doctor’s advice to a patient over the telephone.

Cybermedicine

By contrast, cybermedicine is defined as “a global exchange of open, non-clinical information, mostly between patient and patient, sometimes between patient and physician, and between physician and physician” and mainly “applied to preventive medicine and public health” (see Figure). This definition emphasises that telemedicine applications on the Internet may facilitate an important shift away from the traditional concept of disease management in a patient-doctor relationship towards measures to prevent the occurrence of disease as well as the reduction of consequences of disease. Some eHealth researchers have pointed out that while telemedicine has hardware-centric aspects and its implementation is often technology driven, cybermedicine is characterised by a “consumer pull.”

Source: Gunther Eysenbach, “Cybermedicine?”

http://yi.com/home/EysenbachGunther/cybermedicine.htm

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The Internet & health care

As a global communication tool the Internet allows for the rapid exchange of information at low cost to those who can access it and is “uniquely capable of integrating modes of communication and forms of content.”

Consequently, its use for seeking and delivering health care has increased rapidly and includes health information seeking, Internet-based peer support groups, online health consultations and delivery of health interventions.

While health care professionals remain reluctant, the public has readily embraced the potential of the Internet as a health care medium. A recent US survey (July 2007) found 71% of adults used the Internet for health care information, representing 84% of all online adults. On average, individuals that search the net for health related purposes do so about six times per month.

As the demand for online health information increases, so does the supply. Every month an estimated average of one thousand five hundred new sites are added to more than one hundred thousand health related websites. As a consequence, the user has the added burden of determining how to handle this increased information. Alejandro Jadad in a recent editorial in the British Medical Journal (BMJ), illustrated this with a google search 100 days into the outbreak of severe acute respiratory syndrome (SARS) in 2003 using the term “SARS” which yielded over five million hits.

Health & health disparity

eHealth: solution or part of the problem?

In Australia significant health disparities persist between community groups. Socioeconomic disadvantaged and ethnic minority groups have traditionally been found to have poorer health status but a social class-based health gradient may exist even among the well educated and employed.

Differential access to care is one key contributor to inequity in health, determined by the general availability of services and the effective utilisation of or access to these services. A number of significant barriers can impede adequate care, for example difficulties in establishing a consistent doctor-patient relationship, cultural and language barriers, and low health literacy.

Yet health care has been estimated to contribute to only 15% of the health status of a person. Other relevant determinants are the individual genetic makeup and variables such as the environment, individual health behaviours and community resources, factors influenced greatly by the public health system and social and economic policies.

eHealth may reduce barriers to health equity by:

- Improving people’s understanding of health issues, mainly through Internet based services such as websites, virtual communities and Internet based medical information services.
- Facilitating better access to medical services. Various dimensions of access were discerned, all of which are likely to be influenced by aspects of eHealth (Table 1).

The digital divide

There is growing concern by eHealth researchers that a “digital divide” may even increase inequities in health, in particular with relation to barriers in technology and literacy.
1) The technology barrier
Access to relevant hardware affects both consumers and providers due to financial and/or human capital constraints. An important issue is the limited access to broadband services that exists in those community groups “traditionally under-served by the healthcare system and who suffer the greatest health disparities.”

While the Australian government has identified broadband as “a key enabler for eHealth and improving access to information at the point of care to maximize patient safety and quality of care” significant variations exist between states and regional areas (see Table 2). Notably, at census night 2006 31% more households were connected to broadband in capital cities compared to the rest of the country.

2) The eHealth literacy barrier
Usability and content of programs or Internet based services may raise significant barriers to some user groups due to factors such as lower general literacy and possibly cultural and ethnic differences.

Consumers with limited literacy skills were found to have less knowledge of disease management and health promoting barriers, report poorer health status, and are less likely to use preventive services than those with average literacy or above. Basic literacy is intricately linked to general health literacy, and eHealth literacy defined as “the ability to seek, find, understand, and appraise health information from electronic sources and apply the knowledge gained to addressing or solving a health problem.”

In Australia, however, according to the Australian Council of Literacy 47% of the population lack adequate literacy skills to even cope with the demands of everyday life and work, with 48% of those not speaking English as their first language ranking at the lowest literacy level. Importantly, many individuals are not aware of their inadequacies: 70% of those at level 1 (of 5 levels) on the prose literacy scale rated their reading as good or excellent. This carries a potential risk of being misinformed due to overconfidence in their personal ability to understand the medical information they access.

The Internet offers opportunities to target individual literacy levels. Yet, there is currently little evidence that this potential is actually utilised. Various studies suggest that most web based health information is too difficult to be understood by average consumers.

### Table 1: Dimensions of access to health care influenced by eHealth

<table>
<thead>
<tr>
<th>Access to health care</th>
<th>How eHealth influences this</th>
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<tr>
<td>Availability - the provision of resources (e.g. health personnel, equipment, materials, facilities).</td>
<td>Telemedicine may reduce availability barriers by the provision of care and medical services not previously deliverable.</td>
</tr>
<tr>
<td>Accessibility - the geographic accessibility of services.</td>
<td>Telemedicine is expected to improve equity of access to care between and within regions, previously denied due to socioeconomic constraints or specialised service that tend to be centralised in urban centres.</td>
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<tr>
<td>Accommodation - the efficiency of existing services.</td>
<td>Advances in communication technology are expected to facilitate communication between service providers and patients, leading to: 1) faster access to health professionals 2) increased convenience, and time savings for patients.</td>
</tr>
<tr>
<td>Affordability - the direct and indirect costs of health care services involved in their consumption.</td>
<td>eHealth is expected to have longer term great economic benefits, set to reduce affordability barriers of services. However, costs associated with implementation of technology may in some instances have a negative impact on affordability.</td>
</tr>
<tr>
<td>Acceptability - factors such as ethnic background, class, culture and diagnosis that affect use of health care services.</td>
<td>eHealth has the potential to provide “customised” health information and could help reduce acceptability barriers. At the same time, the use of eHealth may for some groups create new barriers negatively impacting on provider acceptance.</td>
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A surprising result was that websites with a TLD (Top Level Domain) of .gov were written at a collegiate level according to readability scores. Two government websites were specifically intended for seniors who require comprehensible and age-appropriate cancer information.27

