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Factors Impacting Patients' Willingness to Recommend: A Structural Equation Modeling Approach

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Abstract

Patient ratings of inpatient stay have been the focus of prior research since better patient satisfaction results in a financial benefit to hospitals and are associated with better patient health care outcomes. However, studies that simultaneously account for within- and between-hospital effects are uncommon. We constructed a multilevel structural equation model to identify predictors of patients' willingness to recommend a hospital at both within-hospital and between-hospital levels. We used data from 60 U.S. general medical and surgical hospitals and 12,115 patients. Multilevel structural equation modeling reported that patient ratings on the overall quality of care significantly affect the willingness to recommend within hospitals. Also, patients' perspectives on the hospital environment and nursing are the significant factors that predict the patient ratings on the overall quality of care. Overall patient satisfaction significantly predicts the willingness to recommend at the between-hospital level, whereas hospital size and location have marginal impacts.

Keywords

Structural equation modeling, willingness to recommend, hospital consumer assessment of healthcare providers and systems, inpatient satisfaction, hospital service domain

Introduction

Patients have been able to review publicly reported hospital performance information on the Hospital Compare website on a variety of quality and safety dashboard metrics available since 2008 (1). This transparency effort was expanded in 2012 to include the Hospital Value-based Purchasing Program by the Centers for Medicare and Medicaid Services. The program evaluates hospitals' quality of care and incentivizes hospitals to improve targeted measures. These incentives are determined based on hospitals' total performance scores (TPS) (2,3). The TPS is an indicator for the quality of care, and it measures four domains (clinical care processes, patient safety outcomes, patient satisfaction, and efficiency). Of those four, patient satisfaction is assessed by the Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) survey. The HCAHPS survey has been utilized as a tool to assess patient perceptions of care and includes questions on nursing care, physician care, hospital environment, staff, discharge care, overall ratings of the hospital, and willingness to recommend, as well as seven additional questions on patient demographic characteristics (4). The HCAHPS survey defines patient satisfaction as the extent to which a patient is satisfied with the care they have received inside the hospital. It is used as a measure of care quality (5).

Patient ratings on inpatient stay (hospital admission) have been the focus of previous research since better patient satisfaction is associated with better financial benefit to hospitals (6) and patient health care outcomes (7). Positive patient satisfaction was associated with a shorter length of stay, higher quality of surgical care, and lower readmission and mortality rates (8). A higher patient rating is also related to a better

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quality of clinical care, such as the prevention of complications from surgery (9,10).

Prior research documents that patient- and hospital-level characteristics and four hospital service domains (nursing care, physician care, staff performance, and hospital environment) act as determinants of patient satisfaction. There is evidence that age (11), race/ethnicity (12–14), and gender (15) are related to patient ratings on inpatient stay (2,16–19). Previous studies investigated the association between the four hospital service domains and patient ratings on inpatient stay. Otani et al. (13) stated that positive experience with nurses, doctors, staff performance, and hospital environment is associated with overall patient ratings on inpatient stay and their willingness to recommend. Elliott (20) also indicated that communication with nurses is the most important factor, followed by the responsiveness of hospital staff and physical environment, measured by cleanliness and quietness of the hospital room as important determinants associated with patient satisfaction.

Although ample literature exists regarding factors associated with patient ratings on inpatient stay, limited research has examined the relationships between hospital service domains with patient satisfaction and patients' willingness to recommend within and between hospitals. By using a novel statistical model, this study allows for an understanding of patients' perceived experiences and whether patient satisfaction acts as a mediator between hospital service domains and the willingness to recommend the hospital to family and friends. This research is the first study to simultaneously evaluate the overall contributions of patient-level and hospital-level variables on patient satisfaction and determine how these variables impact patients' willingness to recommend, using a multilevel structural equation modeling (MSEM) technique. We explored two main research questions simultaneously. The first was to determine which hospital services domains (nursing, doctor, environment, and staff) significantly predict a patient's rating on the overall quality of care and how a patient's rating on the overall quality of care mediates willingness to recommend the hospital to family and friends. The second was to answer what is the relationship between patient satisfaction, hospital characteristics, and willingness to recommend? In addressing these questions, this study may offer insights into potential areas of improvement that can be acted upon at the hospital level to positively affect the overall patient satisfaction and patients' willingness to recommend.

