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Patient Experience: Improving Patient Engagement in Hospital Settings

INTRODUCTION

Patients' perspective of hospital care, also known as patient experience, has become an important aspect of healthcare. In 2010, with the implementation of the Affordable Care Act (ACA), the Centers for Medicare and Medicaid Services (CMS), the largest hospital payer, introduced Value-Based Purchasing (VBP) to establish the linkage between quality of care and hospital payment. Instead of the traditional healthcare fee-for-service model, a proportion of hospital annual reimbursement is allocated based on the quality of care that hospitals provide. While CMS has selected and removed many quality indicators, patient experience remains a constant since the introduction of VBP, and is expected to account for 25% of the total VBP hospital reimbursement in FY2016 and FY2017. Many experts have indicated that inclusion of patient experience in VBP symbolizes a paradigm shift from physician-driven care to a patient-centered care environment. Healthcare providers are now encouraged to engage their patients and families in care and treatment decision making. In addition, mounting evidence have found that higher patient satisfaction is associated with better treatment adherence, outcomes and medical information retention. These recent developments rendered patient experience an important quality indicator for hospitals.

Given the importance of patient experience in patient care, many hospital administrations have devoted copious resources into customer service education, facility upgrades, and other hospital-wide initiatives to improve patient experience. However, many hospitals are still performing below the national benchmark and struggling to develop effective improvement strategies for patient experience. Patient experience is complex, because it is the summation of all interactions that patient experienced during a hospital stay, from registration staff to physicians. Currently, patient experience is assessed using Hospital Consumer Assessment of Healthcare Providers and Services (HCAHPS). The survey currently consists of the following domains: 1) Nurse Communication, 2) Physician Communication, 3) Pain Management, 4) Care Transition, 5) Staff Responsiveness, 6) Communication about Medicines, 7) Discharge Information, 8) Cleanliness, 9) Quietness, 10) Overall Rating of a hospital, and 11) Willingness to Recommend. In this study, I would like to further examine the relationship between the different domains of patient experience and overall patient experience to better inform future strategies to improve patient-centered care.

METHODS

Data Extraction and Description

Patient experience is assessed using Hospital Consumer Assessment of Healthcare Providers and Services survey (HCAHPS). Hospitals may collect HCAHPS information themselves or utilize a CMS-approved vendor, such as J. L. Morgan and Associates. There are four different survey methods,

phone, mail, mail with phone follow up, and active interactive voice recognition (IVR). Randomly selected patients are followed up between 48 hours and 6 weeks after their discharge. The survey will be conducted using patients' language spoken at home. The survey currently consists of 32 questions. 25 questions are used to assess the domains of patient experience and these questions have Likert-type responses ranging from 1 (never or strongly disagree) to 4 (always or strongly agree). Top box score indicates the percentage of participants who responded 4 in the questions. With the exception of overall rating, overall rating uses a 1-10 scale; 0 represents worst hospital possible and 10 represents best hospital possible. Top box % for overall rating only consists of patients who responded 9 or 10 on overall rating. In addition, several demographic questions were included to adjust for the mix of patients across for the hospital for publically reported data, for example, race, education levels, and overall health levels. In publically reported data, CMS breaks down the survey into 7 composite items, 2 individual items, and 2 global items as listed below (Table 1), and only aggregate scores from each hospital were reported. Data from both VBP 2014 (performance period: 1/1/2013-12/31/2013) and VBP 2015 (performance period: 7/1/2014 – 6/31/15) were extracted from the hospital compare website (https://data.medicare.gov/data/hospital-compare). Data from VBP 2013 and prior were not included in the current study, because the care transition domain was not included in the VBP 2013. Publically reported data also included hospital information, such as location and sample size. Only top box scores were included in the current study, because VBP is based on HCAHPS top box %. All missing data have been imputed using means from each domain. Missing data (NAs) are mostly due to small sample size and CMS exemptions. VBP 2014 data included 4,619 hospitals, and VBP 2015 data included 4,643 hospitals. VBP data included hospitals from all 50 states as well as District of Columbia, Guam, Northern Mariana Islands, Puerto Rico, and Virgin Islands. Around 554 hospitals for VBP 2014 and 422 hospitals for VBP 2015 did not report their HCAHPS data to CMS. Correlation analysis was conducted to determine the relationship between the domains. In addition, patient experience top box scores are often associated with patient mix, such as racial and socioeconomic backgrounds. This study uses state as a proxy for racial and socioeconomic composition for each state. Based on the states, each hospital may have different levels of state support and resources. Cluster analysis was performed to detect the differences in performance based on state.

