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Users’ preferred interactive e-health tools on hospital web sites

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**Abstract**

**Purpose** – Healthcare is becoming an important part of people’s online content consumption, with people searching for information on diseases or medical problems, treatments or procedures, particular doctors or hospitals, or about parking. This paper aims to investigate what users deem essential on patient-oriented interactive e-health tools on hospital web sites.

**Design/methodology/approach** – The findings are based on 242 patients/users from diverse backgrounds in a purposive sample. A modified Delphi technique was used in two rounds of survey to collect and analyze data.

**Findings** – The respondents highly desire core-business tools, especially access to medical records and lab results, while discounting hospitals’ efforts to connect to social media. Hospitals’ e-health implementation on their web sites has greatly lagged behind the users’ needs for interacting with hospitals online. It is concluded that, while continuing to provide traditional functional tools, hospitals should expedite their development in providing core e-business tools and emerging functional tools in order to accomplish multiple objectives, including service, education, and marketing.

**Research limitations/implications** – Hospitals’ e-health development efforts have been behind the users’ expectations at large. Future research should explore whether such lagging has resulted mainly from the lack of technical know-how, lack of funding, and/or lack of vision on the administrative level.

**Practical implications** – The paper provides solid empirical evidence for US hospitals to (re)consider how to prioritize their efforts in implementing e-health online so as to build a user-centric web site.

**Originality/value** – Most US hospitals have implemented some form of e-health online to serve their patients/users, but rarely have researchers studied such efforts. As a result, hospitals have had little evidence to gauge their implementation success. This is the first empirical study that investigates from the patient/user perspective the usefulness of various interactive e-health tools online.

**Keywords** Healthcare new media, Healthcare information technology, E-health, Hospital web sites, Interactivity

**Paper type** Research paper

**Introduction**

Healthcare is increasingly becoming an important part of people’s online content consumption (Romano, 2003; Shaman and Pralgever, 2004; Taylor *et al.*, 2005).
According to the 2002 PEW Internet Project survey, the online healthcare content that people search for most were “specific disease or medical problem (63 percent), certain medical treatment or procedure (47 percent), a particular doctor or hospital (21 percent), and experimental treatments or medicines (18 percent)” (Taylor et al., 2005, p. 33). In 2004, when people were using a hospital web site, 33 percent looked for hospital information, 19 percent for medical information, 18 percent for other health information, 14 percent for a physician, and 9 percent for directions or parking Information (Taylor et al., 2005). It is clear that interactivity can greatly help with such tasks and more. While many interactive e-health tools are scattered on many hospital web sites today (see Table I for examples), it is not clear what users perceive as highly necessary and useful. Thus, this study was conducted to investigate what are the

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<tr>
<td>Online service menu&lt;sup&gt;a&lt;/sup&gt;</td>
<td>11.0</td>
</tr>
<tr>
<td>Personalized account&lt;sup&gt;a&lt;/sup&gt;</td>
<td>10.7</td>
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Table I. Interactive tools on US hospital web sites (by category and feature)

Notes: <sup>a</sup>These are interface designs that promote some of the interactive tools; percentage calculations are based on 712 sampled hospitals that had a web presence

Source: Huang and Chang (2012)
patient-oriented interactive e-health tools on hospital web sites that users deem essential.

Studies have found that, by enhancing customer attraction, delivering service, and facilitating transactions, a hospital can turn its web site into an essential marketing tool to influence and assist users in their healthcare decision-making (Catallo, 2008; Nguyen et al., 2004; Song and Zinkhan, 2008; Taylor et al., 2005). Hospital online marketing is best implemented when providing users with the ability to interact with the hospital system and encourage consumer involvement (Buckley, 2007; Peters, 2006; Wylie, 2006). E-health – “the combined use of electronic information and communication technology in the health sector for clinical, educational, research, and administrative purposes, both at the local site and across wide geographic regions” (Mukherjee and McGinnis, 2007, p. 350) – is highly based on the interactive online technology so that all its functions, such as e-billing, e-payment, e-prescription, e-supply, and e-records, are made possible (Varshney, 2009).