Method

Data Source and Participants

The data in this study included patient responses and hospital characteristics from the HCAHPS survey from July 2013 to October 2014 from 93 U.S. general medical and surgical hospitals in Ascension Health. Hospital characteristics were merged from the 2014 American Hospital Association. The listwise deletion method was used to handle missing data and thus observations with missing values were removed from the analysis (21). For stable solutions, hospitals with <30 observations or with no variation in the outcome measures data were excluded from the analysis (22). Five hospitals had no within-cluster variation for some important individual-level outcome variables (e.g., responses to Nurse_1, Staff_1, and Staff_2), indicating subjects within these hospitals did not vary regarding these variables. To eliminate any potential impact on the quality of estimation due to no within-cluster variation, these hospitals were excluded from the analysis. Nineteen hospitals had <30 subjects within each hospital. Based on the widely used guideline for required sample size using multilevel modeling, at least 30 subjects per cluster is required for unbiased fixed effects estimation (23). Therefore, hospitals with <30 subjects were excluded from the analysis. The final sample consisted of 12,115 patient responses across 60 hospitals. This study does not contain any identifiable information on human or animal subjects and is exempt from Institutional Review Board approval.

Table 1 shows the distribution of both patient demographics as well as hospital characteristics in the final sample. Most of the patients are female (71.09%) and white (76.46%). The patients were categorized into nine age groups (24). Among

Table 1. Summary of Patient Demographics and Hospital Characteristics.

	N	Percentage (%)
Patient demographics, *N* = 12,115		
Gender		
Female	8612	71.09
Male	3503	28.91
Race		
White	9263	76.46
Non-White	2852	23.54
Age group		
18 or younger	652	5.38
18-24	891	7.35
25-34	1594	13.16
35-44	1134	9.36
45-54	2204	18.19
55-64	2898	23.92
65-74	1891	15.61
74-84	718	5.93
85 or older	133	1.10
Hospital characteristics, *N* = 60		
Size		
Large	17	28.3
Medium	28	46.7
Small	15	25.0
Location		
Rural	7	11.7
Urban	53	88.3
Teaching affiliation		
Non-teaching	28	46.7
Teaching	32	53.3

the 60 hospitals, the majority are urban hospitals (88.30%). The various sizes and teaching affiliations are both well represented in the sample.

Measurement

In this study, we measured patient willingness to recommend the hospital by a single question: "Would you recommend this hospital to your friends and family." The response is on a 0–10 scale, with 0 being "not at all likely" and 10 being "extremely likely." Next, we measured patient perception of hospital service domains by using survey items across four hospital service domains (nursing care, physician care, staff performance, and hospital environment). Each service domain was measured by multiple survey questions with ordinal categorical responses. For example, the question "How often did nurses treat you with courtesy and respect?" was used to measure nursing care, and the question "How often did doctors listen carefully to you?" was used to measure physician care. Then, we measured patient rating of the overall quality of care by using a single question using a 5-point Likert scale (1 = excellent, 2 = very good, 3 = good, 4 = fair, 5 = poor). Finally, we included patient demographics such as age group, gender, and race, and hospital characteristics such as hospital location (based on United States Census Bureau's urban and rural definitions of urban or rural) (25), size (small: 0–99 beds, medium: 100–399 beds, large: 400+ beds) (26,27), and teaching status (yes/no). A teaching hospital, also known as an academic medical center, partners with medical and/or nursing schools, education programs, and research centers to improve health care delivery through learning and research (28).

