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The Effectiveness of Australian Medical Portals: Are They Meeting the Health Consumers' Needs?

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Abstract

The move to using portals to distribute medical information is supported by Australian Governments and government agencies. The recent success of 'telemedicine' is promising for patients and governments alike as it could provide quality care and convenience for patients and reduces the burden on the health budget for governments. The Australian Government is taking a proactive role in developing medical portals to encourage the general use of the web for the dissemination of medical information (NHIMAC, 2000). Government portals such as HealthInsite (Australian) and BetterHealth (Australian Victorian Government) encourage users to access the sites (NHIMAC, 2000). Despite the support by governments, usability tests examining portal effectiveness indicate that many portals are not effective for users. This paper presents the results of usability testing conducted on current Australian medical portals and discusses the portals' effectiveness from the users' perspective. The paper also discusses current technology that could improve medical portals' effectiveness thereby better serving the needs of the health consumer.

Keywords: eHealth, usability, health consumers

1. Introduction

In the year 2000–2001, Australia's total spending on health was estimated to be $60.8 billion, an increase of $5.1 billion from previous years (NHIMAC, 2000). At the national level, GDP (Gross Domestic Product) is used to indicate the overall growth in the economy, spending on health in 2000 amounted to 9.0% of total GDP. The Australian government is strongly supporting health online nationally. In September 2001, the government launched a campaign to promote health information online (National Health Information Management Advisory Council (NHIMAC, 2000). Further, the move to using portals to distribute medical information is supported by Governments and government agencies. The Australian Government is taking a proactive role in developing medical portals to encourage the general use of the web for the dissemination of medical information (NHIMAC, 2000). Australian Government portals such as

Health*Insite* and Better*Health* encourage users to access the sites (NHIMAC, 2000). It could be argued therefore that the government sees online strategies as one way to contribute to lowering the cost of health provision.

Whether more people accessing medical information on the Internet can reduce over medical costs is yet to be established. One study conducted by the University of New South Wales on chronic lung and congenital heart conditions where patients are admitted to hospital on average four times a year can spend from $7000 to $40000 dollars. However, Home Telecare can reduce this to $6000, thus one Home Telecare demonstrated it could cut the cost significantly (Murray 2003).

2.   Theory

2.1. The Internet and Health

It is suggested that 278 million Internet searches are conducted everyday, 5% of these is suggested relate to health information searching (Eysenbach, 2003). A number of problems however exist for the health consumers seeking information through the Internet, two of those problems are information overload and poorly organised information sites (Christensen and Griffiths 2000). The development of health information portals has been one response to these. Portals provide a level of filtering for the health consumer searching for internet based information.

Research findings by Kennedy (2003) and by Bodenheimer, Holman and Grumbach (2002) show a strong correlation between health outcomes and the level to which patients are informed, that is, when patients have more information relating to their health this leads to improved health outcomes.

The Internet facilitates the sharing personal experiences and treatments. For example the Internet provides a powerful medium for patients with emotional problems, and a route to personal communication, "in ways that may powerfully affect relationships between patients and physicians" (AIHW, 2004). One example is a discussion forum which allows users to discuss any problems and offers emotional support. This fosters a sense of community and allows users to help each other (AIHW, 2004).

Other websites provide personal consultations, such as Health Network (www.healthnetwork.com.au) providing free services, and others charge a small fee. The use and effectiveness of the internet however, for the dissemination of health/medical information is an area where there have been few studies, this paper describes and analysis of current Australian medical portals and the assessment of their effectiveness.

The aim of this paper is to review the way portal technology can assist users in a broader community context, and in particular, reviews how portals are employed for meeting community medical information needs. Intelligence features such as search engines, spell checking, "sounds like" indexing, parsing, ontology, use of thesaurus, personalisation and decision facilities or expert systems are identified from literature review and research as having the potential to improve the users' experience. These features are analysed against Australian medical portals and their effectiveness is tested through usability testing. Currently portal technologies are explored in terms of technological potential and what can be implemented in medical portals. The research results were then used to build a model that describes key features for a medical portal.