Today, hospitals that settle with traditional “read-only” information fed from glossy brochures and flyers are way behind the technology curve (Randeree and Rao, 2004). Catallo (2008, p. 24) argues:

Online marketing instead must incorporate more interactive, customer-controlled capabilities that serve to attract new patients who logically expect to “converse” online with hospitals in the same manner that they do with schools, financial institutions, and other major service providers in their lives.

After the e-health concept was introduced at the turn of this century (Mukherjee and McGinnis, 2007) and as the Web 2.0 technology, which is characteristic of interactivity and multimedia, has become increasingly mature, new interactive e-health tools have begun to emerge on some hospital web sites, where users can schedule an appointment with a physician, view their own medical records, pay bills, reorder prescriptions, choose and buy new-baby photos, generate patient greeting cards, send flowers to hospitalized loved ones, and so on (Catallo, 2008). Palomar Pomerado Health in San Diego, assisted by its partner Cisco Systems, went as far as moving the whole hospital to Second Life, a wholly interactive virtual environment, to explore the hospital of the future (Zensius, 2009). After analyzing the data regarding the implementation of patient record system in all nonfederal hospitals in the nation, Dave Garrets, president and CEO of HIMSS Analytics, said, “This [e-health] is the most transformational thing a hospital will ever do” (Nye, 2009, p. 11).

The findings of this study will provide empirical evidence for strategic planning for e-health development on US hospital web sites. Specifically, this study aims to answer the following two research questions:

RQ1. What interactive e-health tools do users perceive as the most useful to them?

RQ2. Are hospitals focusing on providing the e-health tools that users want most?

**Literature review**

From the technological perspective, Wickramasinghe et al. (2005) reiterated the importance of implementing e-health and highlighted such challenges as meaningful collaborations with healthcare recipients, efficient strategies and techniques to monitor patterns of Internet use among consumers, and better understanding of the balance
between face-to-face and virtual interactions. At the same time, they acknowledged that e-health encompasses more than just Internet and medicine and that culture is another factor that can greatly impact e-health implementation. That is, “e-health is more than a technological initiative; rather it also requires a major paradigm shift in healthcare delivery, practice and thinking” (Wickramasinghe et al., 2005, p. 333).

Blattberg and Deighton (1991) define interactivity as individuals and organizations communicating directly with one another regardless of distance or time. The importance of interactivity in online presentation for marketing purpose has been most effectively conveyed by the flow theory, which has been developed by multiple scholars over time (e.g. Csikszentmihalyi, 1975; Ghani and Deshpande, 1994; Hoffman and Novak, 1996; Pace, 2004; Trevino and Webster, 1992; Webster et al., 1993). Flow represents “a state of consciousness where a person is so absorbed in an activity that s/he excels in performance without consciously being aware of his or her every movement” (Finneran and Zhang, 2005, p. 82). According to Hoffman and Novak (1996), telepresence – simulated perception of direct experience – occurs in a flow experience and it has two components: interactivity and vividness. Many studies have demonstrated the role of vividness, often represented by a multimedia presentation, in such a flow experience (e.g. Akagi, 2008; Huang, 2009; Huang, 2010; Johnson, 2007; Poller et al., 2009). Interactivity, on the other hand, facilitates a seamless sequence of responses that characterize network navigation so that the flow is made intrinsically enjoyable, accompanied by a loss of self-consciousness and self-reinforcing (Novak et al., 2000). In the flow experience, interactivity, together with vividness, causes increased learning, perceived control, an exploratory mindset, and positive experience (Hoffman and Novak, 1996).

A few studies provide examples regarding the relevance of interactivity on web site effectiveness. In an experiment examining interactivity and vividness on web sites, Coyle and Thorson (2001) found that perceptions of telepresence grew stronger as levels of interactivity and levels of vividness in web sites increased. In addition, respondents who saw sites high in vividness developed more positive and more enduring attitudes toward those sites. Further, based on the observation of world-class web sites, Wylie (2006) suggests that enhancing interactivity, customization and the use of rich media, among other techniques, makes a web site more engaging. Lin (2007) demonstrates that interactivity, site design, informativeness, security, responsiveness, and trust all bring about customer satisfaction with a web site.

