

## Patient Satisfaction Scores and Their Relationship to Hospital Website Quality Measures

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### **Abstract:**

Hospitals and health systems are using web-based and social media tools to market themselves to consumers with increasingly sophisticated strategies. These efforts are designed to shape the consumers' expectations, influence their purchase decisions, and build a positive reputation in the marketplace. Little is known about how these web-based marketing efforts are taking form and if they have any relationship to consumers' satisfaction with the services they receive. The purpose of this study is to assess if a relationship exists between the quality of hospitals' public websites and their aggregated patient satisfaction ratings. Based on analyses of 1,952 U.S. hospitals, our results show that website quality is significantly and positively related to patients' overall rating of the hospital and their intention to recommend the facility to others. The potential for web-based information sources to influence consumer behavior has important implications for policymakers, third-party payers, health care providers, and consumers.

**Keywords:** Patient Satisfaction | Health Information Technology | Social Media | Marketing | Hospitals

### **Article:**

Patient centeredness is a central theme of the health care reform movement and integral to many components of the Patient Protection and Affordable Care Act (ACA; Berwick, 2011). In particular, hospitals and health systems are being incentivized to become accountable care organizations (ACOs) or medical homes (MHs) that promote care coordination through electronic health information exchange (HIE) and increased consumer engagement (Bohmer, 2011). However, the relationship between the use of electronic media for conveying health-related information and consumer satisfaction with care services has not been empirically demonstrated (Lin, James, Vassar, & Martin, 2001).

A great deal of the discussion surrounding consumer engagement has revolved around promoting the use of a personal health record (PHR) and patient portals (Labow, 2010). Despite the promise of PHRs, fewer than eight percent of consumers have used a PHR and less than half of adults have even heard of the tool (Goedert, 2011). Ten times as many adults, more than 80 percent, report using the Internet as a resource for researching and making health care decisions (Berkowitz & Schewe, 2011; Reid & Borycki, 2011; Szokan, 2011). Therefore, the importance of websites for conveying information to consumers is critical for the hospitals and health systems that will serve as ACOs or MHs if the patient-centered care aim is to be achieved (Berwick, Nolan, & Whittington, 2008; Laing, Hogg, & Winkelman, 2005). Based on these trends, many health systems' websites have begun to include tools and information for both patients and visitors designed to make navigating complex health encounters more “user-friendly”; provide information about conditions, treatment, and follow-up; and create a positive organizational image (Erdem, 2007; LaPenna, 2009; Sanchez, 2000). If hospital websites are going to play an important role in delivering care information, it is likely that these sites will play a role in forming patients' expectations against which they will form service satisfaction judgments. To the extent that discharge instructions and other postcare information are made available through hospitals' websites, they may play a direct role in the care experience and influence patients' satisfaction assessments.

The purpose of this article is to explore the relationship between hospitals and health systems' website quality and their patient satisfaction levels. A computer algorithm, used widely in industry, was used to assess 1,952 facilities' websites' overall quality based on 34 measures of accessibility, site content, marketing, and adherence to technical standards. The results of the website overall quality scoring are then compared to five measures of patient satisfaction with health services drawn from the Hospital Compare survey (Giordano, Elliott, Goldstein, Lehrman, & Spencer, 2010) for 2010 using linear regression.

Understanding the relationship between hospitals' website-quality levels and their patient satisfaction outcomes is important for policymakers, hospital and health system administrators, and consumers (Scalise, 2006). For policymakers, transforming health systems into ACOs and MHs that achieve the aim of patient-centeredness will require such organizations to have an effective and user-friendly Internet presence. As a result, website quality likely will be a leading indicator of these efforts and will influence patient satisfaction scores. In particular, websites will help the consumer form expectations about service quality prior to care encounters and subsequently rate their actual experiences in comparison to those expectations (Johansson, Oleni, & Fridlund, 2002; Jun, Hyun, Gentry, & Song, 2001). For hospital and health-system leaders, having quantifiably objective measures of website user-friendliness linked to patient satisfaction creates a clear path for improvement and provides a set of linked outcome measures. Lastly, for health care consumers and their advocates, understanding what features to look for in a hospital or health system's website may become a care effectiveness measure in its own right and integral to meaningful use, care quality and consumer satisfaction assessments.

## **METHODS**

In this study we use primary and secondary data to assess the relationship between website quality and patient satisfaction. The sample represents a large segment of U.S. hospitals that will be impacted by the federal programs called for in the ACA that are designed to increase patient-centeredness. The final analysis included 1,952 facilities that deliver the majority of care in the United States. We employed linear regression to measure the relationships among the consumer satisfaction and website performance variables controlling for other organizational factors.

