学 位 論 文 の 要 旨

氏名　奥田　益美

学 位 論 文 名　An Approach to Exploring Associations between Hospital Structural Measures and Patient Satisfaction by Distance-based Analysis

発 表 雑 誌 名　BMC Health Services Research
（巻、初頁～終頁、年）　（63, 2021）

著 者 名　Masumi Okuda, Akira Yasuda, Shusaku Tsumoto

論 文 内 容 の 要 旨

INTRODUCTION

Patient satisfaction is considered a key factor for improving health care quality. Since the 1970s, domains of patient-satisfaction including global evaluation have been identified through factor analysis to explore what domains consist of patient satisfaction as the structure of patient satisfaction, and relationships among domains are usually assessed by correlates and regression analyses. However, these traditional analyses are methodologically restricted when simultaneously analyzing the relationships of domains. Correlation analysis, requires normally distributed data and explores pairwise relationships, yielding results for each pair. Regression analysis yields as many results as the objectives. Difficulties encountered in drawing conclusions from such results made inevitable the need to focus on selected measures, such as global evaluation and communication, not only because an overall rating is believed to represent the patients' assessments, but also because communication is one of the major determinants of global evaluation. However, domains such as medication explanation and quietness, despite low appreciation from patients, are not as often investigated as communication due to their weaker relationships to overall rating. Hospital structural measures are known to influence the evaluation of domains. For example, overall rating and communication receive higher scores by small hospitals than do large hospitals. As to the influence of hospital structural measures on the relationships among the domains, analyses through traditional methodologies are inherently restricted as previously noted.

Researchers have taken different approaches to questionnaires by applying distance-based analysis which analyzes domains simultaneously to evaluate the similarities among the domains,

which might be called the hidden structure of patient satisfaction. The method does not require specific data distribution, and it is possible to analyze all domains simultaneously without focusing on specific variables, giving equal weight to underrated domains. There are three major methods using distances which may be applied to a questionnaire. Results are shown visually, though their interpretations may be somewhat subjective. This study is to explore factors in order to design a model evaluating relationships between the structure of patient satisfaction and hospital structural measures by three distance-based analysis methods for robustness.

MATERIALS AND METHODS

The Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) 2012 survey scores and their structural measures from the Hospital Compare website which were publicly available reported adjusted percentages of scale for each hospital in the United States. Out of 10 measures, nine reported on a three-point scale were selected. Structural measures selected for analysis were: 1) hospitals with survey response sizes (SRSs) of 50–99, 100–299, and ≥300 subjects, 2) acute care hospitals (ACHs) and critical access hospitals (CAHs), and 3) whether hospitals were registered in the systematic clinical database for cardiac/general surgery and for nursing/stroke care. Such registered hospitals submit sets of process and outcome data to government agencies. To explore the similarities of these measures, multiple-proportion tests ($p < .05$) were utilized to compare the proportions of hospitals with each characteristic with respect to SRSs. The percentages of each measure were aggregated to produce contingency tables of the measures and the ratings of "High", "Medium" and "Low" with respect to hospital characteristics. Subsequently, similarities among the measures were investigated by three analytic methods which computed different distances based on the contingency table to identify homogenous groups. They were Ward's clustering method to arrange the measures into homogeneous groups (clusters), correspondence analysis to visualize the associations among rows (the measures) and columns (the ratings) in a contingency table in scatterplots, and nonmetric MDS to visualize the similarities among the measures in scatterplots based on a distance matrix. R software, version 3.1.0. was used for statistical analysis.

RESULTS AND DISCUSSION

Of 4,677 hospitals, 3,711 (79.3%) met the inclusion criteria and were analyzed. Of these 3,711 hospitals, 220 (6%), 692 (19%), and 2,799 (75%) reported SRSs of 50–99, 100–299, and ≥300 patients, respectively. With respect to these three categories of SRSs, 0 (0%), 8 (1%), and 1,005 (36%), respectively, were included in the cardiac surgery registry. The percentage of each characteristic was significantly lower for hospitals with SRSs <300 than ≥300 patients ($p < .001$ for nursing care; $p < .0001$). Therefore, hospitals with smaller SRSs were integrated. Distance-based analysis was then performed. We first describe the results of hospitals that were and were not included in the cardiac surgery registry as they represent the features of our analyses.

Hospitals performing cardiac surgery formed two clusters, a better-rated cluster including doctor communication, nurse communication, pain management, overall rating, hospital recommendation and cleanliness, and a poorly rated cluster including medication explanation, staff responsiveness and quietness. Hospitals that did not perform cardiac surgery also produced two clusters consisting of different combinations, with a better-rated cluster including doctor and nurse communication, and a poorly rated cluster including all other measures. The relationships between the detected clusters and ratings were verified by correpondence analysis. The results of MDS verified the results of clustering, indicateding that communication measures, medication explanation, quietness and the communication services were dissimilar from the other services. Results for hospitals belonging to the cardiac surgery registry were similar to those for hospitals with SRS $\geq$300, to hospitals belonging to the general surgery and nursing/stroke care registries. Hospitals not belonging to the cardiac surgery registry exhibited the same clustering results as ACHs, as hospitals not belonging to the general surgery registry. Cleanliness belonged to the communication cluster at hospitals with smaller SRS, CAHs, and at hospitals not belonging to the nursing/stroke care registries. Correspondence analysis and MDS showed that cleanliness was closer to both communication measures than to the two global evaluation and pain management measures.

Based on the results of the three different analyses using distances, the nine HCAHPS measures were divided into three groups plus cleanliness, one group including doctor and nurse communications; a second group included pain management and two global evaluation measures; and a third group included medication explanation, quietness and staff responsiveness. Our study shows that hospital structural measures did not alter the similarities in these groups but did affect their combinations. Although the overall rating shows a stronger correlation with nurse communication than with other measures including pain management in previous studies, our study found that the similarities between overall rating and nurse communication were not consistent but were limited at large hospitals providing acute surgical treatment. Overall rating and hospital recommendation have been treated equally in patient-satisfaction studies, yet our study suggests their possible dissimilarities. It should be noted that our analyses utilized adjusted percentages of hospital-level data. Individual-level data may produce different results. Analyses using the data in recent years may also produce different results.

CONCLUSION

Three distance-based analytic methods were utilized to assess similarities among measures of patient satisfaction not possible by traditional analyses in a publicly accessible dataset reported as hospital-level data. This study suggests that hospital structural measures including hospital size, the ability to provide acute surgical treatment, and hospital interest in improving medical care quality are factors which may influence the structure of patient satisfaction.