AUSTRALIAN ONLINE PUBLIC INFORMATION SYSTEMS: A USER-CENTRED STUDY OF AN EVOLVING PUBLIC HEALTH WEBSITE

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ABSTRACT

The area of public healthcare has always been viewed as particularly information intensive notably in the way public information is delivered to citizens and the way citizens are able to interact with public service providers. This phenomenon is made more complex by rapid changes and continual increases in technological capability as well as increasing demands for new function and knowledge by users. The context of this research is the redevelopment of a public health website in the area of palliative care, where sensitive, complex and evolving knowledge spreads beyond the medical issues. This paper reports on the results of a subjective study using Q-methodology to investigate the perceptions of the current and potential design of the palliative care website by a user cohort composed of medical practitioners and students, and the general public, some with experience of palliative care. The use of Q-methodology in the dynamic and complex health context provides a means of fostering deeper understandings of online public health phenomena. The study identifies four user types: interactive, superficial, medical and service, together with sets of statements that are indicative of the issues in the design and use of health websites to which each user type attaches importance. These results have practical and theoretical implications for the usefulness and usability of evolving public health websites.

Keywords: Public Information Systems, Palliative Care, Q-Methodology, Interactivity, Usability

INTRODUCTION

Rapid developments in information and communications technologies (ICT) and the (World Wide) Web are extending and transforming the ways public information is delivered to citizens and the ways citizens are able to interact with public service providers (Kerr & Bryant 2009; Harrison & Zappen 2010). The Web has evolved from static Web 1.0 presentation of information from experts to end-users into interactive Web 2.0 systems (O'Reilly 2007) spanning the boundary between the service providers and citizens. This is evident from the increasing Information Systems (IS) literature on how web-based e-government, e-learning, e-business and e-health are helping economies grow while improving society (Kerr & Bryant 2009).

The Web heralded a major change in the dissemination of health and medical information initially with knowledge transfer from health professionals to the general public (i.e. Web 1.0). The new opportunities of Web 2.0 can be exploited in innovative information systems, which can improve health outcomes by supporting information interactive exchanges between healthcare professionals and the public (Kivits 2006). However, in a recent paper by Fichman et al (2011) on the role of IS in healthcare, the focus seems to be more on internal systems not those involving communication with the public. Moreover, in developing websites for public access, a report from an Australian survey of e-business/e-government note that ICT departments still appear to have “a great deal of say” (Kerr & Bryant 2009 p126) on the design of these systems with little attention to the evolving needs of end-users.

The area of public healthcare has always been viewed as particularly as information intensive, with health authorities having engaged in collecting, disseminating and communicating information long before the advent of computers (Bath 2008). Computers and the Web have improved the way healthcare information is processed and enabled massive increases in the amount of information that can be collected, stored and accessed. The challenges facing the ongoing development of Web-based Information Systems (WBIS) in healthcare include: the amount of information they contain, the specialised nature of the information, increasing the awareness and public knowledge of health, and, the increasing public demand for information and interactive services. In the dynamic public health context, the provision of effective online health information and services can have a substantial benefit in reducing the strain on public health services that are required to cope with the complex and ongoing information needs of users (McKee et al 2008). Furthermore, the technological revolution is reshaping the way that healthcare is organized and delivered, and, transforming the ways public services can be delivered to citizens; this revolution affects the relationship between physicians and patients (Fichman et al., 2011).

In parallel with the rapid development and changes in communication technologies over the past two decades, there have been rapid changes in the population profile, i.e. the increase of the elderly as a proportion of the population, and the emerging impact of chronic illnesses associated with lifestyle choices over the same period (Bansil et al., 2006). The management of chronic illness requires more attention to physical and psychological as well as medical care (Rothschild & Lapidos, 2003). The health care system is challenged in new ways as patients and lay carers have a greater say in treatment with extensive access to information via the Web.