### **Data Sources**

We used four data sources to conduct the study. The primary data collection of website characteristics relied on uniform resource locators (URLs) compiled by SK&A for the Office of the National Coordinator for Health Information Technology (ONC). The SK&A data included all of the facilities contained in the other data sources used in the study. We drew patient satisfaction measures from the Centers for Medicare and Medicaid Services' (CMS) Hospital Compare dataset. The Hospital Compare dataset contains process, outcome, and patient satisfaction information for hospitals throughout the U.S. and is publicly available (Werner & Bradlow, 2006). Additional secondary variables came from the American Hospital Association (AHA) Annual Survey database and area resource file (ARF). The AHA Annual Survey includes organizational characteristics for over 5,000 hospitals in the United States. The ARF contains data on county-level community characteristics and resource availability that we used to measure access to health services. We merged all datasets using the Medicare identification number and FIPS county code. Altogether, 1,952 facilities had complete information with the CMS hospital compare sample being the limiting factor in nearly all instances of missing information.

### **Variables**

Website quality measures are based the standards used to develop secure electronic commerce websites. The measures are assessed by analyzing hospitals' websites using a webcrawler. A webcrawler is an automated algorithm that begins at the homepage for a facility or system (i.e., for the Cone Health System domain, the web crawler starts at <http://www.conehealth.com/>) and drills down into successive subpages to build a topographical map of the links within a website. The analytic engine then randomly samples 100 subpages from the hospitals' website and evaluates them based on 34 subscales. Table 1 contains a list of the tests performed and their contributions to the website overall quality. A total of 3,079 facilities were part of larger organizations (e.g., members in a system) and did not maintain unique domains or did not have a clear, independent web presence. If a hospital did not maintain a unique domain name for each facility, the master domain for the system was tested. Additionally, 65 sites could not be assessed due to the inaccessibility to their webpage's subpages by the webcrawler (described next) algorithm used. Website testing took place in June of 2011.

TABLE 1 Website Evaluation Items and Their Contribution to the Overall Measure

<b>Measures</b>	<b>Definitions</b>	<b>Overall score (%)</b>
Alternative text	Assess whether alternative text accompanies images.	3.4 c
Amount of content	Measures the number of pages with a reasonable amount of text.	3.4 c
Analytics	Determines if the website implements software packages to track new visitors, recurring visitors, which webpages they visit and for how long, etc.	1.7
Broken links	Assess if the website contains links with web addresses that do not exist or return an error.	3.4 c
Contact details	Determines whether contact details (physical address, e-mail, phone number, fax number, etc.) are displaying on the website.	1.7
Content keywords	Measures if meta-data keywords are used properly and are consistent with commonly used words in the content.	3.4
Error pages	Checks for error messages and faults which strongly suggest the website is broken in some way.	1.7
Facebook	Checks whether the website has a Facebook page, Facebook group, or personal Facebook profile.	2.6
Flash	Assess the effectiveness of Flash usage throughout the website, including compatibility with mobile devices, implementation of accessibility, and usability without Flash support.	5.1
Freshness	Measures whether content is kept up-to-date, and if users are frequently exposed to new content (i.e., “latest news” is recent and easily accessible from the homepage).	6.8 c
Headings	Assess whether headings are	3.4 c

	used effectively throughout the website to improve search engine placement, accessibility, and usability.	
Images	Determines if images are used correctly, such as an acceptable size and a web-friendly format.	1.7
Incoming links	Measures the number of links from major search engines, including Yahoo! and Google.	3.4
Internal search	Check whether the website has an internal search facility (i.e., a search box which allows users to search inside the site).	1.7
Link states	Assess the use of Cascading Style Sheets (CSS), which is the industry standard for webpage design, for font sizing and styling.	2.7
Links	Assess whether link text to URLs are appropriate and meaningful (i.e., avoids “click here” and other vague text descriptions).	3.4
Outgoing Links	Check links outgoing from your own website to others.	1.7
Popularity	Assess the relative Alexa ranking of popularity compared to other websites, and whether the ranking is rising or falling. Alexa combines the viewing history of many web browsers using particularly browser toolbars.	4.4
Printability	Determines whether a webpage is designed to be printed, particularly if specific CSS stylesheets are designed for printing.	3.4
Readability	Assess the comprehensibility and quality of website content using Flesch Kincaid Reading	3.4