2.2. Current Portal Technology

Portals should provide wide functionality to allow users to find information, and to manage, categorise and use applications. It should ensure that the features needed by users are met. The implementation of functionalities will vary depending on the nature of the portal. Intelligence is defined here as the "necessary interface between the users and those components that make the portal a useful and unique information system to satisfy the potential dynamic needs of a user" (Moon and Burstein, 2005, p. 278). The following are currently available intelligence features that can be implemented to increase the effciency of portals.

- **Search engine** – the ability to search, browse the content, retrieve information on a content basis, and link to other repositories for information.
- **Personalisation** - portal personalisation can be made at different levels. An individual can have a personal setting; a group of people sharing the same function can have group settings. This feature allows a portal to be customised according to needs.
- **Spell check** – the ability to offer list of possibilities of terms that are related to key words.`
- "Sounds like index" - this is to search for 'sounds-like' terms. Medical terms are difficult to spelt and often the users spell according to pronunciation. Ability to match the words phonetically would help the users.
- **Parsing** – ability to search in sentences or phrases are useful. Most of searches are done in 'key words' search. Sometimes users look for more than key word search. The questions could be 'the effects of use of Tamoxifen', where the users want the sides effects of the drug.
- **Ontology** - representing words that are domain specific. For example if a red wine cabernet sauvignon is spelt as 'cabinet savignon', it would list a red wine rather than a list of cabinet makers.
- **Thesaurus** – ability to assist the users with a list of words that are domain specific. When combined with ontology, and complemented by metadata repository, the search can be narrowed.
- **Decision facilities** – will help with uses to make decision and retrieve the relevant information easily and quickly. There are some analytical tools such as loan calculators, logical reasoning and algorithms that can help the users making processes easily.

3. Research Design

The research sought to understand the state of Australian medical portals. To achieve this, the research took a mixed methods approach. The principle methods used to collect the data were:

- A literature review identified the intelligence features such as personalisation, "sounds-like" index, thesaurus, parsing, ontology, decision-making facilities and spell-checking facilities;
- An analysis of Australian medical portals was undertaken to establish the extent to which the intelligence features identified above were implemented in the portal;
- Usability testing to understand the effectiveness of medical portals from the users' perspective.

3.1 Evaluation of Current Australian Medical Portals

Current Australian medical portals were reviewed and evaluated against specific intelligence criteria identified. The list of Australian medical portals and proprietors are shown in Table 1:

Table 1: List of Australian medical portals and proprietors

Australian medical portal	Web address	Managing organization
Better*Health*	www.betterhealth.vic.gov.au	Victorian Government's Department of Human Services
Health*Insite*	www.healthinsite.gov.au	Commonwealth Government of Australia
Rural*Health*	www.ruralhealth.gov.au	Office of Rural Health (ORH), Australian Commonwealth (Federal) Department of Health and Ageing
Australian Indigenous Health*InfoNet*	www.healthinfonet.ecu.edu.au	School of Nursing and Public Health, Edith Cowan University
Department of Health and Ageing's website (DHA)	www.health.gov.au/	Australian Government Department of Health and Ageing
Medicine Australia (MedAu)	www.medicineau.net.au	Northern Rivers Division of General Practice (NSW) Ltd
Health*Connect*	http://www.healthconnect.gov.au/	General health information site run by Editorial Committee of medical practitioners for educational purposes

For the analysis, seven medical portals were chosen because they were the only ones found at the time providing relatively broad health information (i.e. not disease specific) and considered likely to be those in which health consumers would have confidence in their quality of information due to sponsorship by government or public health agencies.

The Australian medical portals were specifically chosen because the problems and types of information the users were seeking were pertinent to Australians (Boulos, 2003).

The analysis was made against the intelligence features identified above. A screen dump of each scenario was saved for analysis.

3.2 Usability Testing

Usability is defined as "the extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use." International Standards Organisation (http://www.iso.org) is widely regarded that if something is said to be usable it is: easy to use, easy to learn, efficient, visually pleasing, quick and effective (Preece, 2000; Bara, Dorazio and Lesley, 2001; Mandel, 1997; and Dumas and Redish, 1993). Further, Nielsen (1993) states that usability "is not a single, one-dimensional property of a user interface. Measuring usability means checking the efficiency and effectiveness of use of the system, as well as the satisfaction of its users." Usability evaluation is conducted by evaluators with similar backgrounds against a set of predefined criteria (Slakovic and Cross, 1999).