The motivation of this research is the apparent need to better understand and improve the role of technology in dynamic online socio-technical systems for knowledge sharing between healthcare professionals and the public. In the public sector, governments welcome the ability of online systems to promote equal access to information and services for all citizens regardless of location, internet facilities or computing skills. This phenomenon is made more complex by rapid changes and continual increases of the technological capability and increasing demand for new interactive functions by users. In complex contexts, cause and effect can only be determined in retrospect so that decisions, in this case on website design and functionality, can be just as legitimately based on subjective views as on objective criteria (Snowden 2002)

The particular focus of this research is the redevelopment of a public health website in the area of palliative care, where sensitive, complex and evolving knowledge spreads beyond the medical issues. When conducting the research we took a holistic, exploratory and interpretive approach to explore the needs of all stakeholders without being too intrusive. This is because of the obvious stressful circumstances of the users, the variety of users, their needs and demands for medical knowledge and computing capability. We chose Q methodology as our approach because it explores human subjective views in a structured way that allows the emergence of consensus on aspects of a topic, which may not be anticipated by the researchers. In this area of diverse needs and rapid change, this research method is able to draw out not only current user requirement but also possible future ones. In this way, the findings can be generalised to provide a contribution to the challenges of public health web services and user interaction.

LITERATURE REVIEW

There is a substantial body of literature in IS and in the field of Human Computer Interaction (HCI) recognising the continuing evolution of users needs and usability challenges of ICT and WBIS. As stated by an influential HCI researcher, (Rogers 2004 p89), "the rapid pace of technological developments in the last few years (e.g. the Internet, wireless technologies, handheld computers, wearables, pervasive technologies, tracking devises) has created many opportunities for extending, and supporting user experiences, interactions and communications." In a recent study, Knight and Burn (2011) address the fact that IS research into usability and user intentions has been dominated by the Technology Acceptance Model (TAM) and suggest that TAM is now obsolete in understanding the "experienced" user's ongoing adoption and exploitation of information technologies. Our research explores alternative avenues whereby IS can determine user needs in difficult and dynamic contexts such as public health and specifically palliative care. This incorporates the phenomenon of 'information seeking', studies of which have adopted a Q-methodology approach (Meloche 2006; Meloche & Crawford 1998). It also incorporates the possibilities for communication and interaction that come with Web 2.0.

A review of previous palliative care literature shows that there is a considerable lack of consistency in classification of family needs, including patient care, practical, psychological, spiritual, and information needs (Steele & Fitch 1996, Osse et al 2000, Mor & Masterson-Allen 1988, Ramirez, Addington, & Richards, 1998). Andershed (2006) provides a thorough and systematic review of literature (from January 1999 to February 2004) focusing on the overall experience of needs of chronic-ill patients' close relative. Andershed (2006) analysed 94 research studies; 59 studies were qualitative and 35 quantitative. He identified the necessity for information and communication as the primary theme; the consensus across these investigations was that optimal communication and sufficient information made it possible for caregivers to function at their best. Other reviews of the literature (Hudson et al, 2004, Kristijanson & Aoun, 2004), although not as exhaustive as the Andershed review, repeated the same themes: information, communication, service provision, and support from health and community services. He observes that these are all essential needs of end-of-life caregivers.

While there is consensus in the literature that the palliative care for patients with chronic illness is suboptimal, research on their specific needs is limited. Fitzsimons et al (2007) explored the palliative care needs of patients in the UK with non-cancer diagnosis from the perspectives of the patient, their significant other, and the clinical team responsible for their care. Their findings reveal that deteriorating health status was the central theme leading to decreased independence, social isolation, and family burden. Patients and carers described a variety of physical, emotional, and social needs that were unmet and unanswered. The limited resources and the availability of support from hospital and community services mitigated these unmet needs. The expressed concerns regarding the patient's future about the uncertainty regarding their health and depression or acceptance of inevitably death are common among chronically ill patients. Care teams are burdened by the lack of resources available to them to fulfil their patients unmet needs. This study further illustrates that the communication between primary and secondary care should be improved such that more services could be “joined up”. There is indeed a need for urgent progress and improvement of palliative care service delivery. It is essential that communication between primary and secondary care improves and that there is increasing support for clinicians who must develop their own specialists’ knowledge and skill base.