	Ease and Gunning Fog Index scales.	
Redirection	Assess the ability to move back and forward across pages using the web-browser's buttons.	0.7
Search engine results	Determines how the text from a webpage appears in the Google search results. The title and meta data description of each page is important in determining placement in search engine ranking, and should be relevant to the content of the webpage.	3.4
Search ranking	Assessment of search engine placement on select search websites using a set of specified terms.	3.4
Site structure	Assess how “deep” in the website hierarchy (i.e., how far many pages (number of clicks) are from the home page).	1.7
Spiderability	Assess the degree a website can automatically be explored by search engines and other automated programs.	3.4 b
Stylesheets	Assess whether and how effectively CSS are used throughout the website, such as avoiding embedded style sheets and tables for website positioning.	3.4
Twitter	Determines whether the website has a Twitter account (a popular social networking website), and measures the number of references to the account on Twitter.	1.7
URL chopping	Determines if webpage URLs still function if part of the URL is manually removed.	0.9
URL format	Assesses the use of natural language to improve the readability of web addresses	2.8

	of each page.	
Visual interest	Measures the proportion of graphical elements (based on complexity, repetition, and animation) relative to the amount of text.	3.4 b
W3C compliance	Assess whether the website implements best practices and meets specifications for website development according to the W3C. W3C is a consortium and standards body of web technologies, defining the specification of HTML, CSS, and other technologies.	2.6 a

a Measure can have a negative impact on scoring: penalty if below 0.0.

b Penalty if below 2.2.

c Penalty if below 4.4.

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The five summarized scales provide broad assessments of website quality that are likely to influence a consumer's perception of the site and potentially shape their service expectation. While it is important to note that some specific metrics contribute to more than one of the summarized scales, the scores themselves provide a basis for comparing sites. The definitions of the specific items measured and how they are weighted in the summarized scales are presented in Table 1.

We drew the second variable of interest from the Hospital Compare data. We converted each patient satisfaction item captured in the data into the percentage of patients, for a given hospital, that ranked their experience in the highest category for that item. For example, when asked about physician interactions, patients were given three categories to select from, including: “Doctors always communicated well”; “Doctors sometimes communicated well” and “Doctors never communicated well”. For the purposes of our analysis, we only consider the percentage of patients who selected: “Doctor always communicated well.” We calculated these percentages for each satisfaction item because we sought to identify high patient satisfaction and its distinction from mediocre or low levels of patient satisfaction. Table 2 contains a description of the patient satisfaction measures in the survey and identifies those used in the analysis.

TABLE 2 Patient Satisfaction Measures' Expected Relationship to Website Quality

Patient satisfaction item <sup>a</sup>	Conceptually expected to be related to website	Rationale
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	<b>quality?</b>	
Room was always clean	No	Room cleanliness not related to website features
Doctors always communicated well	Maybe	Expectations about providers' bed-side manner and communication style may be communicated through the website
Nurses always communicated well	Maybe	Expectations about providers' bed-side manner and communication style may be communicated through the website
Patients always received help as soon as they wanted	No	Websites are not designed to customize preferences of patients
Pain was always well controlled	No	Pain management is not related to website quality
Staff always explained about medicines before giving them to patients	No	Medication delivered in the facility is not related to website features or performance
Staff always gave patients information about what to do during their recovery at home	Yes	Can potentially be affected by website features and content if discharge information is made available through the hospital website
Patients who gave a rating of 9 or 10 (high)	Yes	Can potentially be affected by website content and quality that establishes the expectations against which satisfaction is assessed
Area around patient room was always quiet at night	No	Not related to EHR
YES, patients would definitely recommend the hospital	Yes	Can potentially be affected by website content and quality that establishes the expectations against which performance is assessed to measure satisfaction

<sup>a</sup> From Hospital Quality Alliance Hospital Compare Care dataset.

We drew variables to control for hospital characteristics from the AHA and ARF datasets. We used the AHA data to measure hospitals' tax statuses (for-profit or nonprofit), teaching status



Beds	.56	603	**	8**									
4. Teaching Hospital (1)	.07	.257	.056**	-.099**	.542**								
5. Rural (1) vs. Urban (0)	.35	.478	-.180**	-.137**	-.421**	-.202**							
6. Website Overall Quality	5.172	1.572	.102**	-.082**	.156**	.100**	-.150**						
7. YES, patients would definitely recommend the hospital	68.99	10.191	.058**	-.040*	.055**	.064**	-.107**	.133**					
8. Patients who rate hospital a 9 or 10	66.68	9.316	.033*	.017	-.118**	-.046*	.081**	.077**	.906**				
9. Nurses always communicated well	75.55	6.173	-.018	-.030	-.307**	-.174**	.304**	-.003	.656**	.785**			
10. Doctors always communicated well	80.10	5.512	-.061**	.081**	-.341**	-.197**	.395**	-.095**	.504**	.623**	.778**		
11. Yes, staff always gave patients discharge	81.74	5.241	-.067	-.015	-.093**	-.022	-.007	.127**	.556**	.573**	.469**	.349*	

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\* $p > .05$ . \*\* $p > .01$ .

