



**Public Reporting of Hospital Infection Rates:
Ranking the States on Report and Website Content,
Credibility, and Usability**

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Version: February 2013

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Abstract

Healthcare-associated infections (HAIs) kill about 100,000 people annually; most are preventable, but many hospitals have not aggressively addressed the problem. In response, 25 states and the U.S. Department of Health and Human Services require public reporting of hospital infection rates for at least some types of infections, and other states and private entities are implementing such reporting. The websites and related reports vary widely in ease of access, ease of use, usefulness of information, timeliness of updates, and credibility. This working paper reports on work in progress, in which the authors assess the quality and suitability of different state websites and reports for different target audiences (ordinary consumers, physicians, and infection control professionals) and the extent to which they meet best practices for online communication, including Stanford's "Fogg" Guidelines for Web Credibility and user-friendliness metrics developed by other researchers. The authors find wide variation in quality, and substantial correlation between measures of website credibility and user-friendliness. They identify ways to improve usability, usefulness, and tailoring for information to different target audiences. The analysis suggests that the "one website (and report format) fits all users" model may not work well in delivering complex, technical information to users with widely varying needs and sophistication.

Public Reporting of Hospital Infection Rates: Ranking the States on Report and Website Content, Credibility, and Usability

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Abstract

Health-care associated infections (“HAIs”) kill about 100,000 people annually; most are preventable, but many hospitals have not aggressively addressed the problem. In response, twenty-five states and the U.S. Department of Health and Human Services require public reporting of hospital infection rates for at least some types of infections, and other states and private entities are implementing such reporting. The websites and related reports vary widely in ease of access, ease of use, usefulness of information, timeliness of updates, and credibility. We report on work in progress, in which we assess the quality and suitability of different state websites and reports for different target audiences (ordinary consumers; physicians, and infection control professionals) and the extent to which they meet best practices for online communication, including Stanford’s “Fogg” Guidelines for Web Credibility and user-friendliness metrics developed by other researchers. We find wide variation in quality, and substantial correlation between measures of website credibility and user-friendliness. We identify ways to improve usability, usefulness, and tailoring for information to different target audiences. Our analysis suggests that the “one website (and report format) fits all users” model may not work well in delivering complex, technical information to users with widely varying needs and sophistication.

Keywords: health-care quality; health-care public reporting; health-care associated infections; performance measurement; website usability

JEL Codes: I18, K32

Introduction

Health-care associated infections (HAIs) are a huge public health problem. Of roughly 39 million annual hospital admissions in the U.S., about 1.7 million (4.5%) result in HAIs and 100,000 HAIs result in death.[1]. The direct healthcare costs of HAIs are estimated at \$45 billion, and total annual costs likely exceed \$100 billion.[2]-[3] In response, twenty-five states and the federal government currently require hospitals to publicly report infection rates for at least some types of infections; other states have adopted laws that will require reporting in the near future; and private entities have created their own public reports. The effectiveness of these reporting requirements in informing consumer choice and reducing infections is unknown.[4] Moreover, and the focus of this study, “we do not just want to know if public reporting works (efficacy); we want to know who it works for and in what situations (effectiveness).”[5]

HAI public reporting presents an ideal environment in which to examine the effectiveness of public delivery of health care information. Each state maintains a website; most also provide downloadable reports, but each uses its own unique reporting format. There is wide variation in websites, and reports, across any metric one might consider: how easy the websites and reports are to find, which infections are reported; how infections or

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infection rates are measured; what information about them is reported; time periods covered; level of technical difficulty, readability levels, and so on.

We report here on work in progress in which we evaluate how effective each state's website and public reports are at communicating information. We focus on website credibility, user-friendliness, and usefulness of information for three target audiences with different needs and ability to understand technical information, including typical healthcare consumers; physicians (and other more sophisticated users); and infection control professionals.

Methodology

To assess website credibility we use ten criteria based on psychological research on persuasive technologies.[6] The specific factors are as follows:

- Is it easy to verify the accuracy of specific statements, by clicking through to supporting information/data?
- Demonstration that a "real" organization is responsible?
- Expertise in the area is highlighted?
- Evidence of trustworthiness?
- Easy to contact those responsible?
- Is site professionally laid out?
- Easy to use and useful?
- Updated recently?
- Limited promotional content?
- Any [reasonably apparent] mistakes?