Many studies recognize the importance of information needs for patients and their families. In a study using semi-structured interviews with nine family members conducted in Sweden, Andreassen et al (2005) found that primary source of information was the physician in relation to their patients living with oesophageal cancer. They conclude that improvement of quality of palliative care is unlikely to occur without addressing and understanding the needs of the family members. Newnham et al (2006) also question the needs of the chronically ill patients in Australia for more accurate and reliable information about their illness to make decisions, which are more informed. The authors conclude that the majority of oncology patients did not believe that information obtained could adversely affect the doctor-patient relationship; this calls health professionals to provide guidance in finding information sources and getting assistance and in interpreting the information obtained. Rozmovits and Ziebland (2004) explored cancer patients’ reflections on their met and unmet information needs and their experiences with information provision. Overall, information needs evolved over the course of illness, and not all information providers were equipped to provide relevant information at all times. Therefore, useful information-provision strategies needed to adapt to the patients’ level of knowledge, interest, capacity, and state of health, rather than the patient adapting to the information provider. Useful information should be supportive, empowering, and personalized.

The question addressed in this research is as follows:

What uses of public Web-based Information Systems (i.e. WBIS) are being accommodated or envisaged by healthcare practitioners and the general public?

METHODOLOGY

As observed in the Literature Review above, the rapid pace of technological developments in the last few years has challenged traditional HCI research approaches. For our exploratory investigation of the current and future needs of all stakeholders, as implied in the research question, we rejected the range of established usability evaluation methods, comprehensive descriptions of which are available from the Usability Professionals Association (see http://www.upassoc.org/). The most appropriate of these methods involve the evaluation against realistic scenarios of use of existing systems or prototypes of future systems drawn up by ICT developers. None of these satisfied our stated criteria of systematically capturing subjective opinions and encouraging participants to speculate on future scenarios while being as unobtrusive and impersonal as possible. Standard usability testing methods invariable look for the one best solution whereas we wanted to allow multiple possible solutions that would suit different user groups. We also did not want to specify these in advance but allow them to emerge from the participants.

In order to examine the evolving phenomena of user needs from online health systems, Q methodology was chosen as a suitable method to systematically study user subjective perspectives of current and future possibilities (Stephenson 1953). The value of Q methodology lies in its abilities to generate and categorises a range of ideas about the specific topic under investigation uncovering valid and authentic opinion, in depth analysis, and, subsequent categorizations (Brown 1986). Q methodology provides a foundation for the systematic means to examine and reach understandings about personal experiences known as a person’s “internal frame of reference” (McKeown & Thomas 1988). Q methodology assists the formation of groups on the basis of their perceptions and collective shared thoughts (*ibid*). Thomas and Watson (2002) describe how the Q methodology offers “a powerful, theoretically grounded, and quantitative tool for examining opinions and attitudes”. They cite several instances of its successful application to MIS research. A Q methodological study was considered appropriate because it gathers subjective views from different stakeholders on a complex topic where a variety of themes are expected and around which consensus will emerge.

The Research Design

In order to address the subjective research question posed above, a partnership was set up between the authors and a team involved in the redevelopment of a public health palliative care website (http://www.caresearch.com.au). Our research follows the Q- method established by Stephenson (1953) where a Q-study is composed of three broad stages, the *concourse*, the *Q-sort*, and the *Q factor analysis*. The *concourse* results in a set of statements on a topic, which are ranked by participants in the *Q-sort* and then analysed by means of a *Q factor analysis*, the results of which is then interpreted by the researchers. Because of the factor analysis in Stage 3, Q methodology has been frequently associated with quantitative forms of analysis. However, as it deals with people’s subjective opinions, the interpretation of the factors has the richness of the qualitative method. As IS researchers we add a fourth stage to the Q methodology where we choose the most suitable factor solution from the analysis and interpret the factors to answer the research question.

In a concourse participants are introduced to a topic (in our case they were encouraged to explore the existing Caresearch website) and asked to produce statements (i.e. their opinions) on the topic (in our case the elements they would like on the website). Examples of such statements can be seen in Tables 3-6 in the Results. Since the Q methodology in this stage allows for free expression, the participants are encouraged to produce as many statements with as many different views as they can. A computer-based brainstorming system (Zing) was employed to facilitate the direct entry, review and storage of these statements by the participants. Zing technology provides a shared conceptual space where participants are able to simultaneously view and contribute ideas as they are created (Lewis & Newton 1995). Zing software is designed to assist teams to create new knowledge together. It is similar to groupware, group decision support systems (GDSS), electronic meeting systems and team learning systems.