Empirical studies regarding hospital web sites and their users are rare. Hermann (2002), in an experiment involving 80 patients, assessed whether new media are suitable for conveying basic information to patients and analyzed the merits of using computerized animation to illustrate a difficult treatment process (the progressive steps of a thyroid operation) in comparison to the use of conventional flyers. The study found that understanding of and subjective knowledge about the surgical procedure and possible complications, the degree of trust in professional treatment, the reduction in anxiety, and readiness for the operation, were all significantly better after watching the computer animation than after reading the text. In addition, patients who had only read the text had a significant improvement in parameters after an additional exposure to the video animation. Hermann (2002) concluded that preoperative surgical information could be better delivered by presenting the operative procedure via computer animation.

Gallant et al. (2006) employed a mixed method of usability testing and in-depth interviews to investigate what content and interactivity users preferred on hospital
web sites. They used a high fidelity prototype of a hospital web site to test 30 participants during five consecutive days by applying a think-aloud protocol. In addition, through three themes – targeted health information, selecting a physician, and seamless information, the researchers attempted to find out how a hospital web site could boost personalization through interactivity. The study concluded:

First, institutional trust conveyed through a Web site is highly important to users when selecting a hospital, a physician, or a healthcare specialist. Secondly, visual elements and perceived usefulness of the Web site can contribute to establishing trust for users. A third point to consider is Web site users want personalized information geared to their health needs presented in a seamless and easy-to-use manner. Fourth, quality information enhances the credibility of the Web site and the reputation of its representative organization. Finally, the need for user-centric design in the development of hospital, healthcare, and medical Web sites is needed if hospital Web sites are to become a widely adopted form of interactive technology for healthcare (Gallant et al., 2006, p. 20).

In a pioneering study that assessed the current state of e-health implementation on hospital web sites, Huang and Chang (2012) conducted a content analysis on a representative sample of 764 US hospitals and identified 21 interactive e-health tools in six categories (see Table I) on their web sites. In addition, they also investigated whether a site had an online service menu to promote such tools or had a patient portal to provide users a secure and personalized environment to use the hospital’s core business tools. The study found that the average number of interactive tools on a hospital web site was 5.6. The maximum was 18, seen on Sharp.com. Of the hospitals, 66 percent had implemented traditional functional tools, such as online search, interactive maps, “find a physician,” and “contact us.” In contrast, the adoption rates of core e-business tools, such as paying bills online, (pre)registration online, making a doctor’s appointment, accessing health record, and refilling prescriptions, were significantly less (17 percent). According to the study, larger hospitals had implemented more interactive e-health tools than smaller ones; hospital networks had implemented more interactive e-health tools than independent hospitals. The 21 identified tools and the findings from Huang and Chang’s study will be compared with the users’ perceptions revealed in the current study.

Methodology
Because there is no fixed list of patients to represent a large patient population, coming up with a systematic probability sample of patients is impossible. Therefore, traditionally, almost all the healthcare-related surveys have relied on a purposive sample. To deal with the fact, this study incorporated the method called Delphi technique – a forecasting methodology for generating expert opinion on any given subject to find out the hows and whys of an issue – since the Delphi technique does not require systematic random sampling (Allen, 1978). In the Delphi technique, the term “expert” refers to someone who is familiar with the stated problem. Since experts interviewed with the Delphi technique do not meet face-to-face, opinion dominance, social desirability, individualistic thinking, anecdotal experiences, guesswork, and fuzzy conclusions can all be minimized. As a result, the focus of such communication is on real problem solving instead of who said what. Through multiple rounds of opinion exchanges via questionnaires, certain agreement or consensus on an issue gradually emerges.
This study used a modified Delphi technique in terms of sample size. To overcome the poor representativeness of a convenience sample, this study drew respondents from multiple sources: one listserv for a university’s staff and faculty, one university class, one listserv for patients who previously volunteered in healthcare research projects, personal invitations to patients from two hospitals, two community organizations, and three online healthcare forums. Snowball sampling method was applied; many of the initial contacts were requested to invite other qualified respondents to join the study. A qualified participant was defined as anyone living in the USA who was at least 18 years old and who had visited either a hospital/clinic or a hospital web site in the preceding 12 months. Although the sample in this study is not a systematic probability sample, with many respondents drawn from a specific geographic area, the diversity of the backgrounds of the participants from all over the nation helped offset the homogeneity of a typical convenience sample, such as a student sample or patients from a specific clinic/hospital. The findings and conclusions from this study can only be applied to these respondents, but they might hint at a pattern for a larger population. The Delphi technique usually involves a panel of 10 to 30 experts, but the pursuit of demographic representativeness finally brought 242 participants on board.