Stakeholders for this usability test were users of medical portals. The usability testing sought to explore users reactions to three Australian medical portals. How the users felt about the portals, whether they were able to retrieve the information they were seeking in

a timely manner and was the information retrieved relevant and accurate were issues covered in the testing.

3.2.1. Selection of Sites for Usability Tests

At the time the seven sites (Table 1) were the only government-sponsored medical portals that dealt broadly with health/medical information. Portals produced by commercial organizations were excluded because of the likely inherent bias in the information provided. The participants were asked to look at three portals since any more than three would be difficult to evaluate, because participants would lose concentration and become confused (Fisher, Bentley, Craig and Turner, 2004). The three Australian Medical Portals explored were:

> Portal 1: Better*Health*
>
> Portal 2: Health*Insite*
>
> Portal 3: Healt*hNetwork*

3.2.2. User Profiles

Seven users were selected for a variety of skills and interests. It is widely regarded that between 3 and 5 participants is enough to establish most usability problems (Preece, 2000; Dumas and Redish, 1993; Nielsen, 1993 and Nielsen and Molich, 1990). Neilsen and Molich (1990) note that relatively low numbers, that is less than 6, can provide insight into users' behaviors. The participants were volunteers, from computer novices to experienced Internet users. Table 2 describes users' computer experience, Internet usage per week, their occupation, age and gender. Computer experience is measured by the users' own assessment.

Table 2. User profiles

User	Computer experience	Internet usage per week	Occupation	Age	Gender
1 (S)	Inexperienced	Every day for emails/surfing/work	Scientist	22–35	F
2 (V)	Experienced	Every day for emails/surfing/work	Legal Transcriber	22–35	F
3 (H)	Experienced	Every day	Web Designer	22–35	M
4 (K)	Experienced	Every day	Computer Programmer	36–55	M
5 (G)	Inexperienced	Once or twice a week for emails. Use at work, intranet	Scientist	36–55	F
6 (R)	Experienced	Every day for research	PhD student	36–55	F
7 (F)	Average	Uses internet for surfing once or twice a week, for work uses intranet	**SCIENTIST**	36–55	F

The usability testing involved observation of the seven users who were asked to talk aloud as they searched medical portals and an interview after their searching was complete.

Before the testing began the users were given an explanation of the project and an explanation of what the testing was about. The testing took approximately 45 minutes in an office setting. The users were asked to think aloud about a health topic that was relevant or of interest to them or to their families or friends. Each user was asked to look at three selected government medical portals using the same topic.

During the search, the users' comments were recorded on a prepared survey form. After the test, the users were interviewed on their experiences relating to information retrieved and their experience. Each subject was audio-taped during the testing.

3.2.3. Data Analysis

A meta-matrix suggested by Miles and Huberman (1994) was used to analyze the data. A matrix is described as the "crossing" of two lists, set up as rows and columns. The qualitative data was entered into tables and categorized according to the factors identified. The use of a meta-matrix allows data to be analyzed in a number of ways, for example counting of negative and positive comments, identifying themes. Miles and Huberman argue that through the use of such techniques conclusions that generate meaning can be drawn.

All seven users commented on downloading times and the design of the health portals they looked at during usability testing. The comments varied from "good" to "bad" to "slow". Table 3 is a fragment of the matrix describing how these two aspects were entered into the matrix for analysis.

Table 3. Fragment of matrix for analysis of results

User 1	Downloading time	Design
Portal 1 - Better*Health*	Slow	Unclear, no underlines
Portal 2 - Health*Insite*	Average	Some pictures
Portal 3 - Health*Network*	Slow	Lots of pictures

4. Results

Table 4 presents the results of the analysis undertaken that established the presence or absence of intelligence features described in Table 1. Please note for the usability testing, three general health portals such as Better*Health*, Health*Insite* and HealthNetwork were taken as the other portals are specific to age group (Department of health and ageing), location (Rural Health) or for professionals (Medicine Australia)

