Title: Using Consumer Reviews to Gain Insight Into Perceptions of Hospital-Based Discrimination
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Introduction:
Discrimination in healthcare impacts the patient experience and may contribute to worse outcomes, but its measurement is currently limited. Consumer reviews of healthcare, such as Yelp, provide a window into real world opinions of healthcare facilities, which have been shown to influence healthcare decisions and correlate with outcomes. We performed a qualitative study of consumer reviews to determine their role as a potential source of information for use in the measurement of discrimination in hospital-based care delivery.

Methods:
Yelp reviews of 100 randomly selected hospitals between January 1, 2010 to December 31, 2020 were collected. Based on the Everyday Discrimination Scale (EDS), a widely accepted nine-item questionnaire measuring discrimination, we identified 31 keywords related to discrimination. Natural language processing was used to identify reviews potentially capturing discrimination using these keywords. Five members of the research team used a modified grounded theory approach to create a codebook of recurrent themes based on a subset of the reviews. After coders achieved an inter-rater reliability kappa score of 0.70 in the subset, the remaining reviews were coded in dyads using the codebook. The final inter-rater reliability kappa score was 0.78.

Results:
Over the study time frame, there were 11,367 reviews associated with 100 randomly selected hospitals. Natural language processing identified 3,218 reviews that contained at least one of the 31 keywords potentially referencing concepts related to discrimination. Through manual iterative exploration of those reviews, the research team identified 190 references of discrimination across five coded themes: individual, institutional, clinical, non-clinical, and internalized discrimination. Most acts of discrimination occurred in clinical spaces (47.9%) and were perpetrated by individuals (38.9%). See table for example quotes.

Conclusion:
This study demonstrates the feasibility of using consumer reviews to identify the occurrence of discrimination within hospitals. Qualitative analysis methodologies allowed for a better understanding of how healthcare consumers perceive and report discrimination. Future work to correlate these findings with objective hospital outcomes can help to create healthcare-specific metrics of discrimination.

Table 1. Codebook Categories and Associated Example Reviews

Code	Code Definition	Example Review
Individual	Perpetrator of discrimination identified as a single individual.	"Dr. *** is the most racist unprofessional doctor I have ever met. She illegally denied me treatment"
Institutional	Perpetrator of discrimination identified as a group of individuals or an entire healthcare institution.	"Worst hospital [they] only run and jump at your feet if you're a white female."
Clinical	Acts of discrimination occur in spaces where patient care is administered.	"…doctors can be heard making fun of illegals on the 3rd floor with no remorse saying they should go back to Mexico…"
Non-clinical	Acts of discrimination occur in spaces outside where clinical patient care is administered.	"This review is for security… I think this is just DISCRIMINATE AGAINST to Asian people."
Internalized	Perpetrator of discrimination was identified as the author of the consumer review.	"First and foremost, fire all those southeast asia nurses that barely knows a lick of English…Lastly, those Chinese doctors are the worst."