Statistical Analysis

Structural equation modeling (SEM) has been widely used to examine multivariate relations among a set of variables, especially when latent variables are involved in the analysis since latent variables are not directly measured but are inferred. Given the hierarchical structure of the data (i.e., patients nested within hospitals), MSEM was used to investigate the relations among the measures of four hospital service domains, patient rating of the quality of care, and willingness to recommend (29). In the MSEM analysis, within-cluster (patient-level in our case) and between-cluster (hospital-level in our case) models are formulated separately. Analyses were conducted in Mplus 8.0 (30) using the mean- and variance-adjusted weighted least squares estimator, which makes no distributional assumptions about the observed variables and assumes a normal latent distribution underlying each observed categorical variable (31,32).

A two-level exploratory factor analysis (EFA) was conducted firstly to explore the two-level factor structure underlying patient perception items. Patient responses to the perception of hospital service domains were reversely coded, if needed, to ensure higher values indicating more positive responses. The analysis results, combined with the prior theory on the structure of perception of hospital service, resulted in four latent factors at the within-level (satisfaction with doctors, satisfaction with nurses, satisfaction with staff, and satisfaction with hospital environment) and one latent factor at the between-level (overall patient satisfaction). At the within-level, the Geomin rotated factor loading matrix from the EFA analysis showed that Nurse_1 to Nurse_5 were highly correlated with the same latent factor "satisfaction with nurses"; Doctor_1 to Doctor_3 were highly correlated with the same latent factor "satisfaction with doctors"; Environment_3 to Environment_5 were highly correlated with the same latent factor "satisfaction with hospital environment"; and Staff_1, Staff_2, Staff_4, and Staff_5 were highly correlated with the same latent factor "satisfaction with staffs." Loadings above 0.4 are used commonly to consider variables in defining a factor as they are considered practically significant (33). The estimated standardized loadings of these items on their associated factors were relatively strong (0.5 or higher) and their cross-loadings on other factors were small, indicating that these items were good indicators for the corresponding identified latent factors. Nurse_6 loaded weakly on "satisfaction with nurses" but loaded strongly on "satisfaction with hospital environment." Staff_6, Staff_7, and Staff_9 loaded weakly on "satisfaction with staffs" but strongly on "satisfaction with hospital environment". Staff_3 loaded weakly on "satisfaction with staffs" but more strongly loaded on "satisfaction with nurses." Doctor_4 loaded strongly on both "satisfaction with doctors" and "satisfaction with hospital environment." To achieve the simple factor structure and align with the prior theory on the perception of hospital service, these six items were excluded from the measurement model evaluation and thus not included in the final MSEM model. Staff_8, Environment_1, and Environment_2 loaded weakly on all the identified latent factors and thus not included in the final measurement model.

Table 2 shows HCAHPS survey items associated with each latent factor and coefficient ω for each scale from the final measurement model. Coefficient ω has been recommended to estimate the reliability of homogeneous measurements, which does not require assumptions as restrictive as coefficient α does (34). At the within-cluster level, coefficient ω ranged from 0.73 to 0.91 for patient satisfaction scales; at the between-cluster level, coefficient ω was 1.0 for the measure of overall patient satisfaction. The values of coefficient ω at both levels confirm the reliability and robustness of the measurement model.

A two-level random intercept SEM model was proposed and estimated (Figure 1), in which intercepts represented heterogeneity among clusters in the outcome variables and could vary across clusters (35). The within-cluster analysis estimated the effects of patient satisfaction with doctors, nurses, staff, and environment on a patient rating of overall quality of care, and the effects of a patient rating of overall quality of care with observed patient characteristics (age group, gender, and race) on willingness to recommend. In

Table 2. Latent Factors With Items and Coefficient ω.

