Opportunities and challenges of Web 2.0 within the health care systems: An empirical exploration

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Abstract

The Internet has become one of the main drivers of e-health. Whilst its impact and potential is being analysed, the Web 2.0 phenomenon has reached the health field and has emerged as a buzzword that people use to describe a wide range of online activities and applications. The aims of this article are: to explore the opportunities and challenges of the Web 2.0 within the health care system and to identify the gap between the potential of these online activities and applications and the empirical data. The analysis is based on: online surveys to physicians, nurses, pharmacist and patient support groups; static web shot analysis of 1240 web pages and exploration of the most popular Web 2.0 initiatives. The empirical results contrast with the Web 2.0 trends identified. Whereas the main characteristic of the Web 2.0 is the opportunity for social interaction, the health care system at large could currently be characterised by: a lack of interactive communication technologies available on the Internet; a lack of professional production of health care information on the Internet, and a lack of interaction between these professionals and patients on the Internet. These results reveal a scenario away from 2.0 trends.

Keywords: *Health professionals, health care systems, internet, Web 2.0*

1. Introduction

All the actors in health care systems are facing the rise of the Network Society; a society whose social structure is made up of networks powered by microelectronic-based information and communication technologies, and a new technological paradigm: Informationalism, based on the augmentation of the human capacity for information processing and communication made possible by the revolution in microelectronics, software, and genetic engineering [1]. Echoing Pickstone's periodisations of medicine, Smith [2] conceptualises these changes as a move from what he calls 'industrial age medicine' to 'information age health care' [3].

In this broad context, e-health has emerged as a broad field [4] which involves the relationship between the current social structure and the new technological paradigm within

the health care systems. Furthermore, the Internet has become one of the drivers of e-health [5] and could be considered as one of the main resources for health information; as a medium for interaction; as a tool for health care delivery and public health [6]. Those conceptions reveal a tremendous potential for improving the quality and efficiency of the health care system [7]; redefining health, medicine and the body [8]; transforming the relationship among health care agents [9–11], and suggest a new medical cosmology called e-scaped medicine [12].

Although those impacts are being studied, the Web 2.0 phenomenon has emerged as a buzzword that people use to describe a wide range of online activities and applications [13]. Rather than a specific set of technologies, Web 2.0 can usefully be thought of as social programming for everyone. The shift from 1.0 to 2.0 has involved a move from a largely 'read-only' to 'read-write-participate' [14]. Aside from e-health, this phenomenon has landed on the scene with new promises of transformation, but with a scarcity of empirical research in its initial stage together with few studies of quantitative data of the population at large [15].

The aims of this article are: to explore the opportunities and challenges of Web 2.0 within the health care systems and to identify the gap between the virtual potential of these *online activities and applications* and the empirical data about interactive communication technologies already available on the Internet and currently used by physicians, nurses, pharmacists and patient support groups. To reach these aims, the possible interactive communication processes allowed by the applications available on the Internet will be identified; the wide range of online activities and applications performed by health care actors will be specified and in what way and to what extent the Web 2.0 phenomenon could be adopted by and embedded in health care systems will be analysed.

2. Methods

Online surveys to physicians, nurses, pharmacists and patient support groups were carried out and a static snapshot analysis of health related webs was accomplished. Empirical data from a broad research project was selected and analysed taking into account interactive communication technology use availability.

2.1. Web static snapshot analysis

To identify the possible interactive communication processes allowed by the applications available on the Internet, the Google directory of 'Medicine and Health' in the Catalan language was selected as an object of the study. This approach reaches a thematic delimitation which is that of health and a geographic focus which is Catalonia.[1]

Between October 2005 and January 2006, all the Uniform Resource Locators (URLs) classified in the Google directory of 'Medicine and Health' (1240 URLs) were identified. URLs were used as unique identifiers of web pages. Those URLs which are broken links, those which identified a .pdf or .doc document format and those web pages under construction were excluded from the analysis. Finally, a total of 1045 web pages were included. A static snapshot analysis and manual classification [16] of the existence (Yes or No) of the items below mentioned were performed (Table I).

In addition, the presence of authorship, affiliation of the authorship and the date of publication were selected as items to gauge the quality of the health content identified. The existence of any terms of use in the web pages was considered as an item to assess the quality of the communication and services provided by the Internet. Finally, the existence of any tools

Table I. Static snapshot analysis items.

Content	Communication	Services
Health content	Email	eCommerce
Postal Address	Electronic mailing list	Web application forms
Telephone number	Web forums	Intranet – Login/password
Advertising	Chat	Others

or methodology (as trustmarks, quality seals or ethic codes) for rating the quality of the health content on the Internet was selected as general quality criteria.