TABLE 4 Relationships Between Website Quality and Patients Satisfaction Measures

Hospital characteristics (Rows)	Patient satisfaction items				
	YES, patients would definitely recommend the hospital	Patients who gave a rating of 9 or 10 (highest satisfaction)	Nurses always communicated well	Doctor always communicated well	Staff always gave patients information about what to do during their recovery at home
Website Overall Quality	0.5376***	0.3610**	0.0505	-0.1670*	0.2828***
System membership (1)	1.1629*	1.2452**	0.4250‡	0.0460	0.4739*
For-profit (1) vs. Nonprofit (0)	-3.5237***	-2.0453**	-1.9203***	0.2766	-1.0563**
Total beds	-0.0003	-0.0044***	-0.0058***	-0.0046***	-0.0038***
Teaching hospital (1)	1.1553	0.6780	-0.0380	-0.0234	0.7697‡
Rural (1) vs. urban (0)	-1.4052**	1.4016**	2.5609	3.3101***	-0.0991
Constant	66.5340***	64.8277***	75.9218***	80.7932***	81.0611***
$F(6, 1680)$	10.58	10.08	61.02	79.39	11.50
Prob.> $F$	.0000	.0000	.0000	.0000	.0000
Number of observations	1952	1952	1952	1952	1952

‡ $p > .10$ . \* $p > .05$ . \*\* $p > .01$ . \*\*\* $p > .001$ .

Among the control variables, the hospital's size, measured as the number of licensed beds staffed and operating, was most often significantly related to patient satisfaction items. Moreover, as the number of beds increases, satisfaction scores go down; therefore, bigger is not necessarily better. Similarly, in the four analyses where profit status was significant, it had a negative relationship with satisfaction, indicating that for-profit facilities have lower patient satisfaction in a systematic fashion. The rural versus urban control variable had mixed results in the two patient satisfaction variables measuring overall quality. The item that asked if the customer would recommend the hospital was negatively related to being a rural facility while the “how satisfied” item measure on the 1–10 scale was positively correlated. Being a teaching facility was not

significantly related to any item other than the question regarding discharge instructions. The implications of these findings are discussed next.

## DISCUSSION

The two patient satisfaction items asking consumers to make general assessments of the hospital (viz., “Would you recommend the hospital” and “What was your satisfaction level”) were both significant and positively correlated with the website overall quality variable. The question asking if the patient “Would you recommend the hospital” had both higher significance and coefficient levels ( $\beta = .5376; p > .001$ ) than “What was your satisfaction level” ( $\beta = .3610; p > .01$ ). Comparing these two measures is important because they do not necessarily assess the same satisfaction domains (Chahal, 2010; Hu, Cheng, Chiu, & Hong, 2011). The potential difference in the satisfaction domains is evident comparing the two satisfaction items' relationships to the binary rural versus urban control variable. While consumers scored rural hospitals positively compared to their urban counterparts on overall satisfaction ( $\beta = 1.4016; p > .01$ ), they were more likely to recommend urban facilities ( $\beta = -1.4052; p > .01$ ). The counterintuitive nature of having positive satisfaction and negative recommendations has been discussed elsewhere, but bears further mention (cf., Burroughs, Davies, Cira, & Dunagan, 1999; Cheng, Yang, & Chiang, 2003).

The website overall quality item's stronger relationship to the willingness to recommend the hospital question is consistent with Cheng, Yang, and Chiang's (2003) finding that “technical features” of the hospitalization experience influence the willingness to recommend aspects of satisfaction more than interpersonal service items. The other general question, asking for a pure ranking of satisfaction, has been demonstrated to be more highly correlated with “interpersonal service” dimensions of satisfaction than technical features of care (Cleary & McNeil, 1988). Nevertheless, that the website quality measure was significant and positively correlated with both general items, indicates that an effective website has the potential to influence multiple aspects of the patient's experience and in turn their satisfaction evaluations and willingness to recommend. Moreover, having an effective electronic consumer interface may be able to bring the interpersonal service and technical domains together in positive ways.