Five of these criteria are yes/no questions; we give each 3 points for a "yes." Five call for more qualitative assessments; we create a detailed 1-5 scale for each, specifying the attributes needed for each score. We sum the scores, to develop an overall "Fogg score" (5~35). The weights are arbitrary but our results are not sensitive to the weighting.

To assess "user-friendliness", we adapt measures suggested in research by other scholars of public reporting of health care performance.[7]-[9] We identified five factors (and are in the process of developing a more refined list of factors):

- Provides good introduction to HAIs
- Helps consumers to integrate information from multiple indicators
- Uses both numbers and graphs/symbols to convey numeric or statistical information
- Straightforward to find results for a particular hospital
- Website and report length and complexity is appropriate for consumer audience

As with the Fogg guidelines, we developed a detailed description of the attributes needed to receive each score. Each factor was scored on a 1-5 scale, for an overall 5~25 scale. We applied these factors separately to the website and to the formal reports on state's websites. In this paper, we focus on the formal reports.

Finally, for "usefulness," we developed and then assessed a number of factors, including:

- Was the state website easy to find?
- Within the website, was pertinent information easy to find?
- Are the explanations clear?
- Was it easy to find information on a particular hospital?
- Types of infections covered
- Type of rate reported ("raw" [crude], risk-adjusted, risk-stratified, or a combination)
- Were number of infections reported?
- Is statistical significance reported?
- Is historical data available?
- If yes, is the format consistent over time?
- Can users compare hospitals online, how many, and using what selection criteria?
- Are similar hospitals compared to each other?
- Overall, was the website understandable and useful?

We assess usefulness for three target audiences. One important audience is average consumers. We assumed that these users have roughly a high school reading level and limited understanding of statistics and medical terminology. A second audience is physicians, who can counsel patients, make decisions on which hospital to admit their patients

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to, and push hospitals for change. This audience is likely to have better than a college graduate reading skills, moderate understanding of statistics and healthcare terminology, but limited knowledge about particular HAIs. A third audience is infection control professionals, who can use the reports to benchmark their hospital against peers. These persons are likely to have a college graduate reading level; be familiar with measurement and coding issues for HAIs, but have limited understanding of statistical analyses.² Manifestly, we must exercise judgment in deciding what criteria to measure, how to measure them, and what target audiences to assume; we do so based on the expertise developed in our previous research on these subjects. [10]-[11]

Thus, each state is scored on five metrics: website credibility, user friendliness of website, user friendliness of public reports; usefulness of website for each target audience, and usefulness of public reports for each target audience. Initial scoring was by a law student at Northwestern. We are in the process of assessing inter-rater reliability. A spreadsheet including all criteria and results will be publicly posted on Professor Black’s website at Northwestern University.

Results

We present here partial results from our analysis, focusing on Fogg website credibility scores and user friendliness scores for the public reports from the perspective of an ordinary consumer. Scores are based on the reports and websites as they appeared in August, 2012. We also plan to assess changes in websites and reports over time. Higher scores reflect better performance on the specified measures. Fogg scores have a theoretical range from 5 to 40; in practice, they ranged from 24 (Vermont) to 39 (California). Public report usability scores have a theoretical range from 5 to 25; in practice, they ranged from 9 (Rhode Island and Washington) to 25 (Massachusetts). The close-to-maximum scores on each measure for some states reflect not perfection, but our effort to define criteria that made a top score reasonably achievable.

Figure 1 indicates the scores on both measures for each state that currently has public reporting of HAIs.³ It also provides a correlation line between the two measures. The Pearson correlation coefficient is strongly positive at 0.58 (t = 3.46). There is thus a strong tendency for states to do either well or poorly on both measures.