2.2. *Online surveys*

This type of survey offers an alternative to the postal, telephone or face-to-face surveys as long as technical, methodological, ethical and legal considerations are taken into account [17–19].

Surveys to physicians, nurses and pharmacists involved five blocks of questions on: (1) socio demographic and key labour issues; (2) Internet access, frequency, utility, experience and expertise; (3) the Internet as a platform for the consumption and production of information and the interaction with patients, social and health outcome consequences, and the health care professional–patient relationship; (4) health information systems and telemedicine use; and, finally (5) the health care professional assessment of Information and Communication Technologies.

The physicians, nurses and pharmacists associations of Barcelona collaborated in the launch of the online surveys to all their members. These professional associations gave access to the e-mails of their members considering questions of privacy, confidentiality and legality. To ensure that the survey was easy to complete and no questions were ambiguous, the questionnaires were pre tested and usability and accessibility issues were tackled during the design processes. The subject of the e-mails was an invitation to collaborate in a non-profit making research project. The body of the e-mails included one paragraph describing the project and another paragraph on legal and confidentiality issues. There was not any reward for answering the questionnaire.

To tackle obstacles related to a low response rate and to a representative nature of the sample, the questionnaires were launched at all the population with e-mail from each association on two separate occasions during a period of fifteen days. This decision is based on the fact that this incurred no extra cost to reach all the population and two consecutive launches of the survey could increase the representative sample.

Surveys conducted on patient support groups included four blocks of questions on: (1) aims and features of the patient support groups; (2) Internet access, frequency, utility, experience and expertise; (3) the Internet as a platform for the consumption and production of information and interaction with patients, social and health outcome consequences, and the health care professional–patient relationship; (4) the patient support groups' assessment of information and communication technologies. Access to e-mails of these groups was granted by the Health Department of Catalonia from its registered public database of patient support groups considering questions of privacy, confidentiality and legality.

During 2006, 253 e-mails with online questionnaires were launched at patient support groups with a 20.95 per cent response rate; 16,531 e-mails to physicians with a 13.3 per cent response rate, 13,583 e-mails to nurses with an 8.61 per cent response rate and finally 7648 e-mails to pharmacists with a response rate of 11.74 per cent.

2.3. Exploring the most popular Web 2.0 initiatives in health

Beer and Burrows [20] identified three possible agendas for the development of a viable sociology of Web 2.0: the changing relationship between the production and consumption of internet content; the mainstreaming of private information posted to the public domain; and the emergence of a new rhetoric of 'democratisation'. To identify the current state of development of these agendas within the health care systems, Web 2.0 initiatives related to health were explored. As empirical data about interactive communication technologies available on the Internet will reveal, there is a lack of Web 2.0 initiatives in the Catalan health care system. Because of this shortage, the selection of the most popular Web 2.0 initiatives was carried out between September 2007 and December 2007 exploring the posts from the first 100 blogs ranked in the Global Ranking of Top English-language Health care Blogs done by edrugsearch.com.

3. Results

3.1. Empirical data about interactive communication technologies available on the internet

The static snapshot analysis revealed that 72.6 per cent of the web pages have a telephone number; 70.6 per cent have a postal address; 55.9 per cent have health content and 13.7 per cent contain advertising.

   The quality of the content is still a challenge: 66.3 per cent of the web pages that have health content offered the name of the author; 60.6 per cent offered the affiliation and 50.2 per cent offered the date of publishing.

   Despite the fact that the e-mail address is the most common communication tool as 78.9 per cent of the web pages have it, traditional communication tools such as the telephone (72.6 per cent) and the postal address (70.6 per cent) have a significant importance on the Internet. It has to be outlined that online services are still scarce: 14.6 per cent of the web pages analysed have electronic forms; 10.1 per cent have intranet; 9.2 per cent have forums; 8.8 per cent have e-mail lists; 4.8 per cent have online appointment; 4.1 per cent have e-commerce applications; 2.3 per cent have chat rooms; and just 1.4 per cent have online health assistance.

   The existence of any clause pointing to privacy, security or terms of use was taken into account as an approach to quality related to the communication process or services: 20.8 per cent of the web pages identified this kind of clause. Finally, the existence of trust marks and codes of ethics, tools for rating the quality of health information on the Internet, was identified in 11.5 per cent of the web pages.