Data collection was conducted from June to August in 2011 in two stages. Data collection in each stage was accomplished by an online survey questionnaire. Since the questionnaires were designed in such a way that skipping required questions was impossible, missing data were minimized. The survey questionnaire in the first stage presented 21 e-health interactive tools, and each tool was illustrated by a typical, live example from a hospital web site. The respondents were asked to evaluate the usefulness of each interactive tool on a five-point scale with 5 being the most useful. Demographic data were collected at the same time. In the second stage, a follow-up survey questionnaire was sent to those first-round respondents who left an e-mail address (almost all did). Both close-ended and open-ended questions were used for the respondents to answer questions related to the major results from the first round of survey. Consequently, the statistics from the first round of survey received explanations by the respondents themselves. For the open-ended questions, after extensive exchanges of ideas, two coders encoded the answers independently by clustering themes in answers to each question. The average value of Scott’s Pi for the coding of three open-ended questions was 0.86.

Findings
In total, 242 respondents successfully participated in the two rounds of survey. A typical participant was a White (74 percent) female (76 percent) with a bachelor’s degree (43 percent), who was 46-55 years old (22 percent) and who visited a medical institution 3-5 times (33 percent) and visited a hospital web site with a broadband connection (94 percent) once or twice (38 percent) in the preceding 12 months.

In the preceding 12 months, 26 percent of the respondents never visited a hospital web site for the following reasons:

- no or little need; never thought of using it; not aware of the presence of the web site of their frequently visited hospital (63 percent); and
- little useful info on a hospital web site; difficult to find info; no or few useful interactive tools; info not current (30 percent).
A few respondents said that they would rather call a hospital for any info (5 percent) or that they were concerned about the security of using hospital sites (2 percent). In addition, the more a participant visited a hospital, the more he or she tended to visit its web site (Pearson $r = 0.459$, $p < 0.001$).

Figure 1 lists the interactive e-health tools in the order that the respondents perceived as the most useful to the least useful. The numbers shown represent the percentages of respondents who considered the tools to be useful (selecting 4 or 5 on a five-point scale). At the same time, the data from Huang and Chang’s, 2012 study specifically, the percentages of US hospitals that have implemented these tools on their web sites – are displayed side by side to provide a context to the current data. The user preference data and hospitals’ adoption rates of interactive e-health tools are certainly two different things. But a comparison between the two can demonstrate where each party’s passion is and highlight the discrepancies between users’ preferences and hospitals’ implementation efforts.

Figure 1 reflects four major discoveries from this study. First, the respondents highly desired access to their medical records and lab results on their hospitals’ web sites (83.7 percent). Unfortunately, only 10.1 percent of the hospitals were providing such a service. The discrepancy is huge. The follow-up survey shows that 59 percent of the respondents had no such access and 34 percent of them were not sure whether they had such access. Only 7 percent were enjoying the access to their medical records. The respondents provided five reasons in their own words why they craved such access on a hospital web site:

![Figure 1. User preference rankings and hospital adoption rates of interactive e-health tools](image-url)

**Source:** The data regarding the hospital adoption rates are from Huang and Chang (2012)
It will be convenient and quick to access the information about their health for free (38 percent).

It will help track and monitor health conditions; research, remember, understand, and verify health conditions and services; and reduce unnecessary procedures (24 percent).

