Understanding Patients' Concerns and Expectations About Hospitals By Mining Feedback Data

Yuhao Liu, MPA

Center for Health Workforce Studies, School of Public Health, University at Albany

CHWS
Center for Health Workforce Studies

ABSTRACT

Background: Understanding patients' concerns and expectations regarding hospitals is crucially important for providers and administrators attempting to provide better service. In the era of big data, as a large and increasing amount of unsolicited feedback is provided on crowd-sourced review websites, the information required for such attempts becomes more accessible and affordable.

Methods: A web crawler was created to retrieve ratings and comments on hospital visits from Google Maps, based on a list of all hospitals in the US obtained from Data.gov. Due to API limitations, only the most recent 5 individual comments and ratings were retrieved. In total, 26,141 individual ratings and comments for 5,888 hospitals in the US were studied. Comments were classified into 3 groups: positive (rating ≥4), neutral (rating=3) and negative (rating ≤2). The top 20 most frequent 2-gram phrases in positive and negative comments were identified and analyzed. A non-supervised machine learning algorithm, K-mean text clustering analysis, was performed on the negative comments. Four clusters were created, and the 10 most representative words of each cluster were identified and analyzed.

Key Findings: Among the top 20 most frequent 2-gram phrases in negative comments, 3 were about waiting times and 3 were about service quality. Among the top 20 most frequent 2-gram phrases in positive comments, 6 referred to the care provided and 6 mentioned hospital staff. Topics of the 4 clusters among negative comments were identified: waiting time and appointments, insurance and billing issues, bad experiences of senior family members, and poor service quality.

Conclusions and Implications: To provide more satisfactory service, hospitals may wish to reduce waiting times, improve billing and payment processes, make facilities more accessible for older patients, and improve service quality. Moreover, hospitals may wish to make patients feel they are receiving excellent and friendly care from hospital staff. Patients' feedback on crowd-sourced review websites is a useful data source for understanding patients' concerns and expectations. Text mining techniques dramatically improve the efficiency of classifying patients' feedback and identifying their underlying meaning. Hospital administrators should value and utilize their patients' feedback on the internet.

CONTACT

Center for Health Workforce Studies

518-402-0250
info@chwsny.org
www.chwsny.org

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INTRODUCTION

- Understanding patients' concerns and expectations regarding hospitals is crucially important for providers and administrators attempting to provide better service

- As a large and increasing amount of unsolicited feedback is provided on crowd-sourced review websites, information becomes more accessible and affordable to collect

- The purpose of this study is to better understand patients' concerns and expectations about hospitals by analyzing feedback data collected on the internet

METHODS

- A web crawler was created to retrieve ratings and comments on hospital visits from Google Maps, based on a list of all hospitals in the US obtained from Data.gov

- In total, 26,141 individual ratings and comments for 5,888 hospitals in the US were studied

- Comments were classified into 3 groups: positive, neutral and negative

- Top 20 most frequent 2-gram phrases in positive and negative comments were identified and analyzed

- K-mean text clustering analysis was performed on negative comments

- Four clusters were created, and the 10 most representative words of each cluster were identified and analyzed