There is additional evidence that hospitals' websites reside at the confluence of technical and interpersonal service aspects of the satisfaction domain in the item related to discharge instructions. The Patient Satisfaction item that asks: “Did the staff always give patients information about what to do during their recovery at home” was positively and significantly related to the website overall quality score ( $\beta = .2828; p > .001$ ). The discharge instruction evolution in hospital encounters touches on both the interpersonal and technical satisfaction constructs in that it is the one-on-one communication of technical information. Moreover, the discharge discussion is likely to be one of the last and most memorable events of a hospitalization. A hospital website is an ideal location to house generic discharge instructions, as well as, host a patient portal for personalized care instructions communicated by providers

(Labow,2010; Raths, 2009). Therefore, it represents an aspect of website development that can directly make an impact on both the overall satisfaction and willingness to recommend features.

The last two patient satisfaction measures that were analyzed related to nurses and doctors' communication skills and their relationship to website quality (Sanchez, 2002). In other studies, perceptions of nursing and physician communication quality have been the first and second most important predictors of patient satisfaction (Klinkenberg et al., 2011). Given these clinical stakeholders strong impact on patient satisfaction and other aspects of hospital operations, they were included in this study also. The patient satisfaction question dealing with nurses communication was not related to website quality in a statistically significant fashion. The patient satisfaction item focused on doctors' communication skills was significantly related to website overall quality<sup>3/4</sup> albeit with a negative coefficient ( $\beta = -0.1670$ ;  $p > .05$ ).

The finding that physicians' communication is negatively associated with the website measure has a range of explanations. At one extreme, hospitals may rely on their websites in an attempt to compensate for poor physician relationships, giving rise to the reversal in signs. Alternatively, physicians may make additional efforts to communicate clearly with patients in order to overcome poor hospital administration that manifests itself across the organization's general level of quality, including its website management. As with the rest of the analyses, it is not possible to infer causality, only a relationship among variables. However, unlike the other relationships that demonstrate a positive relationship that can be built upon, the negative aspect of the physician communication and website quality is problematic. Given that communication issues are central to care quality and building a culture of patient safety, further exploration of this relationship is merited (Blegen et al., 2010; Hughes, Chang, & Mark, 2009). It may be that this measure is a proxy for other issues within facilities that bear scrutiny.

## **CONCLUSIONS**

That the overall quality of a hospitals' website should be correlated with other aspects of its customer service orientation is not surprising. It stands to reason that administrators that can effectively manage the complexity of delivering health services should be competent at managing the building of an effective website. Moreover, in the absence of price sensitive customers and given asymmetries of information, service and technical care quality reputations are how hospitals have competed for many years (Laing et al., 2005). Therefore, marketing through the relatively new media of the Internet should not represent a quantum leap in skills for the hospital sector. Nevertheless, the findings from this study are important and previously unknown.

The first major finding is that hospitals' website quality is most strongly and positively related to the consumers' willingness to recommend the facility. The willingness to recommend response item is the measure consumers are most likely to leave unanswered in a satisfaction survey. It is conjectured that consumers' reticence to answer the recommendation question stems from it

representing the highest form of satisfaction. As a result, consumers hold back their positive recommendations for only the highest quality services. From a hospital administrator's perspective, this is troubling, because it is one of the best means of advertising and satisfied consumers need to be converted into advocates. Therefore, to the extent that a hospital's website can provide additional impetus to a consumer to recommend a facility, building an effective website is a critical activity.

The second major finding is that hospital websites are not being effectively used to link patients directly to caregivers. In the age of social media where hospitals actively ask consumers to “like” them on their Facebook page, it is troubling that these one-on-one connections are not being built in a durable fashion. The hospital website would be the logical starting point and portal for such a social media presence (Berkowitz, 2007). Clearly, this is a major opportunity area for many health system operators to build a better patient experience.

Lastly, the use of website quality as an indicator of overall care quality is consistent with the idea that greater organizational transparency will lead to improved care quality outcomes. If hospitals are truly to be ACOs, where will that accountability be reported if not on the hospitals' own website? The organizations that have a culture and commitment to quality and safety will make the relevant information available.

The desire to transform the U.S. health systems into a consumer-focused industry will require paradigm and cultural shifts impacting individuals, entire professions and health care organizations including, but not limited to, hospitals. Building effective communication through organizational websites is a *sine qua non* part of this effort. Therefore, monitoring and assessing these communication modalities is an important endeavor.

## Notes

<sup>a</sup> Measure can have a negative impact on scoring: penalty if below 0.0.

<sup>b</sup> Penalty if below 2.2.

<sup>c</sup> Penalty if below 4.4.

<sup>a</sup> From Hospital Quality Alliance Hospital Compare Care dataset.

\* $p > .05$ . \*\* $p > .01$ .

‡ $p > .10$ . \* $p > .05$ . \*\* $p > .01$ . \*\*\* $p > .001$ .

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