	Coefficient ω
Satisfaction with doctors	0.91[a]
Doctor_1: How often did doctors treat you with courtesy and respect?	
Doctor_2: How often did doctors listen carefully to you?	
Doctor_3: How often did doctors explain things in a way you could understand?	
Satisfaction with nurses	0.90[b]
Nurses_1: How often did nurses treat you with courtesy and respect?	
Nurses_2: How often did nurses listen carefully to you?	
Nurses_3: During this hospital stay, how often did nurses explain things in a way you could understand?	
Nurses_4: After you pressed the call button, how often did you get help as soon as you wanted it?	
Nurses_5: How often did you get help in getting to the bathroom or in using a bedpan as soon as you wanted?	
Satisfaction with staffs	0.81[b]
Staff_1: During your hospital stay, did hospital staff talk with you about the help you needed when you left the hospital?	
Staff_2: During your hospital stay, did you get information in writing about what symptoms or health problems to look out for?	
Staff_4: Before giving you any new medicine, how often did hospital staff tell you what the medicine was for?	
Staff_5: Before giving you any new medicine, how often did hospital staff describe side effects in a way you could understand?	
Satisfaction with hospital environment	0.73[b]
Envir_3: Rate timeliness, temperature and accuracy of food services	
Envir_4: Rate the level of safety felt[a]	
Envir_5: Rate the registration process	
Overall patient satisfaction	1.00[c]

[a]Questions was removed in the calculation of overall patient satisfaction
[b]Coefficient ω was calculated for the Within-cluster Level
[c]Coefficient ω was calculated for the Betweencluster level

the between-cluster analysis, willingness to recommend was regressed on the latent variable (overall patient satisfaction), which was measured by all 13 items and hospital characteristics (location, size, and teaching affiliation).

The intra-class correlation (ICC) represents the amount of variance attributable to the cluster level. ICC values of outcome measures ranged from 0.01 to 0.045. Although the small ICC values indicated that a small proportion of variance could be accounted for by the cluster, the clustering effect should not simply be ignored, and multilevel modeling or alternative techniques should be considered to account for the clustering effect (36). Model fit of the two-level SEM model was satisfactory in the current study (37): the root-mean-square error of approximation = 0.02, comparative fit index (CFI) = 0.99, Tucker–Lewis index (TLI) = 0.98, and standardized root mean squared residual = 0.07.

Results

Tables 3 and 4 show the estimated standardized factor loadings, regression coefficients, standard errors, and statistical significance indicated by *P*-values. Factor loadings demonstrated significant, positive, and moderate to large relations between indicators and their corresponding latent factors at both levels of analysis.

Within Hospital

For the within-cluster analysis, patient satisfaction with the hospital environment was a significant and the most important predictor of a patient rating of overall quality of care (environment to rating = 0.56; *P*-value <0.001). Patient satisfaction with a nurse was also a significant and important predictor of patient rating (nurse to rating = 0.29; *P*-value <0.001). The impact of patient satisfaction with staff and doctors was either non-significant or not important due to the small magnitude of the effect. The effect of patient rating on patients' willingness to recommend was significant, and the magnitude of the effect was large (rating to recommendation = 0.79; *P*-value <0.001). Although age and race were significant covariates for recommending the hospital, none of them was important, as the standardized regression coefficients were <0.1 (38). The proportion of variance in a patient rating of overall quality of care, explained by the four domains of patient satisfaction was 62.10%, and the proportion of variance in patients' willingness to recommend, explained by patient rating and patient characteristics was 63.40%.

Between hospital

The between-cluster model demonstrated that overall patient satisfaction, measured by the 13 items, had a statistically significant and large impact on willingness to recommend (standardized coefficient = 0.85; *P*-value <0.001). All hospital characteristics exhibited a negative impact on patient recommendation; however, none of the effects were statistically significant. The hospital size has an estimated coefficient of −0.256 (*P*-value = 0.176), indicating large hospitals tend to receive lower ratings. Similarly, hospital location has an estimated coefficient of −0.142 (*P*-value = 0.401), indicating rural hospitals tend to receive lower ratings. Teaching status has a weak negative correlation (−0.077) as well. The proportion of variance in willingness to recommend, explained by overall patient satisfaction and hospital characteristics, was 81.70%.