It has been argued that the gap between what is provided and what can be accessed by consumer groups needs to be acknowledged and remedied,32 for example by using plain language and tailoring the presented information to the needs of consumers.27

**Health education online**

**Surfing the Net for health**

Health and science take 4th and 6th place of the most frequently searched topics, dependent on different search engines.36 Approximately 4.5% of all searches are health related, which amounts in Google alone to an estimated 6.75 million searches per day.35 This underpins the growing importance of the Internet for health education, although consumers continue to value their health care professionals as the primary source.36

A study in which participants were asked to find answers to a series of health questions showed participants used mainly general search engines. None used medical portals (see below). Participants only explored the first few links retrieved and paid little attention to source, disclaimers or quality disclosure statements, although they stated otherwise in focus groups.37

Similarly, a frequently cited poll by the US Pew Research Center <http://people-press.org/about> indicated that although most Internet users (86%) were generally concerned about the reliability of available health information, 52% of users searching for health rated ‘almost all’ or ‘most’ retrieved health information as credible.38 This suggests an existing gap between general awareness of consumers about risks involved in retrieving online health information and the precautions they take in the practical usage of it.

**Impact of health websites on consumer behaviour**

A systematic review in 2002 found little rigorous research on how Internet use impacts on consumer health,39 although some evidence indicated health benefits.

However, a later survey by Pew suggests that online health information may impact significantly on consumer behaviours and decisions.38 In a recent study in New Zealand 61% consumers changed some aspect of their lifestyle as a result of their health related Internet searches. General health and nutrition information (45%), data about specific illness (42%) and medicine (40%) were the main search topics, comparable to results in other studies. The researchers also assessed how consumers valued the information they retrieved by attributing an economic value, which amounted to ~$NZ60, roughly the amount paid for a doctors visit.40 Notably, few participants were directed to relevant websites by health professionals,40 although studies indicated that health consumers would like doctors to inform them about quality and disease specific medical sites.41

Salo et al (2004) argue that physician-directed patient education is important, but often limited in its effectiveness due to time constraints, the unidirectional nature of physician-patient interaction and other factors. The directed use

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**Table 2: 2006 Census: Broadband Connections of Australian Dwellings**

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<th>NSW %</th>
<th>VIC %</th>
<th>QLD %</th>
<th>SA %</th>
<th>WA %</th>
<th>TAS %</th>
<th>NT</th>
<th>ACT</th>
<th>AUS</th>
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<tbody>
<tr>
<td>Capital City</td>
<td>45</td>
<td>43</td>
<td>44</td>
<td>31</td>
<td>41</td>
<td>31</td>
<td>32</td>
<td>50</td>
<td>42</td>
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<tr>
<td>Remainder of State/territory</td>
<td>28</td>
<td>32</td>
<td>28</td>
<td>19</td>
<td>29</td>
<td>24</td>
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of Internet sites could, however, provide an excellent source of supplemental education material leading to better-informed and possibly more compliant patients. \(^{41}\)

**Who searches, why and how?**

Despite the high overall percentage of online health information seekers, there appears to be marked differences between population groups. Women tend to use the net more frequently, and more often in relation to health issues of others. Men, however, search more frequently for sensitive health information, using the relative anonymity of the Internet. \(^{38}\)

Online seekers tend to be younger, have higher incomes and are better educated than individuals that rely on traditional pathways for health information. However, adolescents were found less likely to use the Internet for health information than adults. \(^{43}\)

Online seekers may also be happier and healthier. \(^{36}\) The causality of this finding is, however, unclear. Does Internet information actually help online seekers stay healthy or are groups in poorer health status, simply less able to access Internet based services, a result of an emerging digital-divide?\(^{42}\)

**Doing the doctor’s search**

In some instances, users can request extensive online reports on specific medical conditions or questions. MedCetera <http://users.netropolis. net/pgeyer/> provides (for a fee of $US80-250) extensive health reports of usually 50-80 pages, summarising current research on a particular health topic. The use of these services may require a high level of medical knowledge:

>A single paragraph from a sample search in MedCetera, for example, yields the terms "cephalometric", "intrathoracic" and "polysomnographic."\(^{43}\)

The article, however, also cites examples of how searches, in this case Health Resource, can pay off:

>Herb Karg of Corona del Mar, Calif., suffers from avascular necrosis, the degenerative hip disorder that ended Bo Jackson’s football career. Confining to crutches and told by his orthopedist there was nothing to be done, Karg ordered a giant search from Health

Resource. It turned up an article on an experimental treatment involving immersion in a pressurized oxygen tank. Karg contacted its author, a university researcher, and found a nearby hospital where he could try it. "About halfway through the treatment I began to feel less pain," says Karg, now 51 years old and employed in the aircraft-parts industry. In the eight years since, he says, "I have been crutch-free."\(^{45}\)