The collected statements were then redefined and clarified to remove duplicates, or combined some into one meaningful statement or simply eliminated some because of the lack of relevancy to the topic of interest. Apart from statements collected during the concourse, other statements (i.e. possible elements for the website) were also taken from secondary sources, such as journal articles on website design, for this research study. The collection of refined statements derived from concourse and other sources is known as the Q sample and the number of statement is usually 30-60 (Thomas & Watson 2002). In our case there were 50 statements. These were numbered and printed onto sets of cards each with the statement number on the back.

In the sorting stage of Q-methodology, participants are asked to rank the collection of statements in the Q-sample. Unlike the concourse, the Q-sorting is conducted on an individual basis under guidance from the researcher. The participants are asked to make an initial reading of the Q-sample (set of statements) to get an impression of the range of opinions on the issue. They were then asked to sort the statements into roughly three equal main categories: those statements selected to be positive or important statements, those that are neutral, and those that are negative or unimportant based on their perception of the topic. In the final step in the Q-sort the participants are asked to order the statements in each category starting with the most important, and place its corresponding number under the +5 column on the Q sort scale as in the figure below (see Figure 1). The participants continue this sorting process until all the statements are ranked in the pattern of the grid with a different statement in each cell. All statements in any one column are deemed to be of equal ranked. The consequence of the sorting process is a forced decision making process, where the participants must decide amongst the statements and produce a result, which reflects their decisions (Cottle & McKeown 1980). A set of 20 to 50 participants has the ability to produce meaningful results, i.e. provide an accurate picture of the range of views on a topic (McKeown & Thomas 1988).

Each participant in the sort was given a form, which consists of two main parts: a demographic section, asking for information about the participant, and a section containing the grid where participants will enter the numbers of their sorted statements.

In the third stage of the Q-methodology the participants' sorts are statistically analysed to find correlations and identify factors comprised of (similar) sorts of several individuals (Stephenson 1953). All the sorts are entered into a Q factor analysis program (in our case the "PCQ" software see http://pcqsoft.com/) which produces factors comprised of people who have expressed in their sorts a similar view or mode of thinking. The analysis is a critical part of the task and the usefulness of the outcome will depend on the relative clarity of the factors, which are produced.

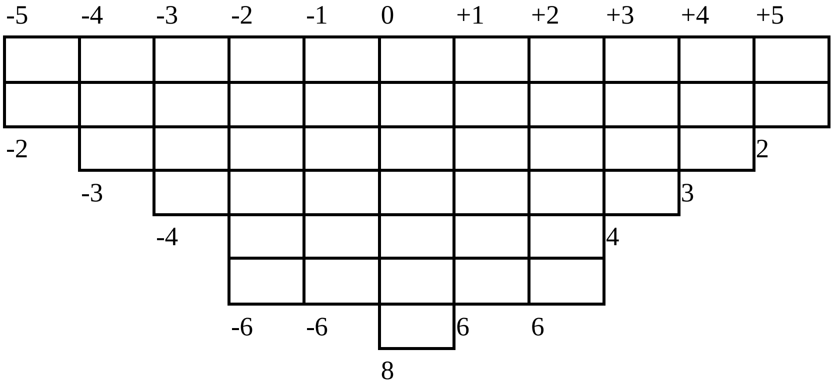

Table 1: Q-Sort Scale

The Participants

The Q-sort involved a group of relevant potential users of the website in Australia, and was composed of medical practitioners and students, other university students, academics, and the general public, some with experience of relatives and friends who had been in palliative care. Most of the participants in this research study were involved in both the concourse and the sorting process. Thirty-seven participants successfully sorted the 50 statements. Each participant averaged 1 hour to complete the study. 51% of participants were male whereas 49% of them were female. The male ages ranged from 22-42 years old whereas female ages 22-50 years old.

