Patient Portals 2.0: The Potential for Online Video

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Abstract

Web 2.0 enabled patient portals incorporate interactive communication features. This paper provides a comprehensive literature review of interactive features of patient portals 2.0; in particular we focus on online video. Although text based communication tools are popular interactive features of the current generation of patient portals, video has the potential to provide a higher level of engagement and educational, communicative and collaborative opportunities.

Keywords: Web 2.0; patient portals; technology; communication; messaging; video; videoconference; online video; telerehabilitation; YouTube; social presence; education

1 Introduction

This paper investigates how patient portals currently use web 2.0 technologies and the outcomes of this use. In particular we focus on the use and potential use of video for patient portals.

We define a *patient portal* as a secure website that allows people to manage health information and that provides features to foster collaboration between patients, health care professionals, and their families and caregivers. The content of the patient portal is created by both health professionals and their clients or patients, working collaboratively. Patient portals feature a variety of interactive tools that, for example, allow patients to access their health records, schedule clinical appointments, renew prescriptions, create their own library of educational materials, and communicate with their health care professionals through secure email and video.

Web 2.0 refers to online technologies such as instant messaging, e-mail, video and videoconferencing that enable and facilitate collaboration, social networking and participation. Currently, governments, hospitals, and private businesses are interested in how emerging Web 2.0 technologies can be applied to patient portals. New media technologies that allow participation and feedback can create socially and culturally-rich learning communities. Patient portals that use web 2.0 technologies not only have the capacity to enable clients to view their own health records and access education materials in a secure way but also can provide clients with the means to schedule appointments, annotate documents, communicate with health professionals over secure e-mail, view and even

create videos. Videos can create learning communities, increase communication richness, empower users and encourage identity formation.

Our research explores how information and communication technologies (ICT) can be employed to improve the effectiveness and efficiency of health care delivery. At the same time, we are also interested in online and user generated video. Online video refers to the recent phenomena of posting videos online where they are widely disseminated to an audience. Online video content is diverse, but many are amateur videos that document people's everyday (Godwin-Jones, 2007).

Our paper provides a comprehensive literature review of interactive communication tools used in patient portals; in particular we investigate the use and potential of online video.

2 Literature Review Methodology

The literature search was performed by NRC-CISTI, Canada's primary institute for scientific and technical information. Databases searched included: Scopus, Web of Science, Medline, CINAHL, ACM Portal, INSPEC, Compendex and IEEE Xplore. The databases were searched using a combination of subject terms and keywords related to patient portal technology. Truncation and adjacency operators were used where indicated. Terms were searched and then combined using appropriate Boolean operators. Search limits included date range (2004-2009) and language (English and French). A total of 491 unique citations were retrieved and reviewed for relevancy. The full-text of 129 of these articles was then reviewed. Article reference lists were reviewed for additional citations and a grey literature search was completed.

During our initial search we discovered that authors used a variety of terms to describe patient portals, so we broadened our search terms to include a variety of different descriptors, including portal 2.0 and PHR 2.0. Finally, article reference lists were reviewed for additional citations and a grey literature search was completed. Grey literature refers to documents that are not produced through commercial publishing (e.g., unpublished government reports, websites, etc.).

The larger report covered the following patient portal topics: Background information (definitions); types of patient portals; portal features and applications; design approaches; and outcomes.

In total 144 items were referenced in the initial report, 50 specifically dealing with the use of Web 2.0 technologies in patient portals and 3 that discuss the use of video.

3 Analysis of Literature Reviewed

3.1 Research from different countries highlighting the importance of personalized and interactive material

Canada

Statistics from the 2005 Canadian Internet Use Survey reveal that 56% of Canadians surveyed (age 18+) search for information on specific diseases on the internet. Fifty percent of those surveyed reported searching online for lifestyle information. At the same time fewer people surveyed discussed specific diseases (45%) or lifestyle information (40%) with their physicians. According to a 2008 Ipsos survey, 94% of Canadians think access to their medical history is important, however only 60% report that access to their records is easy. The same survey found that 55% of Canadians self-reported that their medical history is tracked on paper, while 30% stated their medical history is recorded electronically (Juzwishin, 2009). The majority of Canadians believed that medical errors can be prevented through better collaboration among medical professions (93%) and between caregivers and medical professionals (91%). Eighty-nine percent of the participants surveyed stated that they wanted to be more active in their own health care and the health care given to their family members (Juzwishin, 2009). Overall, personalized features were highly ranked by survey participants and portal users.