**Getting informed through peers: virtual communities**

Virtual communities are one of the emerging channels of health information. These social networks formed through electronic media often have the character of self support groups. \(^{44}\)

Virtual communities may operate as listservers, live chat rooms or through instant messaging and email, sometimes unmoderated or moderated by health professionals. Numerous communities are available on the Internet servicing millions of participants. The search engine yahoo alone lists more than 7000 communities focused on health care, 6000 on alternative medicine and more than 2000 on drugs and medicine. \(^{17}\)

Frequently virtual communities focus on a defined health issue. For example, the Association of Cancer Online Resources <http://www.acor.org/> includes over 100 discussion lists "designed to meet the supportive care needs of patients and loved ones dealing with cancer, regardless of who or where they are."\(^{45}\)

Alternatively, virtual communities may target a population group defined by individuals of similar circumstances, knowledge and experience. TeenNet set up by Health Canada aims to engage youth in health promotion using interactive technology. Young people from diverse backgrounds are involved in all stages of program design, development and dissemination. Various web-based resources provide information for adolescents and also inform health professionals. Projects range from forums to engage in public health issues to projects designed to assist adolescents in their personal health needs <http://www. teennetproject.org>.

For example, in Smoke free world young people analyse and discuss topics surrounding tobacco and globalisation, utilising also the global nature

By contrast, Cyberisle, another TeenNet initiative, is an interactive website providing information on health issues concerning adolescents. One integrated project, the Teen Clinic Online, <http://www.teennetproject.org>

’s seeks to link technology with the health care system and related services (eg. community organizations) by providing youth with information on how and when to contact a health professional, and how to negotiate these relationships.‘

As stated in a recent BMJ editorial:

‘Efforts like this illustrate how harnessing the insights, the power and the energy of our children may prove to be the most effective way to secure the sustainability and fairness of the health system in the information age.’

Professional health advice via the Net

The Internet can also deliver direct medical services or health advice by health professionals outside of a traditional practitioner-patient relationship.

The UK National Health Service (NHS) gives health information and advice 24 hours via telephone, Internet and a digital TV service <http://www.nhsdirect.nhs.uk>. Other Internet based services may be embedded within a commercial website. In Australia ninemsn hosts such a health section, which provides access free of charge to health professionals, such as GPs, Naturopaths, Plastic surgeons and others <http://www.health.ninemsn.com.au>.

These services are not without controversy. In 1998 a paper by Eysenbach and colleagues received widespread media attention. Using keywords “ask & doctor” or “ask & physician” the authors retrieved ten free and seven charging services on the net. Presented with symptoms of a serious, potentially fatal condition, five “cyberdocs” gave correct information while two gave “questionable advice”, risking a potentially fatal outcome. Notably, “none of the cyberdocs (all located in the US) objected to a “cross-border” consultation, which raises licensing and legal questions.”

Globally online services are emerging and offering medical help, exemplified by WebHealthCentre.com and Medindia.com, based in India, which are internationally accessible. WebHealthCentre.com is a healthcare portal offering online medical consultation and comprehensive healthcare information. Set up by Tata Consultancy Services (TCS), an Indian software consultancy, it is also associated with international clients, such as the Global Health Alliance (USA) <http://www.webhealthcentre.com>. Services offered to patients, doctors and hospitals include a telemedicine station, online storage of medical records, lab records, asynchronous online consultations with specialists, and real time consultations with consultants of various specialities. Detailed information is requested such as existing medical records or investigation reports (x-ray films or E.C.G. strips) and consumers are encouraged to setup a personal health record using a secure hotline account. An online consultation requires the consumer to indicate the area of the problem (cardiology, dermatology or diabetology, etc.) and then to complete a detailed questionnaire or consultation form.

Such medical sites blur boundaries between cybermedicine and telemedicine featuring aspects of traditional consultations without a defined doctor-patient relationship. The grey zone of emerging global health services may pose unprecedented legal and ethical challenges currently not sufficiently addressed. Further challenges may arise as patients confront their doctors with remote diagnosis by health professionals outside the health system they are operating in.

Quality of health online

‘...physicians hold the internet as a source of patient education in low esteem; doubting the quality of content and its usefulness as a source of information.’

In 2004 the Cochrane Library published a systematic review Interactive Health Communication Applications for People with Chronic Disease that appeared to confirm concerns about the quality of Internet content or as described in a recent editorial on JMIR, “the myth of the Internet causing harm to your health.” A press release contained statements such as “knowledge-seekers become so steeped
in information from the Internet they make treatment choices on their own, contradicting advice from their doctors”. This received widespread media attention with headlines such as “Is Cybermedicine Killing You: Click to Get Sick”. Two weeks later, the publication was retracted as seriously flawed, yet this received very little attention.48

By contrast, a largely unnoticed meta-analysis published at the same time investigated outcomes of Web-based interventions compared to non-Web-based interventions. It found “16 of the 17 studies revealed improved knowledge and/or improved behavioural outcomes for participants using the Web-based interventions.”49

Search for quality

Most online health seekers search with general purpose search engines. The most popular engine, Google, is based on a “PageRank” algorithm ranking search results by the number of hyperlinks existing to it, similar to the citation method used to rank medical journals.50 The frequency of Internet hyperlinks to popular sites was indeed shown to correlate with quality standards set for health information sites.51

To further assist consumers in selecting safe quality health information the American Medical Association (AMA) has published a set of guidelines similar to those for print publications: authorship of content, attribution of the sources of content, disclosure of funding and competing interests, and timeliness of the information presented. The AMA particularly emphasises privacy policies often not adhered to in health-related websites.52

Quality certification: The HON code

The Health on the Net code (HONcode) is a code of conduct for the health/medical domain developed in 1996 by the Swiss Health on the Net Foundation. This unique quality indicator employs a voluntary accreditation process, whereby the site operator applies to be assessed against eight principles (Box 3).53 Over 5000 sites in 29 languages are enrolled in this program50 including the Australian web portal HealthInsite <http://www.healthInsite.gov.au; see below>. These sites can be retrieved using HONselect <http://www.hon.ch/HONselect>, a health-purpose search engine operating in five languages.