It will be convenient to transfer records, share information, and ask for a second opinion (18 percent).

It will make users feel empowered and informed to take care of their own health (14 percent).

It will be easy to check for accuracy for insurance and other purposes (6 percent).

One participant probably best stated the reasons:

My doctor does not send me my lab values, just a comment if the levels are normal or abnormal. I'm an RN (registered nurse) and advocate for my own healthcare. I like to keep my information to follow trends of improvement or decline of my health status. It is a motivator to maintain my health. Also, when seeing other specialists, I have the medical information readily available and accurate. I don’t have to rely on memory. That is the purpose of the electronic medical record.

Second, having a presence on social media, such as Facebook, Twitter, and YouTube, has become a trend for hospitals in the last three years or so, and many researchers and practitioners have promoted such a presence as a way for hospitals to market themselves (Hawn, 2009; Jain, 2009; Terry, 2009). For example, Ackerman (2010) suggested that “many doctors see social media as a way to strengthen the patient-physician relationship, interact with their peers and publicize their opinions on key issues.” Huang and Chang (2012) found that 35.7 percent of the US hospitals have made an effort to connect to their patients/users via social media. The respondents in this study, however, showed the least interest (10.4 percent) in seeing such a tool on a hospital web site. Again, the hospitals’ emerging passion for a presence on social media and these users’ extreme indifference constitute a stark contrast. As a matter of fact, these users believed that it was even less important for hospitals to have links to social media web sites than to have an online gift shop/flower shop (16 percent). The follow-up survey showed that 80 percent of these respondents never visited or got information about a hospital on a social media web site.

The respondents listed three reasons why they did not like to access a hospital via social media:

Never thought of using it; no need; no interest; not aware of hospitals’ presence on social media; would visit a hospital site directly if necessary; no specific hospital to connect to; no interest to “socialize” with a hospital (52 percent).

Not appropriate, professional, credible, or secure to interact with a hospital via social media; privacy concern; hospitals doing nothing but self-promoting on social media (35 percent).

Having no social media accounts (13 percent).
One participant commented, “I don’t feel that hospitals are social; therefore I wouldn’t be interested in interacting with them via social media.” Another participant noted, “I just feel social media is not the place for my personal health issues. I do not want everyone or at least ‘my friends’ to see what is going on unless I want them to know.”

Third, Figure 1 shows that a little more than half of the respondents loved to have a dedicated menu (52 percent) on the homepage of a hospital’s web site so that they could immediately see what interactive e-health tools were available. The respondents actually felt an even stronger yearning for the personalized functions (61 percent) on a secure section of a hospital web site so as to be engaged in sensitive data processing, such as accessing medical records, (pre)registering, making a doctor’s appointment, refilling a prescription, paying bills, etc. In both cases, hospitals had only an 11 percent adoption rate. Again, what is offered and what is desired has yet to be aligned.

Fourth, when the users’ top ten preferred interactive tools are compared with the top ten interactive tools provided on hospital web sites, it is found that the respondents considered all the core business tools to be highly useful, including accessing medical records and lab results, refilling prescriptions, (pre)registering, making doctor’s appointment, and paying bills. None of these except for paying bills is among the hospitals’ top ten choices. In contrast, some top interactive tools available on hospital web sites, including patient education, online calendar, a presence on social media, e-card, and online nursery, are not among the respondents’ priorities. One participant commented on the calendar function, “I find that the calendar of events and classes is often inaccurate or difficult to find.”

When these 21 tools are clustered into six categories (see Figure 2) as Huang and Chang (2012) did, two noteworthy discrepancies between user preferences and hospital implementation emerge. First, what the respondents needed most on a hospital web site was the core-business tools (73 percent, the most preferred category of tools), but the implementation rate (51 percent) was way below user expectations. In contrast, US hospitals were largely staying on the level of implementing traditional functional tools,
such as online search, online maps, and finding a doctor (90.6 percent, the most implemented category). Second, the respondents were very interested in seeing emerging functional tools on a hospital web site, including ER wait time, interactive cost estimator, and site and applications developed for mobile devices (46 percent, the third most preferred category), but only roughly 9 percent of the hospitals provided such new tools (the least implemented category). Among these emerging tools, the respondents were most interested in using an interactive cost estimator (see Figure 1). One participant wrote:

Depending on the accuracy of the “estimate,” the interactive cost estimator could become a powerful tool in the future. Rising health care costs, coupled with an uninsured/under-insured population, means people will be looking for ways to get the best care for the lowest cost. This tool could even be used with the “Find a doctor” tool to compare providers, services, and costs across hospitals/facilities (assuming other hospitals/facilities have an estimator tool).