Interpreting the outcomes

The factor analysis produces meaningful solutions with numbers of factors from 1 upwards, although solutions of 1 factor, or of more than 7 factors, are unlikely to be useful. Each factor in a solution is typically comprised of several sorts (participants) representing a particular ordering of the statements and the group of participants responsible for that ordering. The factors are not necessarily mutually exclusive in that a given statement or a given individual may appear on more than one factor. The number of factors on the preferred solution chosen for the interpretation stage of the research depends in part upon the extent or degree of agreement amongst subjects, and in part on how much detail the researcher feels is useful to analyse. A suitable solution for the researchers to examine is one in which most sorts are loaded significantly on one of the factors. The Z-value shown for each statement in the factors displayed in Tables 3-6 is a measure of the relative strength of importance attached by each factor or attitude to that statement on the scale used during the sorting (Thomas & Watson 2002). After using the varimax rotation for a simple factor structure in a suitable solution, the researchers then examine the statements with the highest and lowest Z-values to determine what similarities the rankings share together with the participants who loaded significantly on a particular factor.

RESULTS

After the examination of various possible factor solutions of the Q-method study, a 4-factor solution was selected for the interpretation stage of this study. The four-factor solution was superior to all others as it explained 33 percent of the variation in the respondent set with a total of 26 out of 37 participants loading significantly on the factors. The remaining 11 sorts indicated either little significance or were confounded. A sort is said to be confounded when it exists on two or more factors (McKeown & Thomas, 1988). The four-factor solution was adopted as it appeared to most clearly represent the views of most participants. Examination of the statements with the highest and lowest Z-values for each factor led the researchers to give a meaningful label to each factor, as follows.

Analysis of the sort data provided by 37 participants revealed that 10 participants (27%) dominantly loaded on Factor A, labelled “Interactive users,” five (14%) loaded on Factor B, labelled “Superficial users”, seven (19%) loaded on Factor C, labelled “Traditional medical users”, and only four (10%) loaded on Factor D, labelled “Service-oriented users”. The users’ perceptions towards online health information are now analysed and interpreted based on these four factor types.

Factor A: ‘Interactive Users”

Table (2) presents 18 significant statements from Factor A: ten strong positive/important statements and eight strong negative/unimportant statements based on their Z-values. This groups of participants highly ranked the statement on interactive WBIS. The participants whose sorts contribute to Factor A also strongly believed that online palliative care should offer useful content and layout. For example, statement No. 2: “Make the layout more simple clear, and attractive,” and statement No. 33: “Clear, and simple language must be used”. In addition, the participants expecting the website to better address a wider spectrum of users’ needs, i.e. non-English speakers users, (No. 19: “give a language option to non-English speakers”).

Those in Factor A recognized the online palliative care should be valuable resource of information. That is probably why they chose statement No. 34: “provide explanations of roles of different specialists so patients and their families know where to go” to make the website more useful and functional. Furthermore, they favoured fast and effective search engine (No.26) because it is important for them to be able to save time and effort. However, they were also concerned with the issue of security and protection (No. 49). This is consistent with the risky activities that would engage “Interactive users.”

This factor was compromised of 6 females (60%) and 4 males (40%) among whom all were students in medical related courses and were all very computer literate.

No.	Strongly Agreed Statements	Z-values
50	A section of "Frequently and Recently Asked Questions" (FRAQ) should be available.	1.882
33	Clear, simple language must be used.	1.795
45	An 'ask a healthcare professional' facility for patient should be available	1.471
19	Give language option for non-English speakers,	1.427
2	Make the layout more simple, clear, and attractive.	1.233
4	Provide more discussion forums, chat windows and interactive WBIS	1.233
17	The site should contain sections on services for relatives (i.e. emotional counselling, financial services, etc.)	1.233
34	Provide explanations of roles of different specialists so patients/ families know where to go.	1.211
49	There is a statement about encryption or any security protection used	1.2
26	It should provide effective and fast search engine	1.125

No.	Strongly Disagreed Statements	Z-values
47	The site should be more colourful and jazzy.	-2.26
40	Links to updated events should be available.	-2.119
37	Option to change font, size, and PDF should be available.	-1.546
30	Job links are needed.	-1.438
10	The home page in the main menu should be located at the top rather than the bottom	-1.384
15	More work on the arrangements of icons and wordings at the home page is needed to give it a more orderly look	-1.287
46	It should provide a forum for healthcare workers to post their “opinions”	-1.092
12	The site should cover more information and a wide variety of topics	-1.038

