Studying the Way People Rate Their Physicians *Online*

[Extended Abstract]

Author 1 *
author school
author email

Author 2
author school
author email

1. ABSTRACT

Many patients turn to rating websites to share their experiences with the health care provider they visited. Reviewing health care providers online can provide insightful information for prospective patients, but researchers have speculated that the sole aim of some reviewers is to sabotage the health care provider's image. In this research, we investigate the relation between health care provider reviews and health outcomes. We selected two different health care domains - prostate cancer and obstetric care - that impact men and women respectively. Then, we collected reviews via Google APIs from five states with the highest mortality for the specific domain and five states with the lowest mortality. We qualitatively analyzed the reviews using the TAMS (Text Analysis Markup System) analyzer where we found that the states with highest prostate cancer mortality rates had less information about the health care providers in comparison to states with lowest prostate cancer mortality rates.

2. INTRODUCTION

With an increase in number of people investigating health related issues online, [5] online rating sites have become more popular then ever. These internet rating sites give patients an opportunity to rate the health care provider they visited. Rating websites can benefit both physicians and patients because the ratings provide patient perspective that health care providers can use to improve their practice, and prospective patients can choose a suitable physician by analyzing the reviews and ratings posted online [7]. If online ratings reflect patient care and health care provider's treatment, are there differences in how patients rate their health care providers when outcomes are not similar? Health care providers argue that these reviews may not represent an accurate appraisal of surgeon quality [4]. For example, the incidence is higher in Mississippi and Louisiana where the prostate cancer mortality rate is greater than 24%, than Colorado and Alaska, where the rate is under 20% [3]. Does the type of health care people receive make any impact on the mortality rate ? Are there any differences in the opinions of people who receive their health care in states with high maternal and prostate cancer mortality rates compared to people who live in states with low maternal and prostate cancer mortality rates? In this study, we investigate if health care provider ratings give insights into how health care providers treat their patients, which may impact their willingness to be seen for screening and treatment. By studying the ratings and reviews of the patients from different states we can get a brief idea of the type of health care they receive.

Researchers have analyzed the online ratings of health care professionals and found that it is difficult to identify reviews based on actual experiences [10]. In addition, with the exception of [8, 9], most research on health care professional ratings have not documented the locations where the reviews were collected. This is important because outcomes and care may vary based on location. We analyzed ratings and reviews from Google for Urologists and Obstetrician-Gynecologists in states with high prostate cancer mortality rates and high maternal mortality rates respectively. To this end, we used an Application Programming Interface (API) to collect information about the health care provider, patient demographics, reviews,ratings and metadata.

By studying the way people rate their health care providers online we were able to conduct a qualitative analysis of how patients perceive their care from health care providers in areas with high and low incidence of male-oriented and female-oriented health conditions. We built a work flow that utilize APIs to collect, store, and analyze health care provider reviews. Most importantly we will create a discussion of how incidence may impact patient's treatment. Also, the research will help to figure out the relation of patient's treatment to their willingness to be diagnosed again.

3. RELATED WORK

Online health care provider rating websites play a vital role when it comes to choosing a suitable health care provider. [4]. There have been debates on the issue of whether patients should be allowed to rate their health care providers online. A study by Emmert showed that patients are highly influenced by the information presented on an online rating site [2]. Physicians argue that the health care providers should not be reviewed like the grocery stores or restaurants are reviewed online [11]. There are not any means to figure out if the review is posted by a real customer or someone who wants to sabotage the physician's image [7] and in some cases even the real review doesn't reflect the quality of the

health care provider [11]. But, policy makers believe that these sort of rating websites help to create a transparency in health care sector by circulating enough information about the health care providers [6].

Study shows that most reviewers give a good rating to their health care providers. Researchers analyzed the reviews of 23 health care providers in 25 major U.S. cities from 10 of the most used doctor rating sites based on Google trend data. They found out that more than 65% of the reviews were positive [8]. It is found that the people who write reviews are comparatively more educated, younger and healthier then the ones who don't [9]. When it comes to health care providers, younger physicians without malpractice claims and physicians who graduated from top -50 medical schools had somewhat higher ratings then the other physicians [6]. Rosenbaum found that the negative reviews can adversely impact the practice of highly qualified cardiologists [10], thus review accuracy and ratings are important to patients *and* health care providers.

The following tables represent the work that has been done so far by other researchers in this field. We found out that most of the researchers used websites like Yelp, RateMd, Healthgrades to analyze the ratings and reviews of the health care providers. Some researchers conducted cross sectional survey where as some used data from non-profit news room like Propubica. When it comes to type of research most of the researchers conducted both qualitative and quantitative analysis, few of them did qualitative analysis. None of the papers mentioned how the data were collected. Most of the researchers were focused on common health care providers which may or may not include all specialities and very few researchers were focused in categorizing the data according to specialization of health care providers. All the data are included in the table below.

4. METHODS

We shortlisted a few websites as our possible sources of reviews. After brief investigation, we selected Google because in comparison to other websites it had a little restriction on providing its data through its APIs. The collected reviews were arranged systematically and qualitatively analyzed using TAMS(Text Analysis Markup System).