Discussion

Recent policies added financial incentives for care outcomes, cost reduction measures, and patient safety and satisfaction,

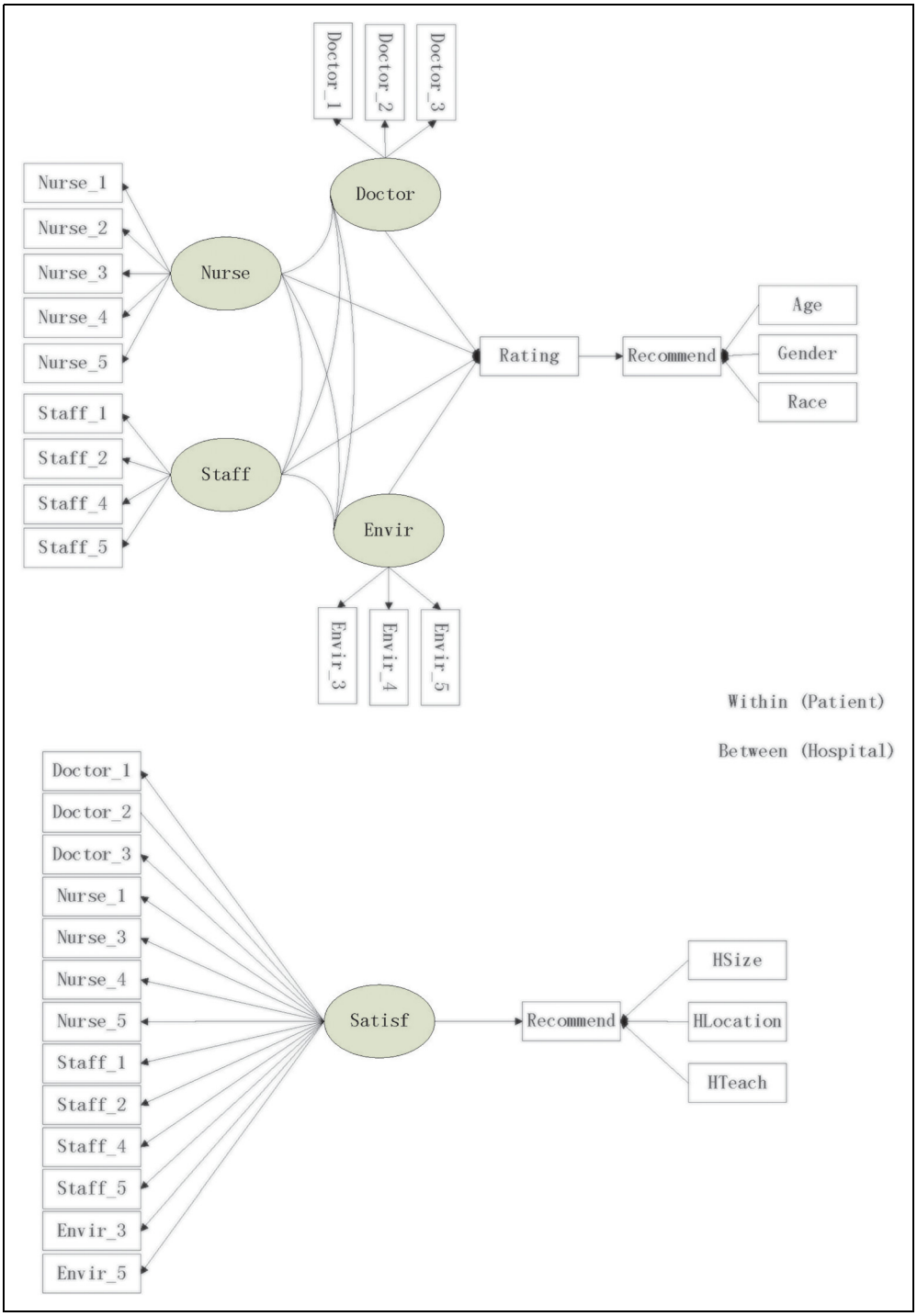

Figure 1. Final overall contributions of patient-level and hospital-level variables on patient experience and their interaction with patients' willingness to recommend using a multilevel structural equation modeling technique. Doctor = patient satisfaction with doctors, Nurse = patient satisfaction with nurses, Staff = patient satisfaction with staffs, Envir = patient satisfaction with hospital environment, Rating = patient rating on overall quality of care, Satisf = overall patient satisfaction, recommend = patients' willingness to recommend, HSize = hospital size, HLocation = hospital location, HTeach = teaching or non-teaching hospital.

which has intensified the need for hospitals to improve performance (16,17). For hospitals that wish to enhance their performance in HCAHPS metrics, our results from the U.S. suggest that focusing on a few critical aspects of care can yield significant benefits, especially with efforts to improve the care environment and interpersonal aspects of care. Patients subjectively evaluate on a cognitive and emotional level (39), the interaction and experiences with health care on multiple dimensions. It is clear from the literature that there is a significant amount of variation in the factors that

Table 3. Estimated Standardized Factor Loadings, Correlation, and Regression Coefficients for Within-Cluster Analysis.

Path	Standardized estimate	Standard error	*P*-value
Physician care			
Doctor_1: How often did doctors treat you with courtesy and respect?	0.884	0.008	<0.001
Doctor_2: How often did doctors listen carefully to you?	0.910	0.005	<0.001
Doctor_3: How often did doctors explain things in a way you could understand?	0.860	0.005	<0.001
Nursing care			
Nurses_1: How often did nurses treat you with courtesy and respect?	0.871	0.004	<0.001
Nurses_2: How often did nurses listen carefully to you?	0.880	0.005	<0.001
Nurses_3: During this hospital stay, how often did nurses explain things in a way you could understand?	0.802	0.005	<0.001
Nurses_4: After you pressed the call button, how often did you get help as soon as you wanted it?	0.722	0.006	<0.001
