

eMethods1

Since there are several commercial websites offering scores, we first determined which sites were likely to be found by consumers searching for hospital information. In the fall of 2010, using three popular search engines (Google, Yahoo, and Bing), one research associate searched for websites that provide hospital ratings of patient experience (search terms: “hospital comparison” “hospital quality” “best hospitals” “hospital comments”). Since our interest was in sites in which consumers self-select to post ratings, we excluded sites that only presented the CMS HCAHPS data (e.g., HealthGrades) or offered no patient experience ratings at all. While several other sites have consumer visitor physician ratings,^{1,2} we found that there were few sites with consumer visitor hospital ratings. We therefore used Yelp.com data for the study as Yelp was the only commercial website with consumer visitor ratings that had publicly available scores on multiple hospitals in multiple states. After our online search and after data collection was complete, a study from November 2011 used a different method to find provider rating websites.¹ We reviewed their list of 10 websites and confirmed that Yelp was the only website that was a consumer visitor rating website with publicly available scores on multiple hospitals in multiple states.

eMethods2

To find hospitals listed in the HCAHPS database in Yelp, we used the set of procedures listed below, which were initially piloted in small batches of 10-20 hospitals. The data was entered using an online form. For the initial search for the hospital in Yelp, we used Google.com since we found in our pilot searches that Google’s search engine more effectively found the hospitals in Yelp than the Yelp search engine. The Search Field for each hospital was created by concatenating three fields: the name of the hospital in the HCAHPS database, the address for the hospital in the HCAHPS database, and a field containing: YELP.COM.

TASK INSTRUCTIONS:

1. Go to Google.com
2. Enter the Hospital information provided in the GOOGLE SEARCH FIELD WITHOUT QUOTATION MARKS. Here is an example of what you would enter in Google: ALAMEDA HOSPITAL 2070 CLINTON AVE ALAMEDA CA 94501 YELP.COM
3. Click Search and look through the Google results for the Hospital in Yelp. The URL for the Google result link should begin with www.yelp.com <http://www.yelp.com/> .
4. If you find a Yelp listing in Google, click on the URL. Note: You may have multiple Yelp results among the Google results for the Hospital. Click on the first result.
5. In the field below called STAR RATINGS GIVEN:
ENTER 0 If you find the hospital listed in Yelp with NO star ratings
ENTER 1 if there are ANY STAR RATINGS given for the hospital

NOTE: Only enter 1 or 0. We do not want to know what the ratings are, just whether you can find the hospital in Yelp and whether there are any ratings
6. In the field below called YELP HOSPITAL URL paste the URL (web address) of the Yelp Hospital result you based your STAR RATINGS GIVEN decision on . Here is an example of what you would enter:
http://www.yelp.com/biz/alameda-hospital-alameda
7. If there are NO YELP.COM URLs in the first page of the Google results, go to Yelp.com and do the following:
8. In the Yelp website, enter the information provided in the YELP SEARCH FOR FIELD and the YELP NEAR FIELD WITHOUT QUOTATION MARKS. Here is an example of what you would enter in Yelp: “Search for”: KAISER “Near”: 3288 MOANALUA RD HONOLULU HI 96819

9. If your search in Yelp yields no results try again by using just the term: Hospital in the "Search for" field together with information provided in the YELP NEAR FIELD. Here is an example: "Search for": HOSPITAL "Near": 3288 MOANALUA RD HONOLULU HI 96819

10. After performing these searches in Yelp, in the field below called STAR RATINGS GIVEN

ENTER 0 If you find the hospital listed in Yelp with NO star ratings

ENTER 0 If you do not find the hospital in Yelp at all

ENTER 1 if there are ANY STAR RATINGS given for the hospital

NOTE: Only enter 1 or 0. We do not want to know what the ratings are, just whether you can find the hospital in Yelp and whether there are any ratings

11. In the field below called YELP HOSPITAL URL paste the URL (web address) of the Yelp Hospital result you based your STAR RATINGS GIVEN decision on. Here is an example of what you would enter:
<http://www.yelp.com/biz/kaiser-permanente-medical-care-program-honolulu-2>

12. For Hospitals with STAR RATINGS GIVEN in the field below called TOTAL NUMBER OF REVIEWS enter the number of reviews next to the star rating as illustrated by the example below.

For those hospitals with ANY STAR RATINGS, the following further steps were followed.

1. In "**Overall Yelp Star Rating**", write the overall rating given by Yelp for the hospital. This "Overall Yelp Star Rating" is illustrated by a number of stars and should be directly below the Hospital Name. Note: "Overall Yelp Star Rating" can ONLY take on the following values: 1, 1.5, 2, 2.5, 3, 3.5, 4, 4.5, or 5.
2. In "**Total Number of Yelp Reviews**", write the number of reviews reported by Yelp for the hospital. The number of reviews is reported to the right of the Overall Star Rating. Do not include filtered reviews.

Click on Rating Details (a small graphic right next to the Overall Star Rating and the Number of Reviews) and a window will pop-up with Rating Details.