United States

In a study based on an intervention involving patients with Type 2 diabetes at three primary care clinics and one practice at the University of Colorado Hospital, Ross and colleagues (2006) discuss the usage of different types of a patient portal. A control group was given communication functions and general diabetes information over a portal, while an intervention group accessed personalized content and a system to set goals and provide automated feedback. The same number of people in each group logged on at least once (83% and 84%, respectively) but, over time, the intervention group used the portal more frequently and for longer periods of time than the control group; 39% of the participants in the intervention group set health improvement goals, 42% reviewed the results of their labs, and 30% examined clinical notes. More substantial usage was seen in the intervention group, which offered personalized and interactive content (Ross *et al.,* 2006).

Australia

In a study of patients from the Endocrinology Department and the Diabetes Centre of The Queen Elizabeth Hospital, South Australia, participants were asked to complete a baseline questionnaire on their perceptions and preferences of patient portals. They were then asked to enter data into the Violet Technology patient portal prototype about their own health and then were presented with educational information tailored to meet their needs. The survey was followed with an in-person interview. The majority of participants (81.81%) preferred receiving information tailored to meet their individual needs. A second study also showed strong support for information tailored to individual patients (Ma *et al.,* 2006).

3.2 *"Favorite" features*

In surveys of non-portal users, and in studying the actual usage of existing portals, patient preferences for portal features can be measured. Alder (2006) discusses the willingness of patients in his medical practice in Arizona to pay for online services, based on survey data. The top three rated services (in order) for those with internet access were: e-mail with physicians (34%); viewing medical records (22%); and medication refills (11%) (Alder, 2006).

In a 2005 study Tang and Lansky surveyed people on their preferences for access to various portal tools; the majority of respondents demonstrated a preference in having appointment reminders and scheduling available online, direct e-mail to physicians, access to test results and electronic medical records, and the ability to send self-monitoring reports to their physician (Tang & Lansky, 2005 as cited in Canada Health Infoway, 2007). Similarly, in a 2004 study, researchers found consumer interest in viewing medical history, recording appointments and medications, viewing lab results, and self-reporting online (Angst & Agarwal, 2004 as cited in Canada Health Infoway, 2007).

Studies of PatientSite, the patient portal for the Beth Israel Deaconess Medical Center in Bosoton, investigated the use of features in April 2003 and again in March 2004. In the April 2003 study, the most popular "hits" were, in order: lab and radiology results; prescription renewals; appointment requests; referrals; and clinical messaging. In the 2004 study radiology and lab reports and e-mail messaging were the most accessed features (Weingart *et al.,* 2006).

In a pilot study of Medicaid beneficiaries in Durham County, North Carolina, researchers asked subjects about their degree of interest in various features: educational materials; visit summaries; immunizations; prescriptions; procedures; insurance benefits; doctor's notes; and test results. Participants identified office visit summaries, records of immunizations, and prescription summaries as the most important features. Participants were least interested in viewing test results (labs and other results) online. When asked what additional services they would be interested in, participants identified prescription refills, booking clinic appointments, and secure e-mail with their care providers as important services (Lobach *et al.*, 2006; Willis *et al.*, 2006).

University of Pittsburgh Medical Center PMC Healthtrak diabetes portal researchers conducted a focus group where participants commented on a list of 15 features based on perceived usefulness (using a Likert scale). More than 60% of the participants listed all 15 technologies as at least "somewhat useful." Eight-six percent rated a self-management tool for recording daily blood glucose levels as very useful. Rated second was a calculator for estimating average glucose control, followed by links to educational sites, diabetes newsletters, an electronic scheduling system, and an electronic reminder system; 61% rated secure communication with the health care team as very useful (Hess, *et al.,* 2006).

3.3 Interactive features

Text-based messaging
The communication feature mentioned most often in patient portal studies were text-based; in particular, web messaging.

While patients showed a strong preference for communication tools in the literature, medical professionals express hesitation over communication features, especially messaging systems between patients and physicians. This hesitation is due, in part, to the fact that most physicians do not currently use any type of text messaging system to communicate with their patients.