Although such quality markers potentially provide some quality assurance, consumers may not be sufficiently aware of them when accessing health sites.57 In addition, health care providers themselves may lack awareness and fail to advise appropriately when patients ask for guidance.

Box 3: Summary of the eight principles of the HONcode53

1. Medical advice will only be given by medically trained/qualified professionals or otherwise clearly stated.
2. Information given is to support, not replace a relationship of physician and consumer-patient.
3. Confidentiality of consumer-patient data is respected.
4. Source data, clear references and update information will be displayed.
5. Claims of benefits/performance of a specific treatment or commercial product are supported by evidence given as in 4.
6. Information given in clearest manner possible. Webmaster email address is displayed.
7. Website support is stated.
8. If appropriate, source of supporting advertising clearly stated and advertising clearly separated from original content from operating institution.

Quality selection: Webportals or gateways

The sheer amount of retrieved information may cause difficulties in finding satisfactory information for specific queries.42 Gateway websites can provide some guidance by collating links to high quality health sites on a particular topic.

In Australia, HealthInsite is a government implemented Web health information site listing links to reliable information on health topics <http://www.healthinsite.gov.au>. It was installed amid growing concern about the quality of sites accessed by the public. In addition to general search functions HealthInsite lists quality assessed sites of interest within specific categories, a considerable help to consumers having difficulty identifying a specific search term.

Taking one step further, the LiveHelp assistance of the National Cancer Institute operates a live chat function linking consumers direct with a professional, which assists in general cancer questions and guides to relevant Web sites <https://cisssecure.nci.nih.gov/livehelp/welcome.asp#>.
consumers retrieve health information online. The abundance of information are major reasons why relative anonymity of the Internet and the convenience of services available 24/7, the reliance and patient power. This trend is characterised by disease to preventing disease and enhancing changes "the focus of health care from curing using email and online forums. This process consumers can give and access instant feedback actively in health-related decisions. Patient-actively in health-related decisions. Patient-

In summary, online health seekers can be guided through web portals or by quality certifications. Although many consumers may continue to access health information through unguided channels or not be aware of certified quality markers, some evidence indicates that the potential risk of being misinformed is reduced by peer review like processes inherent in popular "PageRank" based search engines or the self policing nature of virtual communities.

The empowered ePatient

As the Internet is interactive and consumer centric, it enables patients to participate more actively in health-related decisions. Patient-consumers can give and access instant feedback using email and online forums. This process changes "the focus of health care from curing disease to preventing disease and enhancing health status". This trend is characterised by Web based services encouraging consumers to be responsible for their health, facilitating self-reliance and patient power.

What motivates consumers to seek the Net?

Convenience of services available 24/7, the relative anonymity of the Internet and the abundance of information are major reasons why consumers retrieve health information online. The Web may also be useful for sensitive health topics, and may be increasingly used by people with stigmatising or sensitive illnesses (anxiety, depression, herpes, or urinary incontinence).

In analysing unsolicited emails to a dermatology website, Anderson et al found that site visitors also reacted to social changes, changes in health care systems and existing tensions in patient-doctor relationships such as:

- Unmet expectations raised by advances in medical areas such as acute care and infection control.
- Perceived "impersonal" specialised care, the physician's economic interests, lack of time and inability to appraise up to date information retrieved from the Internet.
- Increased "consumer choice" of providers, health care plans and insurance companies and increased personal out of pocket contribution generates consumers weary of cost reduction and quality trade-offs.
- Increased legal protection of consumers requiring patients to be better informed about their rights.
- A trend towards preventative medicine and the acknowledged value of patient education programs for primary care.
- A general increase in education levels in Western societies.
- Growth of general educational and inexpensive sources of information on the Internet.

The doctor - ePatient-relationship

A new class of patient, the ePatient, is emerging, who on average is better educated, belongs to a higher income group, is critical and wants personalized approaches to his health problems. Informed ePatients may lobby for a particular form of care, shifting the classical 'asymmetric' doctor-patient relationship with the doctor as sole care manager, towards an equal partnership in care management.

Internet health education changes the self-perception of patients as passive recipients of care to become active consumers of health services and information. This complicates traditional doctor-patient interactions which doctors need to adapt to. Two new possible patient scenarios are described below:

1. The "informed decision-maker" demands an active role using accessed information
to negotiate a treatment regime. This may challenge physicians used to traditional uni-directional ways of decision making, but benefits health outcomes.\textsuperscript{57} A “participatory” decision-making process entails that alternative evidence-based therapies proposed by patients are considered and evaluated. Doctors reluctant to accept patients’ participation in health decisions may risk losing patients.\textsuperscript{57}

2. The “knowledge-acquirer” wants to acquire knowledge but not engage in actual decision-making. If this is interpreted by doctors as a lack of interest in medical knowledge, they may miss the opportunity to recommend relevant Web sites. Such “Internet prescriptions”, however, are likely to benefit patients but require physicians to review content and currency of suggested material. This modern approach accepts patients as partners although physicians remain as prime decision makers guiding patients in filling gaps of knowledge.