4.1 Review Selection

We selected a women's health issue and a men's health issue that was intensely episodic in nature. In addition, the care would be personal and require a hospitalization with invasive procedures.

4.1.1 Prostate Cancer

With an average of about 172,258 new cases each year and being the second leading cause of cancer death in men in United States, we decided to find out if there is a relation between the reviews of Urologists and health outcomes in different locations. [3].To further investigate this we decided to use CDCś prostate cancer statistics to select the states with highest and lowest prostate cancer mortality rates. By using the reviews posted by patients in those states we were able to find how patients perceive the health care they receive. Mississippi has the highest, 24.8 per 100,000 and Hawaii has the lowest, 12.1 per 100,000 deaths due to prostate cancer. Five states with highest and Five states with lowest prostate cancer mortality rates were chosen for the research.

4.1.2 Obstetrics

The United States has one of the highest maternal mortality rates for a developed country in the world [**?**]. In order to further examine how these rates were affected by the patient's perception of their treatment, we used the CDC vital stats mortality database to find the states with the highest and lowest maternal mortality rates [**?**]. Massachusetts was the lowest with a rate of only 5.6 deaths per 100,000, while New Jersey had the highest maternal mortality rate; 30.2 [**?**]. Due to the two states drastically different rates but close geographical location, they were chosen for further review.

We then used the Google Places API to systematically search for Ob/Gyn's throughout the state by using a variety of latitudes and longitudes with a 10,000 meter radius. We then accessed the details of the locations, including reviews, for each of the doctors.

4.2 Data Collection

Our research is solely based on diseases like Prostate cancer and maternal mortality that are specific to one sex. Google allows its user to pull 5 reviews for each business using its APIs. We used Google places API to find the place ids and we further used Google place details API to get the ratings and reviews of specific locations represented by the place ids [1]. A python script was used to pull the ratings and reviews of health care providers and write them in a csv file. Scripts were written in such a way that they would only pull the information of those health care providers with at least one rating and were of the the desired specialty.

4.3 Data Analysis

Qualitative Analysis. We developed a code book to analyze the collected reviews. Codes were divided into two parts regular codes and context codes. Context codes are further divided into two parts regular context codes and universal context codes. Regular context codes are the codes that provide an insight of the scenario of the review where as the universal context codes give a notion of the whole review. Regular context codes represent the reviewers opinion. Just for example if the review says, "Love the staff and atmosphere here. The doctor is very professional, yet able to relate to the patient" then we code it as "positive, professionalism and helpful staff". We added a new code when we came across a review that was not covered by the existing code. This whole process is performed in TAMS.

STILL TO FILL IN

Quantitative Analysis

- (Possibly use NLP)
- We use Tableau to visualize the quantitative data we collected. [still to fill in]

Paper	Google	Facebook	Yelp	RateMD	other
Kadry et al. [8]			*	*	healthgrades,vitals, checkbook, angieslist, ratemd
Lopez, et al. [9]			*	*	
Gao et al. [6]				*	Physician's database of Virginia
sciencedaily et al [4]				*	vitals, health grades
Emmert et al. [2]					cross-sectional survey
Sorrel et al. [11]			*		
Jain et al. [7]					vitals
Gebauer et al			*		propublica
Rosenbaum et al. [10]					probublica
Fox Fox et al [5]					

Table 1: Sites Used

Paper	Qualitative Analysis	Quantitative Analysis	API	Web Scraping
Kadry et al.[8]	mostly positive ratings	average rating = 77%	-	-
Lopez et al. [9]		61% positive and 39 % negative	-	-
Gao et al. [6]	most reviews were positive	46% got 5/5 12% got below 2	-	-
sciencedaily et al. [4]	female surgeons and surgeons with affiliation gor good ratings		-	-
Emmert.[2]	more people are using doctor rating sites in Germany	23% of internet users look for physicians online		
Sorrel et al. [11]			-	-
Jain et al. [7]	most people are positive on using internet for health purpposes		-	-
Gabeuer et al.	physician rating sites should be more systematic		-	-
Rosenbaum et al. [10]	there is no transparency in online rating sites		-	-
Fox et al [5]	positive	72% of internet users use internet for health info	-	-

Table 2: Type of Analysis

website	Real Name	Pseudo name	Location	Age & Past Reviews	Gender & Pictures	Date reviewed
Yelp	*	*	*	-	*	-
Google	*	-X	X	X	*	-
Ratemds	X	X	X	X	X	X
Healthgrades	X	X	*	X	X	X
Angieslist	X	X	X	X	X	X
Facebook	*	-	*	-	X	

Table 3: Reviewer Data by API where * indicates most likely available; - indicates may be available; and X indicates not available

website	Doctor Name	Location	Edu History	Star Rating	Review Text	Reviewer Name	Review post Date	Reply to Review	Liking/ Useful	API
Yelp	*	*	X	*	*	*	*	-	*	*
Google	*	*	X	-	-	*	*	-	-	*
Ratemds	*	-	*	*	*	*	*	-	*	X
health grades	*	*	*	*	*	*	*	-	*	X
Angieslist	*	*	X	*	*	X	*	-	X	X
Facebook										*