6

Table :4 Summary of analysis of Australian medical portals

Australian medical portal	Search engine	Spell check	"Sounds-like" index	Parsing	Personalisation	Thesaurus
Better*Health*	Yes	No	No	No	No	No
Health*Insite*	Yes	No	No	No	Yes	No
Rural*Health*	No	No	No	No	No	No
Australian Indigenous Health*InfoNet*	Yes	No	No	No	No	No
Health*Connect* Department of Health and Ageing's website	Yes	No	No	No	No	No
Medicine Australia (MedAu)	Yes	No	No	Yes	No	No
Health*Network*	Yes	No	No	No	No	No

As can be seen in Table 4 few of the identified intelligence features are present in current Australian medical portals. Even the most basic functionality, search was not available in one of the portals. Apart from search engine facilities, Health*Insite*, had one other intelligence feature, Personalisation and Medicine Australia had parsing facilities.

4.1 Design Issues – Users' Preference

The users liked medical portals that had many simple images that were self-explanatory, rather than heavy, text-rich sites. Users strongly suggested that categories, personal contacts and sites that offered authority were really important to them. The following are the areas most commonly commented on by users relating to the design of the interface.

Table 5: Fragment of User comments

Design Issues	User comments
Layout	User (2) commented that the features that are important should not be at the bottom with the copyright statement. Health*Insite* had personalization features next to the copyright statement and since it was right at the bottom, she did not look down so she missed the features. For example: ".. *When it's down at the bottom, It's with copy right statements, so you think, oh, it's just… not relevant.*"
Simplicity	User (6) commented on the over crowded appearance of the site. ".. *too crowded, I don't know where to go....* "
Englagement/inter est	".. Like it would be nice to have color in here. .. Like it lacks color, .. It's a bit boring, I will move away."
Categories	".. this is appealing so far, has categories… "
Links more useful than back buttons	".. it's given me the links again, .. which is great rather than just using the back button"
Search needs to be bigger	A few users had problem finding the search engine. They had to spend quite some time looking for it. The following was one user's comment: ".. partially because, I am just looking at the spaces of the web, .. so to me, the search needs to be, .. bigger" the user was referring to the size of the search button.
User frustration – broken links	During the usability testing, the users expressed frustration in a number of ways. The prominent cause of frustration was broken links. User (1) was frustrated with HealthInsite when the linking did not work. ".. I click here and nothing happens! ..Well, it's bit of a disappointment .. the HealthInsite web site, .. asked me to go on to something, .. it says 'click here', .. to external site but it didn't go any further. .. So I felt very frustrated by that."
Images, pictures	Images are really important to the users. They prefer simple pictures, images that conjure up concepts rather than lots of text, as in the following: ((User looking at HealthNetwork which has lots of images)) ".. I liked it. It appears, user friendly, it's not too busy, .. so you can read all the information available .. without being bombarded."
Personal Contacts	One user (1) found personal contacts to be extremely useful. HealthNetwork was the only site that offered personal contacts out of three health sites analyzed. For her the personal contact meant: ".. Personal contacts. .. Personal contact with the experts, .. because it's very likely he will give the right answers !"

	The only problem, however, was that after she sent an email to the expert, the response took two weeks! She was really disappointed: "..Ah, .. oh, I mean, really disappointing really. ..what I quite liked about that, ..was sort of consultation, ..with expectation of within perhaps one or two days, …ahm, within two weeks still haven't heard nothing, is, .. quite disappointing.."
Download time	Generally the download times of the portals were acceptable to the users. However, user (4) mentioned slow down-loading time for HealthNetwork compared to the other health sites and attributed this to the number of graphics and advertisements. Some comments he made illustrate the frustration. ".. seems to be incredibly slow" ".. Health*Network* was slowest," ".. but it might be a computer, rather than the site, I'm not sure"

Table 5 presents empirical data from users. Other interesting comments noted were that novice users blamed themselves for inability to retrieve the information. It is a common experience that users blame themselves when things go wrong with technology. Two users who indicated that they were inexperienced blamed themselves for the information they did not get, rather than blaming the computer or the Internet. When the user (1) couldn't get the answer she wanted she blamed herself by saying that she didn't type in the correct key words. For example:

> ".. I didn't get specific for answer that I was looking for"
>
> ".. Maybe I didn't put in the right key words
>
> .. although I didn't think I could be any more specific"

The other inexperienced user (7) thought that she had to know a lot about how to look for information in order to retrieve the information. For example:

> ((she felt that users need to know what to look for in the portal))
>
> ".. because, um, I wanted to take it for granted, .. that's what you have to do,
>
> .. you have to KNOW how to look for the information .. to go looking for it.
>
> ((she wants to find out about lymphadenopathy)) **..** I am trying to be simple"

4.2 Quality

Generally users did not make comments about quality of the contents with the exception of one, nor did they questioned the authority of the portals.