Table (2) Factor A: “Interactive Users”

Factor B: “Superficial Users”

There were five participants whose sorts contributed to Factor B, Table (3) contains nine strong positive/important statements and nine strong negative/unimportant statements based on their Z-values. The participants in Factor B recognized the importance of the surface or the front-end feature of online palliative care such as coloured and jazzy, pleasant and visually appealing design, more links, simple printing and downloading, and no pop-ups as in statements (No. 39, 47, 43, 40, 20, 8, 31). In addition, those participants were concerned about the ‘contact us section’ and ‘information and a variety of topics’ which should further enrich online palliative care (No.12, 44). On the other hand, this group in Factor B ignored the interactivity features (No. 46, 17, 4, 45) and the updating function, job links, option to change some features, more links, and appropriate name for the website (No. 27, 30, 37, 22,1).Therefore, Factor B has been labelled “Superficial users”.

Demographic results revealed that out of five participants in this factor, two were females (40%) who were part-time tutors and post-graduate students and three males (60%): one postgraduate student, one manager (age 36-40) and one medical doctor (age 36-40).

No.	Strongly Agreed Statements	Z-values
39	Ability to download and print simple fact sheets	1.955
12	The site should cover more information and a wide variety of topics	1.865
44	A 'contact us 'section should be there.	1.584
47	The site should be more colourful and jazzy.	1.428
43	Avoid the "pop-ups" advertisements.	1.373
40	Links to updated events should be available	1.3
20	It should provide links to recent research articles for evidence based medicine	1.264
8	The website design should be pleasant, attractive, and visually appealing	1.229
31	Provide links to student health organizations/universities	1.108

No.	Strongly Disagreed Statements	Z-values
46	It should provide a forum for healthcare workers to post their "opinions".	-1.973
17	The site should contain sections on services for relatives(I.e. emotional counselling, financial services etc.)	-1.798
37	Option to change font, size, and PDF should be available.	-1.703
4	Provide more discussion forums, chat windows and interactive WBIS	-1.591
1	Choose a more appropriate name for the website (i.e. Palliative care of New South Wales instead of Care search)	-1.353
22	Provide more links to overcome the intensively information	-1.207
30	Job links are needed.	-1.172
45	An 'ask a healthcare professional' facility for patient should be available.	-1.147
27	There should be a date of when the website was created and a date for the last update.	-1.141

Table (3) Factor B: "Superficial Users"

Factor C: "Traditional Medical Users"

There were seven participants whose sorts contributed to Factor C, Table (4) contains seven strong positive/important statements and seven strong negative/unimportant statements based on their Z-values. The participants in Factor C recognized typical functions which would be sought by medical practitioners or palliative care providers as in statements (No.48, 16, 21, and 20). In addition, those participants concerned with about the 'contact us section' and 'printer friendly' functions (No.1, 44). On the other hand, this group in Factor C strongly ignores the interactivity feature with the public (No. 45) and accessibility of information to be provided for the public (No.18). In addition, this

Factor also ignores the superficial features such as coloured design, simple layout, clarity of the language usage, and change of language option (No.47, 2, 33, 19). Furthermore, this Factor does not pay any attention to 'provide explanations of roles of different specialists so patients/families know where to go' (No.34). Therefore, Factor C was labelled "Traditional medical users".

Demographic results revealed that out of seven participants in this factor, four were females (57%): three post graduate students and one full-time academic lecturer, and three were males (43%): one medical student (age 25 and below), two graduate postgraduate students (age 26-30).