In a 2006 survey of 4,203 physicians in Florida, 689 respondents reported using e-mail to communicate with patients (16.6%) while only 120 noted that they corresponded with patients frequently over e-mail. Physicians 61 years of age and older and those of Asian descent were least likely to use e-mail to communicate with patients (at rates of 11.7% and 7.2%, respectively). Of the non-users, 13.4% indicated interest in using e-mail to communicate with patients, 33.8% were undecided, and 52.8% had no interest in using e-mail in their clinical practice (Brooks & Menachemi, 2006; Silver, 2008).

Brooks and Menachemi state that the survey indicates modest advances in the use of e-mail. They also found that clinicians that use e-mail generally do not adhere to guidelines when corresponding with patients (for example, less than half of the physicians print out the e-mail correspondence and place it in the patient's chart, and only 36% of physicians informed clients about e-mail privacy issues). Other studies also reveal that physicians in general do not follow e-mail guidelines unless they are educated about the importance of these guidelines. The authors recommend educating patients and clinicians on the benefits and potential privacy issues concerning traditional e-mail correspondence (Brooks & Menachemi, 2006).

Not all physicians felt unsure about using secure messaging to communicate with patient groups. In an extended abstract, Verheij *et al.* (2008) discussed findings from data gathered in 100 GP practices participating in the Netherlands Information Network of General Practice. They found that e-mail consultations were reported in 30% of the practices involved in the study. In considering the demographic information of those patients using e-mail for consultations, they found that more men than women used e-mail consultations. People aged 25-44 were over-represented in the study. Most correspondences did not require a diagnosis, but when diagnoses were given the most common recorded were "metabolic diseases such as diabetes, pregnancy etc. and diseases/complaints of the male reproductive system," more than in normal practice consultations. "Cardiovascular and respiratory problems seemed to be less suitable for e-mail consultations." The researchers concluded that overall there are very few people who use e-mail for medical consultations, and that people who visit their physicians more frequently are more likely to consult with them via e-mail (Verheij, Ton & Tates, 2008)**.**

Interactive education

Many portals offer a search engine or links to educational material. Some portals personalize educational material to the individual users – for example, the Diabetes Information Profile (DIP) portal in Queensland Australia customizes educational material for its individual users. DIP contains information about the individual's diabetes-related situation, his/her information browsing history on the portal, the individual's information preferences, quizzing history, and agenda generation. The information services and patient responses to the quizzes were used to tailor information by filtering the information the patient needs to know (according to their specific condition and health literacy level) and prioritizing it for viewing. Patients and information items are categorized into three levels according to the patient's health knowledge (level one is basic information for patients who know little about diabetes, level three is high level information in diabetic complications). The program is implemented through a portal that also contains services for patients and providers to view and edit Electronic Health Records and computerized forms (Ma *et al.,* 2006).

eCoaching

eCoaching occurs when a patient has access to educational information and worksheets as well as a health care professional (usually not a physician) who monitors their work and provides patient coaching. PatientSite, the patient portal of the Beth Israel Deaconess Medical Center in Boston, features a new intervention that allows patients to interact with a nurse through an e-coach function of the portal. Initial messages from the e-coach provided some information about the condition and a link to a personalized worksheet within the portal, which patients were encouraged to fill out and bring with them for their next scheduled appointment. The e-coach inbox was monitored by two clinic nurses who responded using edited response templates (to ensure consistency in responses). The authors found that 35% of the 121 participants sent e-mails to the e-coach before their next appointment, 88% of which were requesting further coaching (Allen *et al.,* 2007; Allen *et al.,* 2008). Responses to the e-coach were positive (Allen *et al.,* 2007; Allen *et al.,* 2008).

eVisits

eVisits occur online when a patient requires extensive consultation with a health care professional, generally a clinician or a physician. These could potentially take the form of desktop videoconference, recorded video, synchronous messaging or e-mail. E-visits over patient portals were conducted over the patient portal Patient Online (POL) in Dartmouth-Hitchcock, a multispecialty practice in northern New England. The regular POL functions (online booking, clinical messaging, etc.) were extended to allow for e-visits - an e-mail based discussion directly with a clinician for non-emergency use and for a fee. The patient requests an e-visit with a provider they have seen in the past. The clinician decides over secure e-mail to accept (or not) and responds to the patient's message. When the e-visit is finished it is documented, given a code, and processed (through the patient's insurance billing system). The researchers note that nine physicians in this practice have conducted e-visits and report positive experiences. The most common reasons for e-visits included follow-up for chronic conditions (depression, diabetes, anemia, and hypertension) and for episodes of chronic conditions (sinusitis and back pain) (Walters, Barnard & Paris, 2006).