**Remote doctor - ePatient communication**

The doctor - ePatient relationship not only experiences a “revamp” within the context of a face-to-face consultation but also outside of practice. Several respected US organisations have proposed online communication tools to revitalize primary care, to help improve doctor-patient communication and improve patient access.\textsuperscript{58} Many interactions can be handled by email\textsuperscript{59} such as informing patients of test results, arranging specialty referrals, receiving data on glucose levels, and adjusting medication doses accordingly. Emails or other communication tools on the Internet allow asynchronous patient-doctor communication and provide documentation, important advantages over spoken interactions.\textsuperscript{58,59,60}

Yet, email communication and consultation have not been widely adopted, due to barriers affecting both patients and physicians. Patients have concerns about email response time, fear of messages getting lost and a general preference to speak to a real person.\textsuperscript{61} Yet surveys in the US found over 90% of US adults would still wish to communicate with health providers online.\textsuperscript{5}

Physicians express considerable reluctance to engage in email communication, notably due to a) concerns about lack of reimbursement, b) concerns of patient privacy and confidentiality, c) medicolegal concerns, d) practical overflow concerns and e) fear of being inundated with emails of irrelevant content.\textsuperscript{58}

A US study found that 80% of physicians would be more willing to communicate via email if reimbursed.\textsuperscript{58} A similar concern exists in Australia, where no Medicare item number exists for email discourse with patients leaving doctors either to donate their time or set up a private billing system.\textsuperscript{60}

Fear of being inundated with irrelevant mail may be largely unfounded. A content analysis of primary care patient emails found tone and content of the majority of emails as appropriate, with over 94% of all emails related directly to medical issues.\textsuperscript{61}

Privacy concerns can be addressed by guidelines\textsuperscript{62} or recommendations\textsuperscript{63} on how to set up secure email systems. It is noteworthy, though, that cumbersome security procedures may raise considerable access barriers for patients and providers negatively impacting on usage.\textsuperscript{64}

**One step further: Patient Portals**

Patient Portals integrate components of email and Internet applications. They may be linked to an electronic health record (EHR), or, alternatively, to a personal health record (PHR) containing some aspects of the EHR like a person’s health history, medication list, allergies, health problems and a documentation of email communications (Box 4). In some definitions the PHR is used synonymously with the Patient Portal.\textsuperscript{58}

Patient Portals allow patients to participate in administrative actions (e.g. appointment scheduling, medication refills, billing) and clinical issues (e.g. correction of medications and allergy lists). Reviewing their record, patients can add information that matters to them.\textsuperscript{66} In the US Dartmouth-Hitchcock Patient Portal\textsuperscript{66} patients pay by credit card for an E-visit with a clinician with whom they have an established ongoing therapeutic relationship, supplementing but not substituting regular consultations.
Dartmouth-Hitchcock uses E-visits to follow up chronic conditions (e.g. diabetes, hypertension, anemia, depression) or for acute episodes of chronic conditions (e.g. back pain, sinusitis). Of the various features offered, clinical messaging is most frequently requested, followed by medication renewal, new appointments, demographic update, rescheduling appointment and referrals. Patients also review allergies and medications online.

In the US, many insurances are now moving towards reimbursing these online consultations. Many patients may also be prepared for out-of-pocket payments (61% of Internet users would pay more than $US10 and 31% more than $US50 a year) potentially offering a new stream of revenue for primary care practices.

Who uses Patient Portals?

Users of patient portals have a higher satisfaction with their provider than those who do not. However, a health care study profiling users of the US portal PatientSite found that while PatientSite use grew steadily after its introduction in 2004, enrollees were younger, more affluent and had fewer medical problems than non-enrollees. Some Patient Portals may thus serve the “worried well” more than the chronically and seriously ill that could benefit most from it. Physicians may further entrench this disparity by selectively agreeing to interact electronically with selected patients. Better usability of these services may require all stakeholders to overcome a traditionally physician-centred approach to medical records accepting applications that can be customised to patient’s interest and aptitudes.

Provider Benefits of email communication

There is some uncertainty about the potential positive or negative impacts of secure email messaging on general practice. One study found that increased email usage had no effect on the number of phone consultations, yet generally addressed an unmet need for relevant communication in primary care. A subsequent larger study used a similar approach, applying a system of secured messaging merged with patient records. Although again there was no correlation between the number of phone consultations and email usage, it was found that 1.5 emails sent per patient per year reduced office visits on average by one visit per patient per year.

The most appealing reason for patients choosing electronic communication instead of office consultations is that visits are perceived as a more burdensome alternative for patients not needing physical examinations.

eHealth in a remote setting

“A big problem for places like the Northern Territory (NT) is that it is often very difficult for health professionals working in different settings to have a detailed knowledge of patient histories and outcomes as people move from one health service to another, or from hospital back to their community.

Rural and remote Australia stands to benefit most from eHealth, yet uptake of relevant technology and eHealth tools are slowest in these regions, a “rural eHealth paradox”.

Major state and commonwealth initiatives address this problem, as exemplified by recent developments in the NT.