Discussion and conclusions
The two rounds of online surveys in this study have investigated the usefulness of 21 patient-oriented e-health interactive tools currently available on US hospital web sites, from the users’ perspective. The findings based on the responses of 242 qualified participants recruited from multiple sources have provided many valuable lessons for hospital administrations. The findings can be readily applied to a hospital’s planning of e-health implementation on its web site, which is an important contact point between a patient/user and the hospital. In contrast to prior research on general user behavior (e.g. Gallant et al., 2006; Taylor et al., 2005), this study has highlighted specific patient-preferred interactive tools that hospitals should consider adopting on their web sites to provide a flow experience so as to better serve their patients/users.

The study found that 62 percent of these respondents used a hospital web site from zero (26 percent) to once or two times (38 percent) in a year while 78 percent of them visited physical hospitals at least three times in a year. It is obvious that hospital web sites have been very much under-used, quite possibly for the various reasons the users stated. It was found that the more a participant visited a hospital, the more he or she tended to visit its web site. This finding suggests that, when users have to visit a hospital, they do like to use a hospital web site. In other words, there is a strong need for patient/user’s telepresence on a hospital’s web site. Therefore, a hospital should seriously consider moving some of its interactivity-based services online so that users are interested in using a hospital’s online services.

The results from this study take on a new layer of meaning when compared with the hospital implementation data with the same set of interactive tools in Huang and Chang’s, 2012 study. The current data show that hospitals’ development in interactive e-health tools has greatly lagged behind the users’ needs and expectations across the board. What the participants needed most on a hospital web site are the core-business tools, including accessing medical records and lab results, refilling prescriptions, (pre)registering, making doctor’s appointment, and paying bills, but US hospitals are still largely staying on the level of implementing traditional functional tools, such as online search, online maps, and finding a doctor, etc., which the users do also need.

The data also show that there has been huge misalignment between what the hospitals believe the patients want and what the patients actually want. Many hospitals have made much effort in connecting to patients via social media, but the respondents
have shown the least interest in “socializing” with any hospital. At least, the respondents have not shown enough enthusiasm in socializing with a hospital on social media. Instead, the respondents showed effusive enthusiasm in accessing medical records and lab results on their hospital web site, and they have also showed conspicuous interest in emerging interactive tools though extremely few hospitals are providing such services. Some scholars have argued that the mere presence or absence of certain interactive features on a web site matters only if these features affect how consumers navigate and use the site (Lee et al., 2004; Song and Zinkhan, 2008). To make a hospital web site relevant to the patients/users and to make them willing to use such a site, hospitals should design user-centric web sites as Gallant et al. (2006) advocated.

This study has its limitations. White females self-selected to be included in this study and constituted the significant majority of the sample; in addition, 22 percent of the sample was between 46-55 years old. The significant proportional change of either group may change the results of this study.

Based on the findings from this study, here are the recommendations to US hospitals for building a user-centric hospital web site for the future:

1. Build a highly interactive web site. Almost all the reasons that the respondents put forward for accessing medical records and lab results can be summarized as providing convenience and empowering. This finding supports Reichheld and Schefter’s argument that “the largest single segment of online customers seeks convenience above all else... They want to do business with a site that makes their lives easier” (Reichheld and Schefter, 2000, p. 110). Wylie (2006) suggests that enhancing interactivity and customization make a web site more engaging. Interactivity helps make a user lose self-consciousness and self-reinforcing in a flow experience (Novak et al., 2000). Therefore, hospitals need to enhance interactivity on their web sites by first being aware of the 21 interactive e-health tools and then implementing as many of those as possible that the patients/users care for. When a hospital enables its users to conveniently do and not just watch things on its web site, the site will become much more valuable to the users. As Catallo (2008, p. 26) pointed out, when hospitals promote Web 2.0-style interactivity, they can “quickly establish brand images of convenience, caring, and responsiveness for their institutions”. In this rapidly moving and changing world where many people are short on time, the remarkable convenience of a well-developed hospital web site that provides what the patients need will instantly make the hospital more appealing than competing institutions and will empower people to take responsibility for their own health.