No.	Strongly Agreed Statements	Z-values
39	Ability to download and print simple fact sheets (printer-friendly)	0.395
48	The site should contain stories on what it's like to be as a healthcare worker".	0.349
44	A 'contact us' section should be there.	0.34
16	The organization or content provider should be recognizable to user (i.e. AMA, or national academic or professional institutions).	0.324
43	Avoid the "pop-ups" advertisements.	0.311
21	It should have networks with or links for other regional general practitioners, nurse, and allied healthcare providers.	0.309
20	It should provide links to recent research articles for evidence-based	0.279

No.	Strongly Disagreed Statements	Z-values
18	Access should be provided within information booths in hospitals waiting rooms	-0.436
45	An 'ask a healthcare professional' facility for patient should be available.	-0.416
47	The site should be more colourful and jazzy.	-0.414
33	Clear, simple language must be used.	-0.361
2	Make the layout more simple, clear, and attractive.	-0.359
19	Give language option for non-English speakers,	-0.298
34	Provide explanations of roles of different specialists so patients/ families know where to go.	-0.269

Table (4) Factor C: "Traditional Medical Users"

Factor D: "Service-Oriented Users"

There were four participants whose sorts contributed to Factor D. Table (5) contains a total of nine statements for Factor D: five strong positive/important statements and four strong negative/unimportant statements based on their Z-values. The participants in Factor D recognized the importance of palliative care service (No. 17, 29, 28, 18). These participants were those who receive the palliative care services (i.e. workers, patients, carers). In addition, this group also recognized the importance of the interactivity function of online palliative care (No.4). On the other hand, this group in Factor D strongly ignores the interactivity features such as 'FRAQ', 'contact us', and 'ask a healthcare facility' (No. 50, 44, 45). In addition, this Factor also ignores having a 'fast introduction to the site and purpose of the site' (No.41) that should be available. Therefore, Factor D was labelled a "Service-oriented users".

Demographic results revealed that out of four participants in this factor, one was a medical doctor (age 26-30), one a pharmacist (age 36-40), one a full-time academic lecturer (age over 41), and one an international postgraduate student aged between 31 to 35 years.

No.	Strongly Agreed Statements	Z-values
30	Job links are needed.	0.196
17	The site should contain sections on services for relatives (i.e. emotional counselling, financial services etc.)	0.164
29	Provide scenarios of different users, i.e. patients, and healthcare providers on how to use the health website.	0.14
28	The site should contain stories on what it's like to be as a "patient".	0.133
4	Provide more discussion forums, chat windows and interactive WBIS	-0.132

No.	Strongly Disagreed Statements	Z-values
41	Fast introduction to the site and purpose of site should be available.	-0.219
50	A section of "Frequently and Recently Asked Questions" (FRAQ) should be available.	-0.21
44	A 'contact us' section should be there.	-0.156
45	An 'ask a healthcare professional' facility for patient should be available.	-0.146

Table (5) Factor D: "Service-Oriented Users"

DISCUSSION

This research explores and analyses perceptions of various stakeholders including medical practitioners and students as well as members of the general public towards online palliative care in the context of the Australian health environment. The factors represent four subjective perspectives of online information systems, i.e. websites, for palliative care, and were labelled as Factor A, 'Interactive Users' (N = 10), Factor B, 'Superficial Users' (N = 5), Factor C, 'Traditional Medical Users' (N = 7), and Factor D, 'Service-Oriented Users' (N = 4). The results above have reported the strongest positive/important statements and negative/unimportant statements for each factor, based on their Z-values, as well as the demographics of the participants whose sorts contributed to that factor.

This research identifies that a significant number of users now desire interactivity in WBIS. This is supported by the work of Knight and Burn (2011) who call for an interactive-driven construct to be added to the traditional technology acceptance model to make it relevant to current web-based systems. Their work reveals that neither usefulness or ease-of-use adequately addresses the complexities of systems in which there is the capacity for users to interact.

The interactive users pertaining to Factor A were distinguished from the other groups by four statements: No.24, 33, 44, 45. Interactive users strongly agreed on the importance of including an 'ask a healthcare professional' facility for patients (No. 45) while all other factors strongly disagree with it. Interactive users recognized the importance of having an interactive facility to enable them to serve the needs of chronic ill-patients and their families by posting questions to their healthcare professionals. In addition, interactive users strongly agreed on the issue of simplicity and clarity of the language usage and the content (No. 33) while traditional medical and service-oriented groups strongly disagreed with this. The importance of providing a more comprehensive service or one-stop shop government website (No.24) was ignored by the Factor A group whereas other factors slightly agreed with it.