In 2005 HealthConnect NT commenced the Point to Point (P2P) Service to implement a secure electronic messaging system covering in an initial phase, the Darwin and Katherine regions with 343,267 km², a population of 126,000. This supplements the Shared Electronic Health Record (SEHR) service also implemented within the Katherine region and from there throughout the Northern Territory.
In June 2006, 7,000 individuals had signed up in the SEHR service. Significantly, a participation rate of around 90% was achieved in Indigenous populations living in remote communities in the Katherine region indicating wider acceptance by those most to benefit from eHealth services.

Other comparable initiatives are currently rolled out in various states throughout Australia, with a similar focus on the particular problems in traditionally under-serviced remote and rural communities.

Beyond logistical difficulties and costs, other variables may contribute to the persistent gap in access to eHealth in rural communities:

1. Lack of specific policy and legislation, for example benchmarks for adequate bandwidths and standards for reliable and affordable Internet connections.
2. Inadequate infrastructure and support of rural providers through skilled and reliable technical training and professional support.
3. The need for clinical care models and the use of a common language to describe the same concepts and activities.
4. A readiness by providers and consumers to accept and use eHealth applications.

To address these issues, Liaw (2006) argues for a national strategic approach, underpinned by a research and development (R&D) framework, to continually monitor and improve the (rural) eHealth systems. This would require collaboration between all levels of government, universities, health authorities, private industry, health professions and consumers within the framework of national eHealth standards and benchmarks for ethical research and practice.

Implementation and acceptance of use of eHealth by consumers and providers could also be triggered by special circumstances in which existing practices may fail or prove to be inadequate. In a posting to his Blog site “Australian Health Information Technology” Health IT consultant (More & Associates Pty Ltd) David More compares the recent emergency plans by the Australian Government for compulsory health checks of 23,000 Aboriginal children in the Northern Territory with the effects of the Hurricane Katrina. The latter event exposed the risks associated with paper recorded health details, as they were largely destroyed and inaccessible at the time of and after the emergency. This led to the KatrinaHealth program, implementing electronic health records for those displaced, and providing digital PHR to facilitate follow-up care. The positive experiences accelerated the acceptance of PHRs in the US.

David More estimates that four times the number of doctors currently working in the NT, will be needed to assess these children, often on a “fly-in/fly-out” basis, creating a situation where eHealth measures could demonstrate a real difference and hence accelerate its implementation and acceptance by relevant stakeholders.

Telehealth & telemedicine at work
see definition Box 1 page 3

Vast distances between patients and health service providers or even the lack of services, aggravated by travel expenses, lost working time, etc, are major problems in rural Australia. Advanced telemedicine applications could significantly reduce access barriers, provided a suitable infrastructure is implemented.

For example, since the late 80’s, the University of Tromso, Norway has pioneered the use of telemedicine in northern Norway implementing teleradiology, telepathology, teledermatology, remote endoscopy, remote gastroscopy, teleechocardiography, transmission of electrocardiograms, telepsychiatry, electronic delivery of laboratory results and distance learning for health professionals. Most applications are based on videconferencing. By 1996 Northern Norway had 52 sites equipped with videconferencing facilities. As a consequence of having coherent strategies and policies in place, applications readily gained acceptance. This was aided by a national telemedicine fee schedule introduced in 1996 that included reimbursing all telemedicine services.

In Australia, a Northern Queensland project (Networking North Queensland, 1998-2000), investigated variables influencing technology uptake by both providers and community members, and benefits gained by having access to videconferencing, email, and Internet for delivery of health related services. Usage of the telehealth facilities was found to centre around educational purposes, both professional and community health education.
Clinical activity accounted for only 10%, which usually consisted of sessions with isolated professionals and their patients discussing specific health issues with larger centres. General impediments of telehealth uptake were identified (also experienced in urban settings), encompassing implementation of technology and a technical support infrastructure.

Other factors specifically influenced remote areas, notably the presence of a local “champion” or a skilled group of communicative workers. The study found that communities with permanent staff, particularly directors of nursing or medical superintendents acting as ‘local drivers’ or ‘champions’, more frequently used the facilities and had more benefits from it.75

A primary care telehealth practice

Rural and remote communities, globally and in particular in Australia, experience serious shortages of general practitioners and allied health staff. Most commonly, telehealth is used to access specialist services, relying on GPs at the patient site. The US University of Texas Medical Branch (UTMB), however, integrates a primary care program relying totally on telehealth technology, as GPs and patients are geographically separated. Boodley (2006) describes such a practice at the UTMB, which services patients at a corporate site 250 miles away.

The practice consists mainly of a broadband computer network connecting the provider with a patient site. Basic components at the provider site are a pan/zoom camera, a displayed EMR and clinical resources such as online drug information. The patient site features a pan/zoom camera and a handheld camera with peripherals such as otoscope, ophtalmoscope, and dermascope.

Boodley emphasises the skill required of the presenter at the patient site. This is usually a registered nurse (RN) or an emergency medical technician operating the technical equipment during the consultations. These presenters also provide important information about the general state of the patient.

The conduct of the telehealth visit is similar to a face-to-face visit (Box 5): “There are a few parts of the physical exam that I cannot do, but I can address most primary care complaints.”76

Box 5: The telehealth consultation

‘The handheld camera provides fantastic views of eardrums, nasal mucosa, and mouths and throats. The light on the handheld camera is so powerful that it can transilluminate sinuses easily. The pan camera is amazingly adjustable, and I can inspect all of the patient’s body just as I would in person. The dermascope magnifies skin lesions to a point where I see them better than I could in person. The stethoscope is very sensitive and can change from diaphragm to bell, with a flip of a switch.’