Figure 1. Example of Online Hospital Reviews
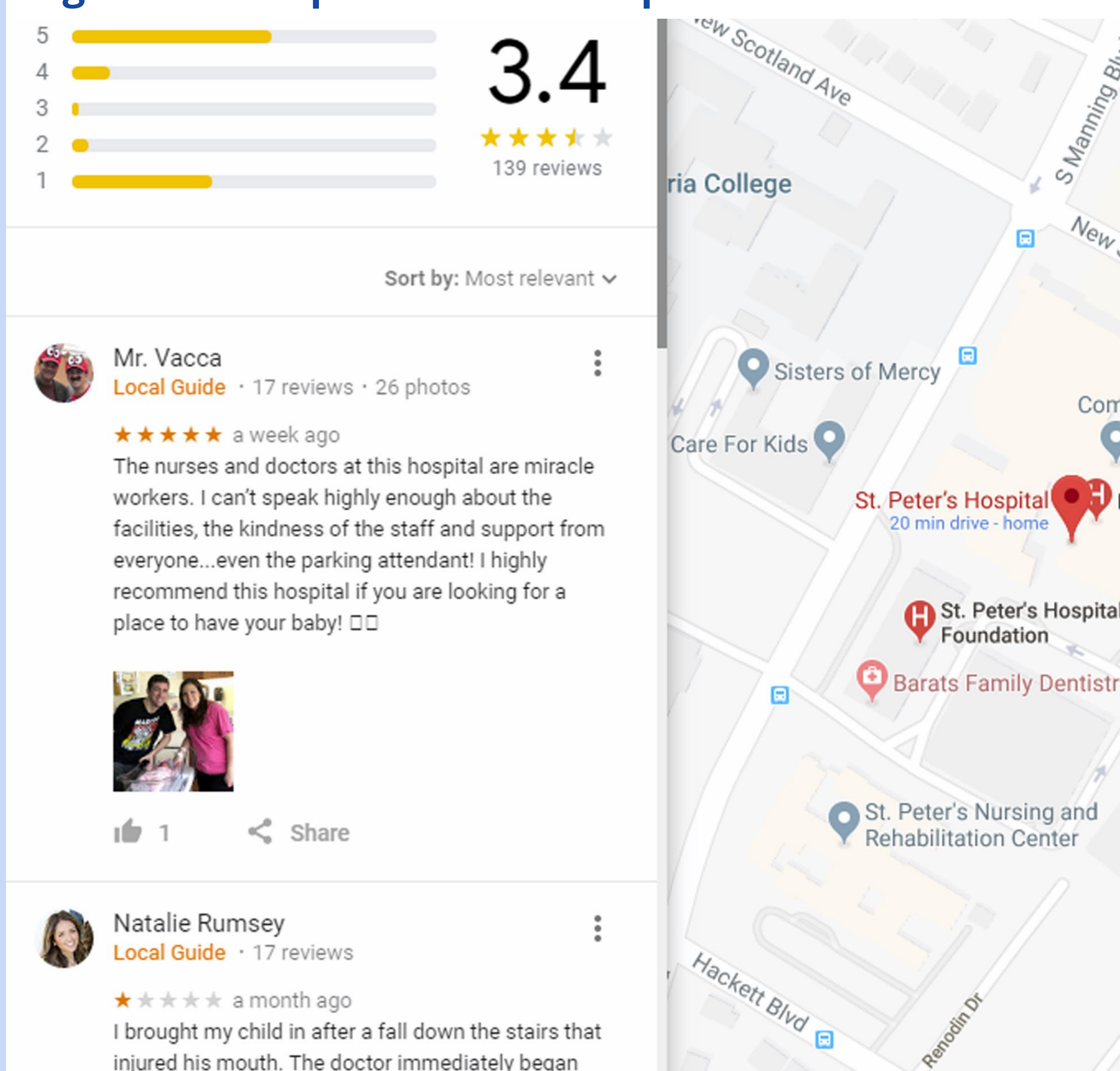
RESULTS

Classification of Ratings and Comments

- Individual rating ≤2 ➡ Negative rating & comment
- Individual rating =3 ➡ Neutral rating & comment
- Individual rating ≥4 ➡ Positive rating & comment