Video
Video is still an underdeveloped as a communication and information tool on patient portals. Currently, video is used on portals for educational purposes.

The Health Technologies Knowledge Transfer Network (HT KTN) was implemented in 2006 to bring together those in the medical technology and health-care communities through an internet-based communications portal (www.healthtechktn.com) – a site featuring customizable conferencing and information, including accessible presentations (saved video) and a clinicians forum designed to facilitate collaboration (Ansell, 2007).

Store and forward (asynchronous) video has been used for a portal for children with asthma – participants were given the equipment, including a computer mounted digital video camera – to monitor their inhaler technique and peak flow meter. The portal provided the capability for secure digital video uploads. Videos were record and loaded on the site to be viewed by the case managers, who scored them and sent e-mail instructions back to the children or family. Videos were supposed to be sent twice a week for six weeks then once a week for the rest of the time. Excellent outcomes were reported, however researchers were disappointed that only 1/3 of the anticipated videos were uploaded. The authors note that over time interest in the site declined steadily (but that interest in both in person and internet groups declined over time) (Chan *et al.,* 2008).

The health portal Hearts of Salford dedicated primarily to education also contains a forum where people can discuss their experiences with food and heart disease. Patients were able to comment on the site's educational material. One male participant noted that the educational material acted as important reminders for him to stay on the right track with regards to his eating and exercise habits (Lindsay, 2008). Participants were also able to respond to a video posted on the portal from the British Heart Foundation – a video which generated a lot of discussion in the patient portal forum groups (Lindsay et al., 2008). People commented that it was well done and effective. One male participant in particular noted that "*The visual images of what goes into the popular food identified does give out a strong message. I think a lot of people will be more aware of what they are eating when they are eating the foods shown because of the visual rather than the written image.*" (Lindsay, 2008, p. 325).

4 Research on Online Video

4.1 Our Recent Research
Thanks to YouTube and other video sharing websites, during the past several years millions of ordinary people have become regular viewers and creators of user-generated online videos. We conducted several studies to explore this phenomenon.

Our analysis of YouTube's potential as a site of discussion found that user-generated online video is effective as a discursive tool when organizational and technical structures allow all participants to both present their views and to review those of other participants. To support maximum interactivity, there must also be opportunities for unstructured and unscripted debate and discussion between participants (Milliken et al., 2008).

Our exploratory study of technology use by 60 YouTube users in Fredericton found that different demographic groups had different reactions to user-generated online videos, and that the user interface may influence user reaction. Similar to the research discussed on patient portals, our YouTube study findings suggest that the design of online video technology and content should consider the socio-cultural contexts of online video use and develop inclusive technologies to meet all users' needs (O'Donnell et al, 2008).

Our study of gendered aspects of video blogs (vlogs) on YouTube found that women posted vlogs less frequently than men and are more likely to communicate with the vlogging community. The vlogs made by females displayed similar levels of technical skill to the male vloggers, and women vloggers were more likely to ask questions and respond to the questions and posts of other vloggers in their own videos. Women participating in our study were less likely to report uploading their own videos, comment on videos, and watch YouTube videos (Molyneaux et al, 2008).

We also conducted a study of technology use by high-school students in three Canadian high-schools that participated in a Virtual Classroom project. While the youth in this study regarded video as an important tool for communication, they did not use it for communication on a regular basis (Molyneaux et al, 2009). Our investigation also revealed that the students were able to learn and understand each other's perspectives regarding diet and body image through the use of online videos — particularly those who reported more frequent use of video technologies — and that knowing their peer's viewpoints led to shifts in their own perspectives and attitudes. These findings suggest that the communication of opinions and attitudes which takes place between peers during in-person interaction can also occur during discussions over video technologies (Simms et al., 2009).

The use of videos for communication depends on the extent to which all participants have equal or similar opportunities to produce and consume video. Equal access to ICT tools like adequate bandwidth and equipment and organization and technical knowledge is necessary for effective video communication (Milliken & O'Donnell, 2008).