Boodley, 200676

Practices like this may demonstrate a suitable model for remote situations in Australia, where lack of sufficient numbers of GPs pose a severe barrier to access of health services.

The doctor - ePatient relationship in a telemedicine encounter

The technology filter between the patient and the clinician in telemedicine consultations is likely to add further layers of complexity to the traditional doctor-patient relationship. The impact of distance and technology not only affects the presentation of a patient’s symptoms and a physician diagnosis, it also impacts on the development of a crucial therapeutic alliance between doctor and patient.71 A telemedicine encounter is further complicated as it depends on a mid-level “presenter”, a physician assistant or nurse practitioner and their skill to place medical devices (see also “a primary care telehealth practice” below). To overcome these potential barriers to optimal care the practitioner may have to concentrate proactively on good communication skills.71

Increased implementation of telemedicine applications, as is expected in rural and remote settings, will require doctors not only to be trained in practical issues of delivering remote health services, but also in using new communication tools in order to maintain optimal patient-provider relationships.

Telemedicine and mental health

Modern videoconference technology provides the technical basis of telepsychiatry, currently the only online consultation itemised by Medicare, accounting in Australia for almost one-third of telehealth applications.77,78 Telepsychiatry
promises considerable cost reductions and increased equity in providing mental health services, particularly in rural and remote areas. However, cost savings are difficult to measure as telepsychiatry is frequently seen by clinicians as a supplement to improve quality rather than replacement of service.

Various types of telepsychiatric consultations may be delivered
- directly by psychiatrists,
- primarily by the primary care physician, or
- jointly by primary care physician and psychiatrist.

Telemedicine also offers psychological treatment, mostly as a hybrid of a face-to-face assessment followed by interactive teleconference treatment. This has been received with a high degree of satisfaction by consumers.

Online facilities for consumers and physicians may be an ideal and cost effective way of supporting the mental health sector, particularly in remote and rural regions, as shown in the following three examples.

1. In 2001, the Australian not for profit company “Beyondblue” launched an information-based Website to increase awareness and understanding of depression, anxiety and related disorders throughout Australia <http://www.beyondblue.org.au>. The site has particular relevance for individuals suffering from disorders poorly understood, highly stigmatised and/or largely dealt with by practitioners who do not have access to highly specialised information.

2. Going beyond the limitations of a pure information service, the Australian National University developed MoodGYM <http://www.moodgym.anu.edu.au>, an internationally recognised interactive program delivering free of charge cognitive behaviour therapy for prevention of depression. The efficacy in reducing symptoms of depression was indicated in a randomised control trial. Building upon the desire of users to improve their attitude, much like a gym, it requires a high degree of personal motivation, possibly limiting potential benefits to a subset of patients from general practice.

3. A third initiative, SPHERE, is an Australian national mental health project run by a private company based in Melbourne, designed to help general practitioners to identify, treat and manage common psychological disorders <http://www.spheregp.com.au>. The project provides basic training in issues related to depression and anxiety disorders and additional skills training focusing largely on cognitive and behavioural strategies.

Managed online: chronic disease care going digital

The increase of chronic diseases (CD) is a significant strain on hospitals and general practitioners. Current approaches to managing CD may be unsustainable requiring a shift to proactive prevention and personalised care planning. At present, less than 14% of Australians with chronic conditions are on care plans, 30-50% of patients are hospitalised because of inadequate care management, and less than 1% are monitored for compliance to care plans, together posing a significant economical burden. It was estimated that in Australia improved knowledge sharing and care plan management through information and communication technology could reduce CD related costs by 7 billion per year through direct and indirect cost savings.

From multidisciplinary care to interdisciplinary care: the eHealth team

Multidisciplinary team based approaches are seen as a way to improve chronic disease management and to reduce incidence of acute conditions. Such teams may include GPs, specialists, nurses, and allied health workers (e.g. dieticians, asthma educators, social workers and others). In a multidisciplinary team approach providers may share information with each other but usually tend to treat patients independently, often with patients being merely recipients of care. By contrast, interdisciplinary care is collaborative, whereby participants from different backgrounds integrate knowledge into a comprehensive care plan, typically including the patient as a team member. There is good evidence that patients should be “partners in their care”, as most care takes place at home.

The Internet with its capacity for synchronous and asynchronous communication is an obvious
platform to support the complex qualities characterising an interdisciplinary care approach such as:

- diversity of participants,
- shared records,
- improved communication between doctors and patients,
- a clear role for the patient,
- specialist input,
- consensus on management, and
- close coordination.86

HealthConnect SA is currently implementing the South Australian Care Planning System (SAPS), a web based care planning system featuring an interdisciplinary approach <http://www.healthconnectsa.org/OurProjects/SouthAustralianCarePlanningProject/tabid/84/Default.aspx>. As part of this project the Minister for Health in South Australia in 2006 launched a 12 month trial, to assess the effectiveness of a web based care management tool for patients with chronic conditions (Box 6).84

**Box 6: South Australian Care Planning and Communication Trial**

'The patient was impressed by the process, and thought it was really good to see the different health providers working as a team. Everybody got the right information when they needed it, and the patient saw an allied health practitioner who gave them excellent advice. It was a very positive experience for the patient with a good outcome.'

Feedback from a GP participating in the Care Planning & Communication Trial.