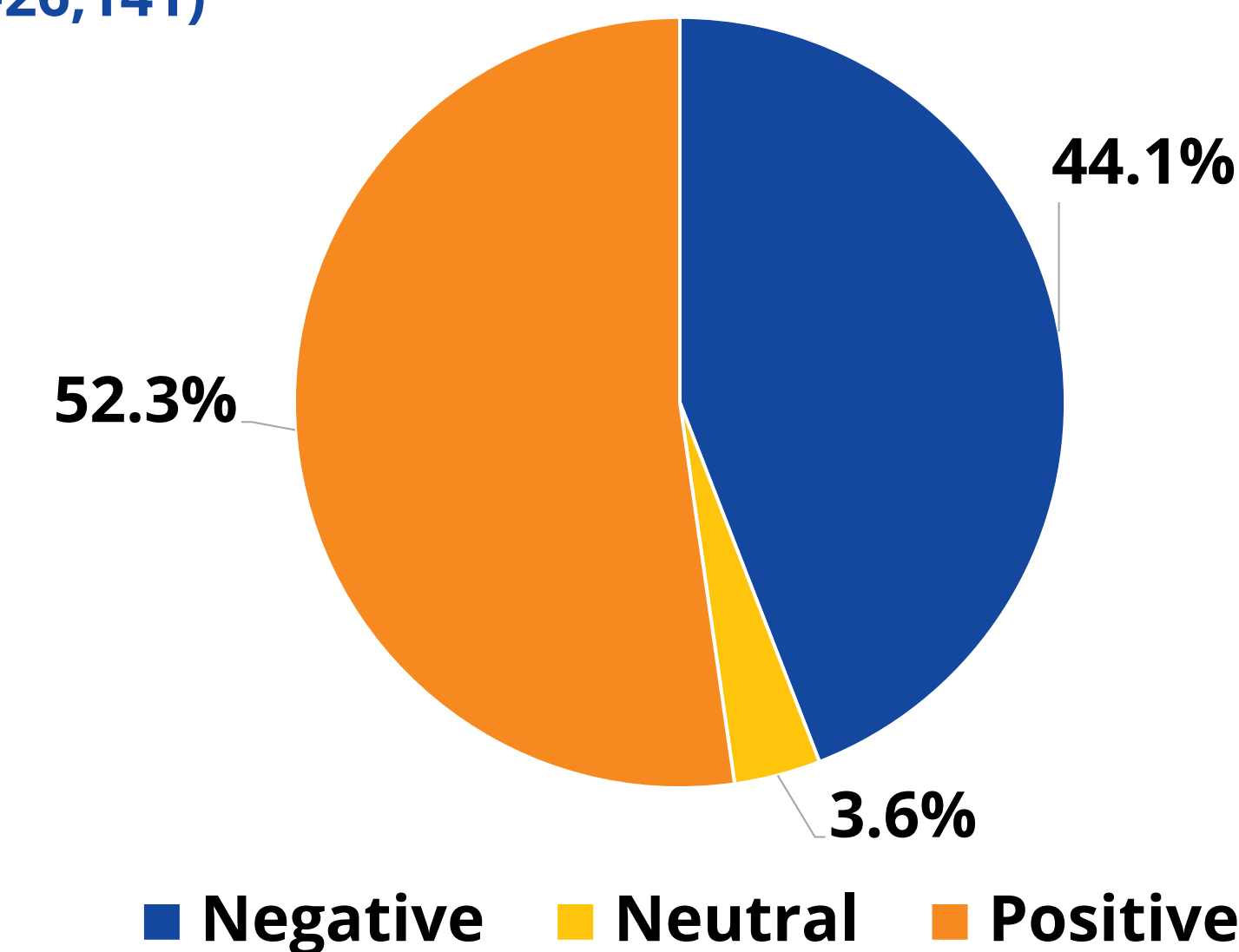**Figure 2. Distribution of Ratings and Comments (N=26,141)**

- Negative 44.1%
- Neutral 3.6%
- Positive 52.3%

Figure 3. Top 20 Most Frequent 2-gram Terms in Positive and Negative Comments and Their Frequencies

Positive Comments		Negative Comments	
highly recommend	639	emergency room	771
emergency room	557	waiting room	681
doctors (and) nurses	499	worst hospital	470
great care	478	sent home	392
excellent care	451	don('t) know	382
nursing staff	413	year old	342
nurses doctors	413	don('t) care	300
staff friendly	392	family member	300
good care	381	went (to) er	273
recommend hospital	373	loved ones	254
hospital staff	355	treated like	254
great experience	341	blood pressure	249
best hospital	322	care (about) patients	247
make sure	311	make sure	245
medical center	306	feel like	236
staff great	297	urgent care	234
great staff	290	waited hours	222
taken care	289	waste time	216
best care	271	worst experience	208
care received	268	customer service	202

- Terms in orange and blue help to better understand commentators' concerns and experiences

RESULTS (cont.)

Figure 4. Top Representative Words of 4 Text Clusters

1st Cluster	2nd Cluster	3rd Cluster	4th Cluster
insurance	wait	family	bad
billing	hour	mother	better
pay	seen	loved	want
department	waited	mom	service
bills	minutes	days	work
paid	appointment	facility	treated
collections	long	member	terrible
payment	30	surgery	really
received	finally	ones	unprofessional
company	blood	father	daughter

- Representative words indicate topics of each cluster

- Topics were decided mainly based on the words in red

DISCUSSION

- Among the 20 most frequent 2-gram terms in negative comments, 3 were about waiting times and 3 were about service quality

- Among the 20 most frequent 2-gram terms in positive comments, 6 referred to the care provided and 6 mentioned hospital staff

- Topics of the 4 clusters among negative comments were identified: waiting time and appointments, insurance and billing issues, bad experiences of senior family members, and poor service quality

CONCLUSIONS

- To provide more satisfactory service, hospitals may wish to reduce waiting times, improve billing and payment processes, make facilities more accessible for older patients, and improve service quality

- Hospitals may also wish to make patients feel they are receiving excellent and friendly care from hospital staff

- Patients' feedback on crowd-sourced review websites is a useful data source for understanding patients' concerns and expectations

- Text mining techniques dramatically improve the efficiency of classifying patients' feedback and identifying their underlying meaning

- Hospital administrators should value and utilize their patients' feedback on the internet