Nurses_5: How often did you get help in getting to the bathroom or in using a bedpan as soon as you wanted?	0.742	0.008	<0.001
Staff performance			
Staff_1: During your hospital stay, did hospital staff talk with you about the help you needed when you left the hospital?	0.629	0.013	<0.001
Staff_2: During your hospital stay, did you get information in writing about what symptoms or health problems to look out for?	0.614	0.016	<0.001
Staff_4: Before giving you any new medicine, how often did hospital staff tell you what the medicine was for?	0.836	0.007	<0.001
Staff_5: Before giving you any new medicine, how often did hospital staff describe side effects in a way you could understand?	0.804	0.006	<0.001
Hospital environment			
Envir_3: Rate timeliness, temperature and accuracy of food services	0.558	0.008	<0.001
Envir_4: Rate the level of safety felt	0.877	0.008	<0.001
Envir_5: Rate the registration process	0.610	0.009	<0.001
Path between service domains			
Doctor with nurse	0.683	0.009	<0.001
Doctor with staff	0.671	0.010	<0.001
Doctor with environment	0.596	0.011	<0.001
Nurse with staff	0.764	0.007	<0.001
Nurse with environment	0.706	0.007	<0.001
Staff with environment	0.611	0.010	<0.001
Path between service domains and quality rating			
Doctor to rating	−0.029	0.013	0.024
Nurse to rating	0.286	0.015	<0.001
Staff to rating	0.021	0.020	<0.001
Environment to rating	0.564	0.013	<0.001
Path between quality rating and willingness to recommend			
Rating to recommendation	0.794	0.004	<0.001
Path between patient characteristics and willingness to recommend			
Age to recommendation	0.039	0.009	<0.001
Gender to recommendation	0.000	0.011	0.989
Race to recommendation	0.036	0.009	<0.001

constitute patient satisfaction (40–44). Furthermore, hospital characteristics are essential in reviewing and examining patient satisfaction. Studies have shown that patient satisfaction surveys are multistage or hierarchically, whereby there is an organizational influence on patient satisfaction while receiving care (45,46). There is a sparse literature on the importance of modifiable hospital characteristics. These studies show that hospital size (47), teaching status (47), nursing staffing (48), and financing well-being (49) impact patient satisfaction. This is similar to the findings of our study.