Table 4: Review Data by API where * indicates most likely available; - indicates may be available; and X indicates not available

paper	no.reviews /reviewers	no.doctors	rural	sub-urban	urban	speciality
Kadry et al[8]	4999 reviews				*	23 specialities
Lopez et al [9]	712 reviews	445			*	
Gao et al [6]		18,174				fam/ped, ob/gy, surgery, hospital, other
Science daily et al [4]	2,813 reviews	275				sports medicine surgeons
Emmert et al. [2]	3052 reviewers.					
Sorrele al. [11]						
Jain et al. [7]						
Gabeuer et al.						
Rosenbaum et al. [10]						cardiologists
Fox et al. [5]						

Table 5: Number of Doctors and Demographics

5. LIMITATIONS

- Sampling Issue - worse care associated with income and possibly this demographic is not online
- Sampling Issue - some areas, (if we go with erectile dysfunction), are for higher socioeconomic status groups; some health outcomes may be impacted by socioeconomic status (e.g., people only go to the doctor when they are really sick and, in some cases for cancer, this may be too late for treatment. Having fewer than four pre-birth appointments, among other things hard for low income women, is tied to a higher maternal mortality rate.)
- Among all the reviews of an urologist, very few of them were posted by the patients who had issues related to prostate cancer. Most reviews were posted by the people who have been to an urologist but not necessarily because of prostate cancer. Similarly, many of the reviews for Ob/Gyn's refer to checkups, cancer checks, birth control prescriptions, and other items besides birth.
- `www.reviewtrackers.com`, a website that monitors reviews from multiple sources and provides the ability to easily respond to reviews, notes that the company can "improve your reviews by 400%", thus positive reviews may not necessarily indicate a positive experience. For example, `www.reviewtrackers.com` notes HealthGrades, Vitals, and RateMDs are clients.

6. FINDINGS

We were able to collect 3217 reviews for prostate cancer and [FILL IN] reviews for maternal mortality from the states with highest and lowest maternal mortality rates in the specific headings. We obtained highest, 800 reviews from Georgia and lowest, 15 reviews from Delaware for prostate cancer where for maternal [FILL IN]. From 3217 reviews 1531 reviews that were of other specialties than urologists were removed.

7. RESULTS AND DISCUSSIONS

7.1 Results

Based on our current results(it might be changed as we go further in our research) we are certain that the health care provider reviews are independent to health outcomes. We support it by the following facts. Lets take an example of Mississippi, where the prostate cancer mortality rate is highest among all states. If we are just to look at the fact that, Mississippi has the highest prostate cancer mortality rate in the US then we can assume that health care providers in that state get the worst ratings but our data shows that that health care providers in Mississippi have the highest mean rating of 4.1/5 stars. Let's take Hawaii, which has lowest prostate cancer mortality rate among all US states. If we are just to look at the fact that, Hawaii has the highest prostate cancer mortality rate in the US then we can assume that health care providers in that state get the best ratings but our data shows that that health care providers in Mississippi have the second lowest mean rating of 3.5/5 stars Using the data collected we will find out the relation between the reviews posted by patients and health outcomes. We are still yet to analyze the data in depth.

7.2 Discussions

- (YET TO IMPROVE) We are still in the process of data collection. At first we collected few hundred data just using google places API but now we are using latitude/longitude to collect reviews and rating from the google.
- We are running little late in data collection process.
- As soon as we finish data collection we will start coding reviews.

8. REFERENCES

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State	Google	Yelp	State	Google	Yelp
Mississippi	17		Arizona		
Louisiana	16		Wyoming		
Alabama	14		North Dakota		
Georgia	45		Missouri		
South Carolina	41		West Virginia		
Oklahoma	15		Connecticut		
Nevada	43		Alaska		
Idaho	21		Florida		
Nebraska	6		Delaware		
Maine	14		Hawaii		

Table 6: Total number of reviews by website and states[STILL TO FILL IN]

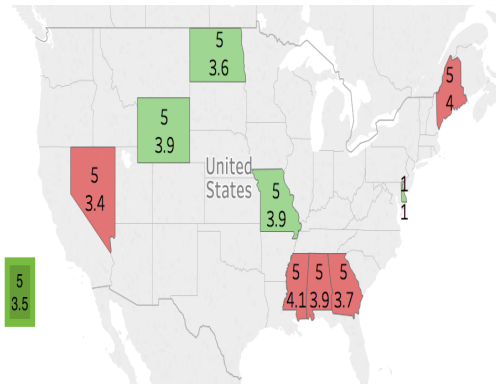

Figure 1: Top five states with the highest and lowest prostate cancer mortality rates in the United States.

State	PCMR	State	PCMR
Hawaii	12.1	Mississippi	24.8
North Dakota	12.7	Nevada	23.5
Delaware	15.4	Maine	23.2
Wyoming	16.5	Georgia	22.8
Missouri	17.2	Alabama	22.1

Table 7: States with highest and lowest prostate cancer mortality rates where PCMR represents Prostate Cancer Mortality Rate per 100,000 people.