3. In "**Number of 5 Star Reviews**", write down the number of 5 Star Reviews provided in the Rating Details pop-up window.
4. In "**Number of 4 Star Reviews**", write down the number of 4 Star Reviews provided in the Rating Details pop-up window.
5. In "**Number of 3 Star Reviews**", write down the number of 3 Star Reviews provided in the Rating Details pop-up window.
6. In "**Number of 2 Star Reviews**", write down the number of 2 Star Reviews provided in the Rating Details pop-up window.
7. In "**Number of 1 Star Reviews**", write down the number of 1 Star Reviews provided in the Rating Details pop-up window.

Sort Yelp Reviews by DATE

8. In "**Most Recent Review Date**", write down the month, day and year of the most recent review (the newest review) in this format mm/dd/yyyy. For example, February 17, 2010 would be written 02/17/2010. Note we are NOT interested in filtered reviews.
9. In "**Oldest Review Date**", write down the month, day and year of the oldest review (the first ever review) in this format mm/dd/yyyy. For example, March 12, 2005 would be written 03/12/2005.

Scroll through all the Yelp Reviews (sorted by DATE)

10. In "**Number of Reviews 2010**", count the number of reviews given between January 2010 and December 2010 and write down the total number. We are NOT interested in filtered reviews.
11. In "**Number of Reviews 2009**", count the number of reviews given between January 2009 and December 2009 and write down the total number. We are NOT interested in filtered reviews.

A REMINDER OF THE IMPORTANT NOTES STATED ABOVE: When you visit the Yelp Hospital URL provided below Yelp reviews are not sorted by DATE but by "Yelp Sort". You need to sort the Yelp Reviews **by Date** in order to find the Most Recent Review Date and the Oldest Review Date. Also, Hospitals with many reviews (>40) have multiple pages of reviews in Yelp so you will have to scroll to the bottom of the Yelp review page and click on the "next page" in order to get the total Number of 2010 Reviews (Jan. 2010 - Dec. 2010) and the total Number of 2009 Reviews (Jan. 2009 to Dec. 2009). Also Yelp filters certain reviews. Ignore all filtered reviews.

eMethods3

For HCAHPS, CMS provides only the percent of respondents giving a low (0-6), middle (7-8), or high (9-10) rating. CMS uses only the percent high ratings as the score for the hospital. Because of this, we were not able to calculate mean HCAHPS ratings. The publicly available data on Yelp includes the star score (the approximate mean of all individual ratings) and the number of visitors who gave 1-, 2-, 3-, 4-, or 5-star ratings for each hospital. To compare the percent high ratings from HCAHPS and Yelp, we had to develop a system to group the Yelp star ratings into low, middle, and high groups. However, there is no prior research describing a grouping process of 5-star ratings that is analogous to CMS' groupings of the HCAHPS ratings on the 0-10 scale, nor has CMS published the rationale for its groupings. Therefore, to develop a system of grouping Yelp ratings, we randomly selected a subsample of 100 hospitals. We used this subsample to compare the percentage of high and low ratings on HCAHPS and Yelp using different approaches to grouping the Yelp ratings. We calculated the correlation coefficient and mean differences between the percent high HCAHPS overall ratings and percent high Yelp ratings, under three different definitions of "high" for the Yelp ratings: only 5 star ratings, 4-5 star ratings, and 3-5 star ratings. Similarly, we calculated the correlation coefficient and mean differences between the percent low HCAHPS overall ratings and percent low Yelp ratings, under three different definitions of "low" for the Yelp ratings: only 1 star ratings, 1-2 star ratings, and 1-3 star ratings. We then chose the grouping of Yelp scores that correlated most closely with the HCAHPS groups and had the smallest mean differences in the development sample and used that grouping method in subsequent analyses. The subsequent analyses were performed on the entire population of hospitals that had Yelp scores.

eTable1. Number of Businesses reviewed on Yelp.com by Category in Geographically Diverse Cities

	Doctors	Hospitals	Auto Repair	Doctors/ Auto Repair Shop*
Boston	291	53	295	0.99
Chicago	909	86	591	1.54
Houston	255	41	256	1.00
Saint Louis	84	14	127	0.66
Atlanta	457	27	506	0.90
Oakland	448	14	366	1.22

* Because there are no denominators available for these numbers, we showed the ratio of numbers of doctors reviewed to number of auto repair businesses reviewed to illustrate the variation by region in interest in healthcare providers. We showed the ratio with auto repair businesses because the type of information asymmetry is similar for auto mechanics and doctors, and the number of doctors per capita is more similar to auto repair businesses per capita than is the number of hospitals per capita.

References

1. Kadry B, Chu LF, Gammas D, Macario A. Analysis of 4999 online physician ratings indicates that most patients give physicians a favorable rating. *J Med Internet Res.* 2011;13(4):e95.
2. Bardach N, Hibbard JH, Dudley RA. *Users of Public Reports of Hospital Quality: Who, What, Why, and How? An aggregate analysis of 16 online public reporting Web sites and users' and experts' suggestions for improvement.* . Rockville, MD2011.