The superficial users of Factor B were distinguished from the others by the six statements (No. 4, 13, 17, 33, 40, and 47). They emphasised the issue of clarity and simplicity of language usage and content (No. 33) perhaps an indication of lack of health or medical knowledge among participants while this group strongly ignored the importance of the currency of information and colourful design of the website (No.40 and 47). Conversely, they recognised the significance of updating medical or health information, especially, on a public website.

The traditional medical users of Factor C were distinguished from other groups by the four statements (No. 2, 18, 19, 48). Traditional medical user of online health information users strongly acknowledged the importance of having 'stories on what it is like to be as a "healthcare worker" in a palliative care environment. On the other hand, this group of traditional medical users discourage providing the public with access to information (i.e. within information booths in hospitals waiting rooms) (No.18) and this might be due to their time constraints. In addition, this group clearly discourages the superficial enhancement of online palliative care including 'make the layout more simple, clear, and attractive' (No.2), and supporting the activity of non-English speakers by having an option for changing language on the website (No. 19).

The service-oriented users who ascribed to Factor D also had distinct characteristics. Interestingly, this group was attracted to the client service features offered by online government health website: jobs for workers and service information for the public. They were not enthusiastic about contributing ideas using a section of 'Frequently and Recently Asked Question or FRAQ' (No. 50). They saw that the public website is not just for information, but it is a service for the public and practitioners. Clearly, these service features will attract the attention of users and entice their participation during a visit to an online palliative care information system.

Our research question concerns the actual or envisaged uses of public WBIS (websites) from the perspective of healthcare practitioners and the general public. This is in contrast to the views of the ICT department or healthcare administrators usually responsible for website design and construction as noted by Kerr and Bryant (2009). From a practical perspective it is self evident that the quality and usability of health websites can only improve if the needs of the target user groups are known. The literature review revealed the particular challenges to the provision of health information systems and palliative care is an area where sensitivity and a breadth of understanding is needed beyond just medical knowledge. Our research demonstrated a method of dealing with the challenges of sensitivity and breadth through the engagement of suitable participant in the Q-methodology protocol. It also revealed four different users types with statements which are indicative of the issues in the design and use of health websites to which they attach importance.

As indicated from our research results, differences between participants are reflected in their priorities, expectation, views, and perceptions of online palliative care, which are largely based on their own purpose or intention. Therefore, designing and maintaining a website can be a challenge. Website needs to balance the needs of different users, simplicity versus completeness and hence complexity, the utility versus the attractiveness, and the service providers versus the service users. Clearly designers would benefit from this awareness and understanding of variety of users and their needs as identified in this study.

CONCLUSION

This research explored and analysed perceptions of medical practitioners and students, as well as members of the general public, towards online palliative care in the context of the Australian health environment. Q methodology was used to capture public users' subjectivity and perceptions on online palliative care, not only as it is now, but also how it may be in the future. The most significant findings from this subjective study of users' perceptions of a palliative care website were the recognition of different sets of users. In this case, four sets of users were identified, namely: interactive, superficial, traditional medical and service-oriented users.

We do not claim that this is the definitive set of users or that it represents the solution to the whole problem of health website design. We also acknowledge that user needs will not remain static for any length of time. We do suggest that these results provide evidence-based insights into the different and even contradictory needs of different user types, which are not necessarily aligned with their obvious designations as stakeholders in the system.

Future work could also involve interviews with participants in different factor groups to explain more about why they placed the statements accordance with either the most agreed (+5) or most disagree (-5), so that a broader perspective can be obtained on the reasons why online palliative care users would make certain choices in their use of online palliative care. This research could be repeated with a more varied group of participants in particular those with more direct palliative care experience. This would include patients' families and their carers, who could provide stories, practitioners who could provide answers to questions imposed by the public, and web owners who could explain what possibilities and limitation are posed by the technology and the budget.

This work supports the argument that qualitative studies are valuable for exploring the perceptions of users of online palliative care in the Australian environment. The perceptions of different groups and demographics may vary. The Q-methodological approach has proved very useful for revealing users' perceptions, because the main strength of the methodology is a systematic study, and measure of, subjectivity. This study has demonstrated the usefulness of this approach in exploring the perceptions and the uses of online palliative care information for both professionals and the public.

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