The Care Planning and Communication Trial is testing:

- If electronic care planning within a primary health care setting can improve communication between health care providers managing patients with chronic disease.
- the effectiveness of the change management techniques used for optimising participation rates by GPs, allied health professionals, pharmacists, specialists and patients.

When implemented, patients will have online access to their care plan, in the development of which they took part - together with members of the family or nominated representatives and the provider team.84 Communication between patients and providers is a key issue addressed in the trial. Findings from the Care Planning and Communication Trial will inform the development of a statewide web based care planning system for implementation in 2008.

Cancer patients already use Internet communication tools extensively to stay in touch with friends and family, forming new social networks (e.g. virtual communities). However, communication with their doctors has lagged behind, although "patients desperately wish to communicate by email with their physicians."88

**Chronic disease management at home**

Increasingly, continued care occurs outside the standard consultation by means of home telemedicine, "a rapidly evolving subspecialty of telemedicine focused on providing care in a home or community setting with the primary role of providing support for the patient rather than the health professional."89 Common applications are in management of chronic heart failure (CHF), asthma, diabetes and hypertension, typically based on videophone communication. Celler et al (2003) found few studies evaluating cost-effectiveness of home telemedicine, albeit significant economical benefits were demonstrated in the management of CHF patients.89

**Online Pharmacies**

This paper does not attempt to cover the rapidly growing sector of purchasing of medications, within Australia or internationally, often for legitimate purposes. Yet in many instances online pharmacies are an unsolicited offspring of the online health development, much a product of spam emails advertising, in particular sexual medication. According to a 2004 Pew survey 63% of Americans have received such advertising. The survey also found that few trust the online market, with only 4% of Americans having ever purchased online prescription drugs and only 20% rating it as safe as local purchases.90

However, there are voices of concern about, for example, the apparent misuse of amphetamine-type stimulants, where online pharmacies are a central component of a growing illicit global market. The Internet hereby not only facilitates illicit trade but also spreads information for illegal drug manufacturing. A recent editorial
in the British Journal of Psychiatry emphasises that in light of one billion Internet users current legislation and resources for law enforcement are inadequate and requires a coordinated global response.91

Conclusions

Health care delivery in the 21st century will experience dramatic and unavoidable changes through the implementation of eHealth technology. While changes within the organisational structures of health care delivery are pushed forward by government, it is the consumer-patient embracing the opportunities of the Internet that may have the greatest impact. Cybermedicine is revolutionising both the way health information is disseminated and the traditional communication pathways between stakeholders in health. Firstly, through the Internet information exchange and communication between stakeholders is not restricted anymore by geographical barriers. Secondly, as information can be produced and disseminated relatively cheaply, specialist information about health topics is now available to the public previously only accessible to professionals. As outlined in this review, these new opportunities will impact on the role of the consumer-patient in the health care system. Traditionally a mere recipient of care, many patients now want to engage in care decisions and may gradually transform into managers of their own health or that of their dependents as general health literacy through Internet health education rises. Doctors will have to adapt to this new type of patient and redefine their role as care givers. At the same time those community groups who are not able to engage in eHealth effectively will still need to be provided for.

Many eHealth researchers believe Internet health education will boost health prevention, promising significant downstream health and economic benefits. This is a much needed development in light of the obvious health challenges faced not only by the growing number of elderly people but also by the young, whose health is in many aspects adversely affected by modern lifestyle factors (Box 7).92 The Internet provides an obvious platform to reach out to this technology savvy community group. The Canadian initiative TeenNet <http://www.teennetproject.org> may serve as a good example of that. However, while these initiatives exist, there are few websites currently tailored to the needs of community groups most in need of it, such as seniors, the youth or minority ethnic groups. In addition, as eHealth researchers point out, there is still minimal guidance from health professionals who by and large are reluctant to jump on the eHealth train, often overemphasising the potential perils while ignoring the potential benefits.

Box 7: Children of a lucky country?

*The present generation of children may be the first in the history of the world to have lower life expectancy than their parents.*
Stanley, Richardson & Prior, 200592

With the implementation of EHRs, specific information can be easily shared between various care providers and the patient, providing the means for multidisciplinary or team care management. This may affect the prominent position of the primary care giver as the burden of care management is spread to various providers, but may also allow some professional groups, in particular in geographically isolated areas, to take on a more prominent role, remotely supported and supervised by a health care team. It is foreseeable that as a result professional profiles in the health industry will be more dynamic than in the past.

A major objective of current health policy is to facilitate greater acceptance of EHRs and the case for this, according to a recent report by the Canadian Health Infoway, remains strong.26 As demonstrated by the US department of Veterans Affairs, large scale implementation of EHRs showed significant improvement in all its prevention and treatment process metrics.26 By contrast, the recent, yet unpublished study by Joan Henderson could not find evidence that computerisation of Australian general practice has improved quality of care. Measurable benefits may be long term and complex, and more studies will be required to understand the effects of ICT in general practice on the cost and quality of care.
References


7. WHO. The Global observatory for ehealth (GOe). Re-


33. Australian Council for Adult Literacy. (2006 update). In-


35. Eysenbach, G., & Kohler, C. (2003). What is the preva-


The Primary Health Care Research & Information Service (PHC RIS) is a national primary health care organisation based at Flinders University in South Australia in the Department of General Practice. It is funded by the Australian Government Department of Health and Ageing. PHC RIS works in partnership with the Divisions of General Practice Network, primary health care researchers and policy advisors to generate, manage and share information and knowledge that contributes to policy and improves performance.

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