Two users commented on aspects of privacy and authority. Those who made comments about governance were experienced computer users. User (3), who is a website designer, was offended by the personalisation feature, that required him to enter personal details.

The user (3) did not want to use the personalisation because he didn't want to spend the time to register. He also did not want to register because he did not want to reveal his

personal details, neither did he want to receive newsletters, because he believed that could clog up the computer.

> "… I mean, I expect those websites not private , ..some problem about my health,
>
> ..and if, ..they have some kind of personalization feature,
>
> ..and if they ask for, .. to input, give the problem I have,
>
> ..and then, .. they might.. trap me"

> ".. I don't want them to send me about, any kind of newsletter,
>
> .. I think that should be private."

User (3) also did not want to pass on information about his friends, or a third person for whom he was looking for information, as he thought those persons would not like it:

> ".. I mean, if I have some information of what,
>
> .. if not myself, .. but somebody, .. someone else's information,
>
> .. and I can't give away to the, … those people, .. they will be, get offended."

Only one user (user 6) out of seven commented on the credentials of the site. Looking at the Better*Health*, found it was really difficult to find either the credentials of the website or the authority of the articles on the site.

> "…way over here, .. Something says government, .. I am looking for credential,
>
> … but it's hardly visible, .. it's not readable actually. .. I've only found it
>
> .. ah .. okay, .. I am trying to look for credibility"

4.3   Would Revisit

Only 50% agreed to go back to the sites if they needed health information.

User 1 will re-visit the sites, especially the Health*Network*, as she liked the personal consultation.

User 2 expressed her need for more time to get used to the websites.

User 3 mentioned he would go back to those sites only when he knew the exact spelling of the disease or the medication, as portals didn't provide any guidance with searches.

User 4 mentioned that he would go back to all of them if he needed to find information on a particular topic.

User 5 liked the third medical portal, Health*Network*, and she would return to that site but not the others.

User 6 did not like any of them and would not go back. She would rather use Google to search.

User 7 will not visit any of the sites. She will check Google first and then see her doctor.

5.   Conclusion

The results of the usability testing which looked at the effectiveness of medical portals on three selected medical portals showed that they provided little help to the users and that more than half of the users wouldn't go back to those sites again as they provided little help to them.

The users' view on usefulness in terms of how relevant the information retrieved was and whether the information has cross-referencing were poorly received. The majority of the users did not find any of the sites particularly useful. Health*Insite* was the better choice out of three sites, followed by Health*Network* and Better*Health*

Ease of use was tested in terms of how easy searching was for users. For example the users' view on navigation and how easy it was to find search facilities were noted. Most of the users did not find any of the three portals easy to use.

The level of intelligence features present on the three medical portals were limited and proven to be inefficient for users.

Despite the government's initiatives to encourage health consumers to utilize medical portals for their health information, current Australian Medical Portals are far from reaching the goals of retaining health consumers. Unless these portals can retain health consumers by providing knowledge specific information, it will be very difficult to retain the consumers. A better designed portal that is user centric and implementing available intelligence features would improve the value of portals.

6. Future

There have been many papers on the usability of websites but very few have focused on Medial Portals from the users' point of view. The common problem has been the lack of search facilities identified as 'intelligence features'. In improving the interface of the portal, comments from users should be taken into account when designing such portals. To make the portals credible, reliable, up-to-date quality rated medical information is necessary.

As forecast by NHIMAC (2000), Australia has an aging population and cost of Health ever increasing. One way to reduce the cost of health is to better inform health consumers, attracting more health consumers to use the medical portals for their health decision making, reducing the overall health cost.

There is a paradigm shift in medical practice as the Internet plays an important role in health information seeking and patient care. Well designed portals with implementation of intelligence features are vital to satisfy the demands of consumers as well as the intention of government.

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