3.2. Empirical data about interactive communication technologies used by health care actors

Analysis of the patient support groups' online surveys showed that 92.3 per cent of them have an Internet connection; 40.4 per cent asked members for their e-mail addresses; 34.6 per cent did not ask for the e-mail address but their members gave it to them and 25 per cent did not have the email address of their members. It has to be pointed out that 76.9 per cent of the groups have a web site, but 75 per cent did not have an electronic forum and 69.2 per cent did not have an electronic newsletter. The patient support groups' answers revealed that 41 per cent of the groups used the Internet mainly to spread health information and to inform about their own activities, whereas giving support and medical advice by the Internet were selected by less than 18 per cent of them.

Health care professionals who answered the questionnaire are heavy users of the Internet: 93.3 per cent of the physicians; 92.9 per cent of the pharmacists and 74.3 per cent of the nurses used it for their jobs, basically as an information source. Furthermore, 73.3 per cent of the physicians, 70.5 per cent of the pharmacists and 56.5 per cent of the nurses considered the Internet as a very useful tool for their jobs and more than 70 per cent of all of them considered it as relevant or very relevant with respect to the health information available on the Internet. In spite of all that, half of the health care professionals did not recommend their patients to go online for health information although 30 per cent of them did sometimes. Moreover, 51.2 per cent of physicians, 48.3 per cent of pharmacists and 42 per cent of nurses stated that some of their patients share or discuss with them their Internet health information findings.

It has to be underlined that the practice of patients seeking Internet health information is considered by physicians, nurses and pharmacists as slightly more important in terms of the questioning of professional health knowledge than improving the patient–professional relationship and patients' knowledge. On the one hand, the online survey results showed that 47.2 per cent of the physicians, 44.5 per cent of nurses and 35.1 per cent of pharmacists stated that patients seeking Internet health information might question their knowledge but on the other hand, 31.1 per cent of physicians, 34.9 per cent of nurses and 26.1 per cent of pharmacists declared that patients seeking Internet health information improved quite a lot the patient–professional relationship. Moreover, 43.7 per cent of physicians, 45.3 per cent of nurses and 37.9 per cent of pharmacists stated that this activity improves patients' knowledge significantly and facilitates their treatment. In addition, approximately 40 per cent of them stated that it improves patients' autonomy and quality of life quite noticeably.

Consumption of Internet health information by health care professionals is more widespread than the production of information on the Internet. Firstly, just 19.1 per cent of physicians, 40.7 per cent of nurses and 47.5 per cent of pharmacists have a personal web site. Secondly, just 49.1 per cent of physicians, 30.9 per cent of nurses and 20.5 per cent of pharmacists have a collective web site. Thirdly, only 5.1 per cent of physicians, 9 per cent of nurses and 15.5 per cent of pharmacist have a blog.

The main reasons selected by health care professionals to be on the Internet are shown in the Table II.

Bearing in mind that pharmacists are the most accessible health care professionals due to the distribution of chemists throughout the territory and their incentives to reach consumer loyalty, it is perfectly understood that 46.7 per cent of those selected share information with citizens and thus is their main reason to be on the Internet.

Sharing information with my friends and relatives was selected as the second reason to be on the Internet by physicians and pharmacists and the first one by nurses. It has to be remarked that producing information on the Internet is more related with leisure than with the job post.

Table II. Reason selected by health care professional to be on the Internet.

What are the main reasons to be on the Internet?	Physicians (%)	Nurses (%)	Pharmacists (%)
Share information with citizens	15.4	10.7	46.7
Share information with my friends and relatives	12.5	21.4	38.0
Spread my own scientific papers to the scientific community	11.1	9.3	9.2
Promote debate on my own medical speciality	6.8	7.6	7.4
Share information with my patients	5.5	2.9	18.8

Issues related to the spreading of scientific papers or promoting debate on a medical speciality is led by physicians who are more research oriented than pharmacists and nurses.

The e-mail is heavily used by health care professionals to communicate with other professionals: 89.1 per cent of physicians, 74 per cent of nurses and 73.3 per cent of pharmacists declared to use it for this propose. On the contrary, the use of the email to communicate with patients is less widespread: 21.9 per cent of physicians, 38 per cent of pharmacists and just 7.7 per cent of nurses used it.

Furthermore, health care professionals were asked about how often they use the Internet as an interactive space: 45.5 per cent of physicians stated that they usually or often participate in websites or electronic discussion lists clarifying queries on their own speciality and 54.5 per cent rarely or never did so. In addition, 57.6 per cent of nurses and 33 per cent of pharmacists usually or often carried out this activity.

The participation level decreases when health care professionals were asked about how often they participate in websites or electronic discussion lists asking questions about their speciality: 91 per cent of physicians, 89 per cent of nurses and 73 per cent of pharmacists stated that they rarely or never performed this kind of activity. Moreover, 97 per cent of physicians and nurses and 64 per cent of pharmacists rarely or never participate on the Internet supporting or answering questions to patients.