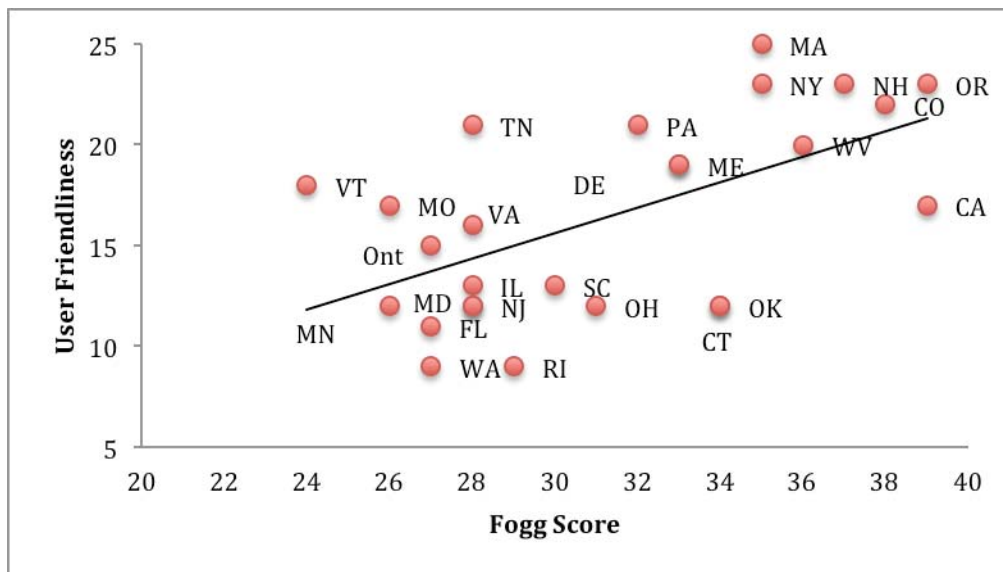


Figure 1. Fogg Website Credibility Score vs. User-Friendliness Score for Public Reports
Fogg website credibility scores and HAI report user friendliness (for ordinary consumers) scores for 25 states plus Ontario with public HAI reporting (as of August 2012). See text for scoring method.

² At many hospitals, infection control is assigned to registered nurses. Only at major hospitals, often with academic affiliations, is the head of infection control likely to be an epidemiologist with advanced statistical training. Thus, we judged that a typical infection control professional would know more about HAIs but less about statistics than a typical physician or other sophisticated user.

³ Figure 1 also includes the Canadian province of Ontario. We plan to expand our analysis to include the Hospital Compare website run by the Department of Health and Human Services, and the websites operated by the Leapfrog Group and Consumers Union.

One might expect larger states, which usually have greater resources, to do better, but this was not universally true. For example, New Hampshire did well on both measures, while Florida did poorly on both measures.

Finally, rankings may change dramatically if states redesign their website. For example, Washington's current Fogg Score is 27 but an earlier version of Washington's website had a Fogg score of 36. The mean (median) Fogg score was 31.2 (30.5) for our entire sample of 25 states and Ontario, so the redesign dropped Washington's score from substantially above-average to below-average.

Discussion

Public reporting of HAIs is widespread, but little attention has been paid to how to design websites and public reports to reach the multiple target audiences. We report on work in progress in which we systematically quantify the effectiveness of existing websites and public reports, across a variety of general metrics (credibility, user friendliness, and usefulness) for three different target audiences. For ordinary consumers, we find substantial correlation between website credibility and user-friendliness of each state's public reports.

One issue that is missing from current discussions of credibility and user friendliness, but substantially complicates any analysis of these issues, is the variety of potential target audiences. HAI data can be quite technical, and assessing its value requires an understanding of statistics and confidence intervals. To be readable and understandable for a typical consumer, some website and reports have been deliberately "dumbed down" to a level that is likely to prove inappropriate and frustrating for more sophisticated users.

Another issue that is missing from current discussions is "usefulness." Assessing the usefulness of HAI information requires in-depth knowledge of the goals of reporting and the information being reported. For example, a time-series of data is usually more reliable than a snapshot of a short time period. Reports that tell users only whether a hospital is above, average, average, or below average (with 95% or more graded as average) are easy to understand, but not very useful. Some states provide more granular information, but most do not. A comparison of the CLABSI (central line-associated bloodstream infection) rates at a small community hospital to the rate at major tertiary hospitals may mislead, rather than inform. And so on.

Finally, many websites and reports seem to focus on a single target audience, even though more tailored information would be useful. Serving multiple audiences through a single website and report format is challenging. In the future, we will analyze the extent to which states have recognized and addressed this problem.

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