2. Develop more sophisticated and emerging interactive tools. The respondents’ top ten preferred tools fall exclusively into the traditional functional tools and core e-business tools categories. While hospitals continue to provide traditional functional tools and continue to explore how to connect to its patients/users via social media, they should focus on developing core business interactive e-health tools – especially accessing medical records and lab results – as their top priority. At the same time, hospitals can consider implementing emerging functional tools, including ER wait time, interactive cost estimator, and site and applications developed for mobile devices, to cater to patients/users’ contemporary, fast-paced lifestyle.
Promote interactive tools. Once hospitals have implemented an extensive array of interactive e-health tools, they should promote the tools to their users by designing a dedicated interactive tools menu on the home page so that more patients/users will do business with a hospital online. More important, more hospitals need to create a personalized and secure web space for convenient and carefree transactions of sensitive data and for easier access to up-to-date user-specific information on a hospital web site.

Customize interactivity to a specific population. The findings show that a respondent’s sex, education, and age all had an impact on the preference of interactive tools, whereas race did not. For example, female (vs. male) respondents considered the features of online search, virtual tour, online gift shop, online nursery, and a presence on social media to be more useful (all $p’s < 0.05$). Respondents with higher (vs lower) education levels considered the features of finding a doctor, paying bills online, and accessing medical records to be more useful, but a presence on social media to be less useful (all $p’s < 0.05$). In all, it is likely that a hospital may match patient population demographics or the nature of the hospital (e.g. women’s hospital or other specialty hospital) with the design of the interactive tools on its web site. While the present study provides an overview of users’ preferences, individual hospitals may further cater to their specific profile of patients/users and adapt their web sites and provision of interactive tools accordingly. Since those patients/users who frequently visit a hospital tend to be the ones who visit its web site the most often, identifying this group of users/patients will be helpful as they can provide tracking data and feedback to better the design of the web site and its features. They can also serve as the target of word-of-mouth campaigns to bring in more potential users to the web site.

Hospitals’ e-health development efforts have been behind the users’ expectations at large. Future research should explore whether such lagging has resulted mainly from the lack of technical know-how, lack of funding, governmental regulations, and/or lack of vision on the administrative level. Nevertheless, the importance of understanding users’ needs and preferences for e-health interactive tools cannot be overemphasized. Various discrepancies uncovered in this study serve as a practical starting point for hospitals when they attempt to implement e-health on their web sites by providing useful interactive features. Such features will very likely bring a flow experience so that, through their telepresence, they user will truly learn about their own health issues, explore solutions, meaningfully participate in their own healthcare, and gain positive experience from a hospital web site. Taken together, hospitals cannot overlook the opportunity to shape their relationships with their patients/users and to enhance their reputation and credibility by adopting useful patient-oriented interactive tools; such successful implementation will make a hospital truly stand out by serving multiple objectives, including service, education, and marketing.

References
Users’ preferred e-health tools


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Dr Edgar Huang is an Associate Professor from the School of Informatics, Indiana University on the Indianapolis campus. His research articles on healthcare new media, media convergence, streaming media, copyright issues related to DVD ripping, online imaging, documentary photography history, digital imaging manipulation, and the internet and national development have been published in many prestigious journals, including Convergence and Journalism and Communication Monographs. He has taught more than 20 different kinds of courses from online video streaming, advanced web design, video production and editing, to media convergence, research methods, and news writing at eight universities in the last 27 years. Edgar Huang is the corresponding author and can be contacted at: ehuang@iupui.edu

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