Finally, health care professionals were asked about the main difficulties they have had to use the Internet. Lack of time in their workplaces was selected as the main difficulty by 54 per cent of physicians, 63 per cent of nurses and 62 per cent of pharmacists. The second difficulty selected was the lack of security and data confidentiality (35 per cent of physicians, 36 per cent of nurses and 24.2 per cent of pharmacists). Following these barriers, the lack of training and the lack of access to computers connected to the Internet were mentioned.

3.3. Health and Web 2.0 trends

Because of these possible agendas and to the exploration of the most popular applications of Web 2.0 and health, four major trends have been identified.

Firstly, the main characteristic of Web 2.0 is the opportunity for social interaction, which is understood as the opportunity to have an Internet mediated conversation. The profiles of the actors who have the conversation are defined by the aims of the Web 2.0 initiatives and the openness of the applications. It has to be taken into account that some of the initiatives require the identification of the users and their profiles whereas other applications allow the participation of any person without any identification or profile. Social Network Services illustrates different initiatives defined just for physicians (www.sermo.com), nurses (www.nurseconnect.com) or patients (www.patientopinion.org.uk); other initiatives are based on a mix of profiles (www.medhelp.org). The identification process has produced an impact on legal aspects like that of privacy and confidentiality as well as on the accuracy, reliability and quality of the information.

Furthermore, the openness of the application is related with the social scalability of the initiative. This means how to handle the ever increasing workload in a graceful manner or to be readily enlarged thereby maintaining social performance benefits. The case of patient assessment of health care services (www.patientopinion.org.uk) and patients posting sickness information onto a map (www.whoissick.org) revealed the importance of the amount of users that could reach the expected benefits. But in other cases, like the adoption of the Wikipedia approach by the World Health Organisation for the key updating of the International Classification of Diseases (http://extranet.who.int/icdrevision/), the limitation and the identification of the participants determines the success of the initiative.

Secondly, there are new ways of developing content (collaboration) using different media formats (multimedia) and applications (mashup). The use of the YouTube video for patient health education (BuilthSurgery's Videos); the use of wikis (www.radiologywiki.org) and blogs (http://clinicalcases.blogspot.com/) for continuous medical education and the use of the 3D online digital world like Second Life for health proposes (Second Health) are just a few examples of the collaborative creation and diffusion of information. It has to be remarked that this trend has consequences on the ownership of the content and challenges the traditional copyright laws. New types of licences like Creative Commons have reached the health field (www.scivee.tv).

Thirdly, there are new possibilities of access, control and assessment of the information. Initiatives like 'Google Health', 'Microsoft HealthVault' and 'HealthSpace' revealed the interest of private companies and the Government to develop personal health records and health search engines. Semantic web technologies are applying new tools to manage health information in a transparent and trustworthy manner too in favour of Internet users [21]. Access and control of that huge amount of information implies the many questions have to be researched. How these initiatives will be appropriated by users in their everyday life and what are the consequences in terms of health outcomes; how these companies will manage privacy, security and the terms of use of the available information; and finally how health care providers and health care professionals will become part of this practice are just a few of the key questions and challenges to be solved.

Other initiatives allow the Internet users to rate their doctors (www.ratemds.com), give a public opinion about their health care system (www.patientopinion.org.uk) or share experience about their own illness (www.patientslikeme.com). Governments, health care organisations, health care professionals could appreciate this knowledge as well as the companies that have a great advertising market that they wish to explore.

Finally, Web 2.0 initiatives supported the mix between expert knowledge and lay knowledge in a way that suggests the emergence of a new rhetoric of 'democratisation' within health care systems and the transformation of patients into consumers and producers of health knowledge [9]. An example of that mix of knowledge could be found at DailyStrength (http://dailystrength.org/) and at Alzheimer's Association CareFinder (http://www.alz.org/) defined as a health network of people sharing advice, treatment experiences, and support.

4. Conclusions and implications

4.1. The internet regarded more as a content platform than as an interaction and social space within the health care system

Web 2.0 trends identified: opportunity for social interaction; new ways of developing content (collaboration) using different media formats (multimedia) and applications (mashup); new possibilities of access, control and assessment of the information and a mix between expert knowledge and lay knowledge contrasted with the empirical findings.