4.2 Research on Online Video as an Educational Tool
With increased bandwidth, lowered equipment costs, and the proliferation of free on-line video-sharing websites, user-generated video is now an attractive option for eLearning (Greller, 2006). New media, like social networking sites (Facebook, MySpace), wikis, blogs, vlogs, podcasting and vodcasting are no longer about "narrowcasting" or broadcasting content but are focused on interactive exchange and creating communities (McLoughlin & Lee, 2007). These new technologies, combined with collaboration and peer-learning pedagogy, could potentially create learning communities that encourage participation and feedback in a socially and culturally rich environment (Boulos, *et al.,* 2006; Boulos, *et al.,* 2007).

There have been several studies on the use of video iPods as important teaching tools for busy university and adult learners, especially in the medical field (nurses, medical students). These studies do not focus on user-generated content, but podcasts (just audio)

or vodcasts (video podcasts) that supplement the course lectures (Maag, 2006; Palmer & Devitt, 2007) Studies show that mobile learning devices are important technologies for busy adult learners as well as rural and remote students (Palmer & Devitt, 2007) In all of the studies accesability was the biggest issues – not all the students had video-enabled mobile players (Palmer & Devitt, 2007; Gkatzidou & Pearson, 2007)

Variation in presentation is also necessary for effective learning – adaptable environments can be superior to conventional classroom teaching, media can enhance the social aspect of learning (Okamoto *et. al.,* 2001). The adaptability of the technology is important; for example, video iPods, combined with an option for captioning, can be important tools for people with hearing impairments as well as students working in noisy environments (Gkatzidou & Pearson, 2007). Gkatzidou and Pearson's study was based on the "concept of a Transformation, Augmentation and Substitution framework (TAS)." Their goal was to adapt an existing learning object to meet the needs of individual learners – in this case, PDA or video mp3 player. Therefore they considered several adaptable features, including showing text as characters, sign language or tactile form (Braille), adding text to video (for hearing impaired, or those viewing in a noisy environment), vision free access to the resource, or activity requiring a mouse can be substituted for a keyboard or keyboard emulator (for mobility impaired persons) (Gkatzidou & Pearson, 2007).

Flexibility in the tool was considered key in many studies. Learners need to exchange information, also need to have some control (beyond reading, etc) to navigate and contribute. Greater freedom allows students to take control of their own learning (Sims & Hedberg, 2006). Scholars writing on technological tools for education focus on empowering students through collaborative and interactive design. They note the importance of social software allows users choice in which tools they can use for specific tasks **(**McLoughlin & Lee, 2007).

Scholars also advise using a variety of tools; in 2006 Boulos advised the use of all three (wikis, blogs, podcasts) in medical education because of the generally held assumption "that students of all ages learn best when immersed within a culturally and socially rich environment (Bolous, 2006);" a statement later echoed in the literature (McLean, *et al.,* 2007)

5 Discussion and Conclusions: The Potential for Video on Patient Portals

Sharing and viewing online videos has recently become extremely popular among millions of ordinary web users. With web access, a computer, and a webcam or cell phone, videos can easily be created and uploaded online. Studies of online video sharing have highlighted that user-generated video can be a dynamic information and communication technology.

To date, however, this explosion of videos online has barely touched patient portals; this situation represents a huge opportunity for innovation. To conclude we will briefly touch on how online videos can add value to specific interactive patient portal features.

Text messaging: Videos to convey simple information can be used by health care providers, patients and their families in the same way that text messages are used now. With an integrated webcam or webcam attached to their computer, these portal users can make these videos using open source software and free products available now on the web. Text messaging will be a useful way for everyone to comment on or reply to the video messages, so that interaction among portal users is more engaged and diverse.

Interactive education: Obviously this is one feature area where online videos have the potential to excel. Providing educational material in a rich audio-visual format has a higher chance of engaging patients.

eCoaching: A video message from the e-coach to the patient can convey many more social presense cues than a text message. e-Coach video messages have more potential to build trust and feelings of closeness between the health provider who is acting as the e-coach and the patient.

e-Visits: Similar to e-coaching using video, conducting e-visits via video will also allow for more social presense cues to be shared, building feelings of social connection between the health care provider and the patient. A video message from a clinician with personalized content would be particularly valuable for patients experiencing isolation.

Clearly there is a need for empirical research on the potential uses and impact of online video in patient portals. We invite all potential researchers on this topic to contact us to begin sharing ideas on how this technology can be best harnessed to make patient portals more interactive, dynamic and engaging.

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