Our study results for within-hospital analysis show strong relationships among patient satisfaction on service domains, rating of overall quality of care, and willingness to recommend. The four latent factors of patients' satisfaction on care delivered by physicians, nursing care, staff performance, and hospital environment explain 62.10% of the variance in the hospital's quality of care rating. Furthermore, quality of care and patient characteristics were estimated to explain 63.40% of the variance in a patient's willingness to recommend a hospital to family and friends. These findings align with prior studies that looked at those aspects individually.

Table 4. Estimated Standardized Factor Loadings and Regression Coefficients for Between-Cluster Analysis.

Path	Standardized estimate	Standard error	*P*-value
Physician care			
Doctor_1: How often did doctors treat you with courtesy and respect?	0.977	0.085	<0.001
Doctor_2: How often did doctors listen carefully to you?	0.840	0.103	<0.001
Doctor_3: How often did doctors explain things in a way you could understand?	0.838	0.080	<0.001
Nursing care			
Nurses_1: How often did nurses treat you with courtesy and respect?	0.892	0.065	<0.001
Nurses_3: During this hospital stay, how often did nurses explain things in a way you could understand?	0.976	0.059	<0.001
Nurses_4: After you pressed the call button, how often did you get help as soon as you wanted it?	0.717	0.125	<0.001
Nurses_5: How often did you get help in getting to the bathroom or in using a bedpan as soon as you wanted?	0.812	0.087	<0.001
Staff performance			
Staff_1: During your hospital stay, did hospital staff talk with you about the help you needed when you left the hospital?	0.541	0.147	<0.001
Staff_2: During your hospital stay, did you get information in writing about what symptoms or health problems to look out for?	0.754	0.152	<0.001
Staff_4: Before giving you any new medicine, how often did hospital staff tell you what the medicine was for?	0.993	0.062	<0.001
Staff_5: Before giving you any new medicine, how often did hospital staff describe side effects in a way you could understand?	0.946	0.062	<0.001
Hospital environment			
Envir_3: Rate timeliness, temperature and accuracy of food services	0.442	0.137	<0.001
Envir_5: Rate the registration process	0.880	0.093	<0.001
Path between service domains and willingness to recommend			
Patient satisfaction to recommendation	0.853	0.096	<0.001
Hospital size to recommendation	−0.256	0.189	0.176
Hospital location to recommendation	−0.142	0.169	0.401
Hospital teaching affiliation to recommendation	−0.077	0.197	0.696

Several studies have found that patient characteristics (50), physician care (20), nursing care (44,51,52), staff performance (13), and room/hospital quietness and cleanliness (53) assessed from the HCAHPS are predictors of willingness to recommend at different degrees of magnitude (45).

This study provides a novel approach to examine factors that influence the patient perception of care. Our approach explores the relationship between patient perceptions of hospital service domains and willingness to recommend, simultaneously using patient-to-patient variance and hospital-to-hospital variance. We found that the domain that was most influential on patients' perception of care was the hospital environment. The positive reported relationship is moderate, with a correlation coefficient of 0.56. Prior research has shown that physical features, such as room temperature and cleanliness, were associated with the perception of care quality. One study suggested that if patients feel unable to judge the clinical care provided, they use the physical environment as a proxy for overall quality (54). Other studies reported that patients perceive the hospital environment as integrated with the health care package being delivered (55,56). Furthermore, poor room cleanliness, in particular, was found to be associated with patients' perception of the quality of care (53). It may seem like a small thing, but, for example, reducing noise levels throughout the night can positively impact patient satisfaction. Although there is little that can be done about the beeping of machines or even about snorers, a clear policy concerning traffic in and out of areas with resting patients, the number of people on staff during night hours, and even to ensure nurses remember to whisper can play an important role to improve patient satisfaction related to the environment. Similarly, in how timely a manner the food is provided, the temperature and accuracy of food services, how safe the patient feels in the facility, and facility cleanliness all affect patient satisfaction and should, therefore, be given sufficient attention by hospital management. However, we found no relationship between satisfaction with staff performance and quality of care, which is consistent with the literature (13).