Static snap shot analysis of health websites revealed that the Internet is still a content platform and not a communication or social space. With the exception of the e-mail, communications tools and services are scarce and quality is still a challenge for health contents or applications and services. In the case that the health information available on the Internet does not sort out patients' needs or expectations, there are not many possibilities of virtual interaction so the demand will move straight to the traditional face-to-face meetings. The Internet works as an inefficient gatekeeper, as far as the lack of interaction does not allow

professionals to distinguish between those cases that really need face-to-face interaction to be solved and those that do not.

Access to the Internet and having a website have not produced any inconvenience to patient support groups and the e-mail is identified as the main communication tool. The relationship of the social structures of these groups and the scarcity of interactive communication technologies available on their websites suggests that patient support groups are based on face-to-face communication and the Internet is conceived as a content platform to disseminate unidirectional information and not to perform any other activities related to virtual support.

Professionals are connected to the Internet and make an intensive use of it, mainly for questions related to the search and consultation of information. The use of the Internet as a communication tool with other health care professionals is widespread, but it is still unusual to communicate with patients or to produce health information for them. The increase of the information flow available on the Internet has not been accompanied by an increase of the interaction which is still constricted to face-to-face meetings. In spite of this, most professionals positively value the relevance of the contents available on the Internet and they do not consider that the patient's search for information is negative either for the professional–patient relationship, for health outcomes or for patients' health management. However, just a very small percentage of professionals recommend their patients to consult health information on the Internet or even talk about the Internet during face-to-face meetings. Furthermore, results suggest that also a small percentage of patients are pushing the use of the Internet in their relationship with the health care professional.

The main barriers to the Internet use selected by health care professionals are: lack of time at work, lack of data security and confidentiality restrained to the embeddedness of the Internet in their relationship with patients more than the professionals' fear to be questioned on their knowledge.

Community pharmacists' behaviour perfectly describes this situation. These professionals are more accessible to the citizens than physicians or nurses. They have more incentives to engage patients and have less time constrictions during face-to-face meetings so the embeddedness in their relationship with patients is easier for them. Likewise, the results revealed that those health professionals who develop their activities in a market oriented context tend to use the Internet as an interactive space more than those who develop their activities in public health care organisations. It has to be remarked that the relationship between the Internet and the social structure of health care systems shape the introduction and use of this technology.

4.2. Web 2.0 and health: opportunities and challenges

Focus on Web 2.0 and Health within the health care system at large allowed to clearly identify the gap between the potential of this phenomenon and the current features of interactive communication technologies. Health care systems could be characterised by: a lack of interactive communication technologies available on the Internet; a lack of health care professional production of the information on the Internet and a lack of interaction between these professionals and patients on the Internet. Faced with that situation, there are enormous possibilities in Web 2.0 applications to overcome the different weaknesses detected as long as these kinds of applications are characterised by the interaction process which supported it. But, it is important to bear in mind that those processes are embedded and embodied [3] in the relationship between the social structure of health care systems and the new technological paradigm.

The main limitation of online surveys is related with the non-representative nature of the sample and through the self-selection of participants [19]. In this case, both limitations provide a better support to conclusions and implications of the paper because of the fact that the population who answered the questionnaires are supposed to be more Internet-oriented than those who did not answer them.

Taking into account the distinctive features of digital technologies defined by Castells [1], online activities and applications labelled as Web 2.0 could be characterised by their self-generated expansive capacity; by their ability to recombine information on the basis of recurrent interactive communication and by their flexibility in a more dynamic and interactive space [22].

These features are in the core of Beer and Burrows' [20] and suggest that the Web 2.0 phenomenon has developed new commercial and social practices, taking up again the original design of the World Wide Web by Berners-Lee: the World Wide Web as a browser and as an editor [1]. But these practices are still scarce within the health care system because there are many frictions between these technologies and the current social structure. The relationship of production, consumption, reproduction, experience and power within the health care systems are in an initial shift stage from 'industrial age medicine' to 'information age health care', away from 2.0 scenarios. The challenges of Web 2.0 are those connected to innovation in the aforementioned relationships in a concrete spatial-temporal context. Innovation is at the roots of economic productivity, cultural creativity and political power making [1]. Furthermore, the drivers behind many Web 2.0 resources are market-oriented [14] but European health care systems are not as much market-oriented than the United States health care ones. European Government authorities may emphasise the Web at the forefront of health innovation and policy change in the leading of the shift, otherwise global market forces will do so.

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Note

1. Catalonia is a region in Spain with 7.37 million residents. The Catalan health system has a universal coverage financed primarily by the State general budget (4.2 per cent of GDP). The provision of health care services is both private and public with a mixed model that is integrated in a single network. More information available at http://www10.gencat.net/catsalut/eng/coneix_models.htm

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