Next, concerning interpersonal factors and consistent with prior studies, our findings support the idea that patient perception of nursing care is a predictor of quality of care. In our model, nursing care had a weak positive correlation with the quality of care ($r = 0.286$). Nurses are the largest group of care providers in hospital settings, and, since the 1960s, nursing care has been strongly associated with overall patient quality of care and overall patient satisfaction with inpatient care, regardless of the method used to examine

nursing care (20,42,51,57,58). Our findings are in line with findings that confirm the overall importance of nursing to the assessment of hospital care explained by Long (59) and may reflect the fact that patients interact the most directly with nurses within an inpatient hospital setting. Furthermore, a prior study found that clear and timely communication from nurses was the most important factor in explaining patients' ratings of hospitals (20). Therefore, creating a care process that includes a window within which nurses must communicate with patients following a procedure or post-admission can improve patient satisfaction.

In contrast to prior research, our novel approach to examining patient-to-patient variance shows no relationship between satisfaction with physician care and quality of care. Previous research indicated that the perception of physician care is a significant predictor of quality of care. Such studies found a relationship between physician–patient communication and quality of care (20,43,60). However, many of those studies examined aspects of physician care across hospitals rather than within the same hospital. Our use of MSEM provides us the ability to identify the most sensitive satisfaction domain within a given hospital.

Last, our results for between-hospital analysis show that there is a strong relationship between patient overall satisfaction and willingness to recommend ($r = 0.853$). Also, the latent variable (overall patient satisfaction), along with hospital characteristics, explains 81.7% of the variance in patients' willingness to recommend. In line with prior studies, we found that larger hospitals (42,61) and rural hospitals (61–63) tended to have a lower likelihood of being recommended by patients. Thus, overall patient satisfaction from all domains has a large impact on the willingness to recommend, which provides evidence that hospitals should improve patient satisfaction and satisfaction.

Limitations

The study has several limitations. First, all 60 hospitals in the sample are not-for-profit hospitals from Ascension Health. Further research must be conducted on for-profit hospitals to confirm the findings. Second, as the data is de-identified, we do not know how many patients are counted in this study, only the number of encounters. Third, racial and ethnic groups are limited to two groups in our study which may reduce the impact of disparity in our findings. This was done to address the lack of statistical power when non-White groups are looked at individually in comparison with the white group. Fourth, the cluster size (60) was relatively small to show a conclusive impact of hospital characteristics on patients' willingness to recommend. Further research should be done to include more hospitals from a larger geographic region to permit exploration of the impact of market information. Fifth, the same sample was used for the two-level EFA on the perception of hospital service domains and MSEM analysis on patients' willingness to recommend in the current study due to limited hospital data. Further validation of the proposed MSEM can be conducted using a different sample for results generalization.

Conclusion

With a shift toward value-based and patient-centered models of care in the hospital industry, hospital and health system reimbursement is more closely tied to patient satisfaction and satisfaction. Therefore, the proposed MSEM model differentiated the variability in the willingness to recommend and identifies critical factors that influence patient satisfaction and choices, which can help health executives invest resources in critical areas to improve and attract more patients.

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Authors' Note

This research project was deemed exempt by the institutional review board of the University of North Florida. Patient's consent was waived.

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The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article

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