Table 1. HCAHPS Breakdown

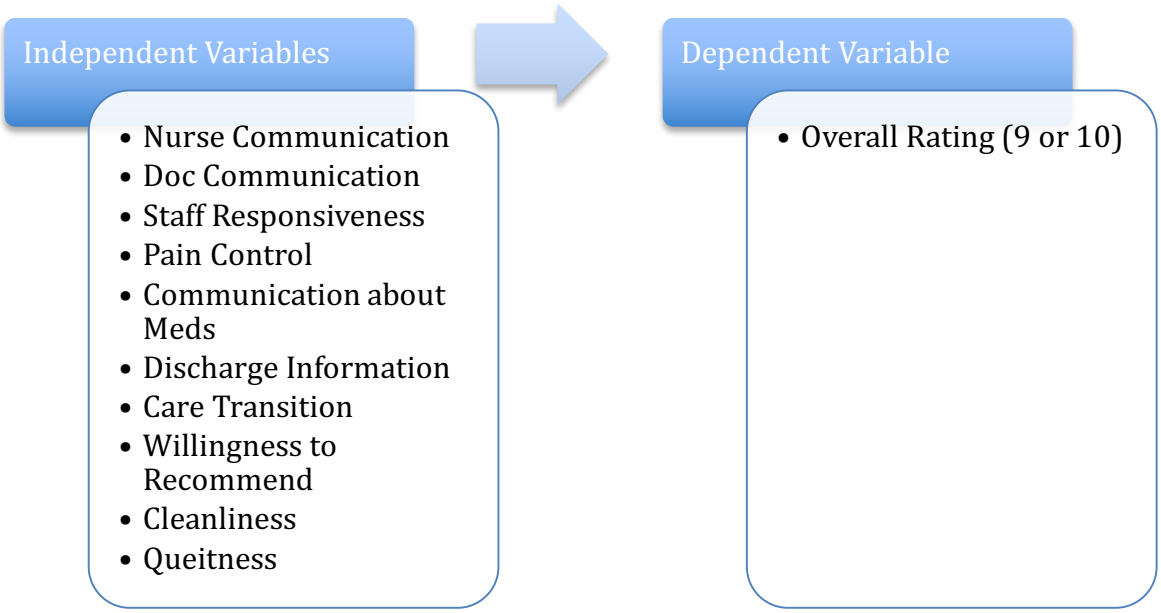
Type of Item	No.	Publically Reported Data
Composite Items	1	Nurse Communication
	2	Doctor Communication
	3	Pain Management
	4	Care Transition
	5	Responsiveness of Hospital Staff
	6	Communication about Medicines
	7	Discharge Information
Individual Items	8	Cleanliness
	9	Quietness
Global Items	10	Overall Rating of Hospital

	11	Willingness to Recommend Hospital

Modeling to Predict Global Item – Overall Rating of Hospital

Many defined patient experience to be the accumulation of all occurrences and encounters with hospital staff throughout patients' continuum of care, and no questions will better capture the entirety of patient experience in HCAHPS than Overall Rating of hospital (Figure 1.). Therefore, in this study, several different regression models were conducted to predict the top box score for overall rating of hospital using different domains of patient experience. The independent variables in the models were selected based on correlation coefficients and variance inflation factor (VIF) to avoid multicollinearity. Two values were used to determine the strength of correlation based on correlation coefficients: 1) >= 0.5 (moderate correlation), and 2) >= 0.75 (strong correlation). A VIF of greater than 5 is an indication of multicollinearity, and models will be readjusted based on this criterion. The models used in this study included: 1) linear regression (glm), 2) logistic regression (predicting the probability of top box %), 3) classification and regression trees (rpart), and 4) random forest (randomForest). All analysis was conducted using R version 3.2.3. For logistic regression, a new variable opportunity, represented the present of patients who did not rate the hospital with 9 or 10, was added to simulate a binomial distribution for the percent of patients who gave the hospital a 9 or 10 rating out of 100%. The models were built using VBP 2014 data and validated using VBP 2015 data using the predict function. Sum of Square Errors (SSEs) and Root-Mean Square Errors (RMSEs) were used to compare and contrast to determine the best model for prediction. All models were adjusted for state clusters.

Figure 1. Predictive Model



RESULTS

Descriptive Analysis (see Table 2.)

Overall, most domains improved in the percent of patients who were included in the top box scores. Care Transition questions were the latest addition to the HCAHPS, and had the lowest mean percent of patients who strongly agree they understand their care when they left the hospital. However, Care Transition domain had the greatest improvement in mean percent, 1.03%. Most hospitals performed well in giving patients discharge information. In both years, more than 85% of patients reported that they were given information about what to do during their recovery, and the hospitals continued to improve their performance (0.75%). Quietness remained a challenge for hospitals; the mean percentages of patients who reported that the area around their room was always quite were 61.4% for VBP 2014 and 62.01% for VBP 2015 (0.61% difference). Both mean percentages of patients who reported their pain was always well controlled and patients who reported that staff always explained about medicine before giving it to them both improved moderately at 0.17% and 0.44%, respectively. In terms of care givers and staff, nurse communication experienced a 0.41% increase and staff responsiveness increased by 0.39% in mean percent. However, percentage of patients who reported their doctors always communicated well had a 0.01% increase. For global items, the mean percent of patients who gave their hospital a rating of 9 or 10 increased by 0.5%. Yet, percent of patients who reported yes, they would definitely recommend this hospital only had a 0.12% increase. Cleanliness is the only domain where the performance was worst in VBP 2015 than VBP 2014. The mean percentages for percent of patients who reported that their room and bathroom were always clean were 73.57% for VBP 2014 and 73.49% for VBP 2015, a 0.08% reduction. Please see Appendix 1 for year to year box plot.

Table 2. Descriptive Statistics on HCAHPS Domain Top Box % VBP 2014 and 2016

Domain Title	Top Box % Description	Year	Range (Mean)	Median
Nurse Communication	Patients who reported that their nurses always communicated well	2014	45, 100 (79.09)	79
		2015	8, 100 (79.5)	79
Doctor Communication	Patients who reported their doctors always communicated well	2014	25, 100 (81.76)	81
		2015	15, 100 (81.77)	81
Pain Control	Patients who reported their pain was always well controlled	2014	7, 100 (70.84)	71
		2015	4, 100 (71.01)	71
Care Transition	Patients who strongly agree they understood their care when they left the hospital	2014	2, 100 (51.24)	51
		2015	2, 96 (52.27)	52
Staff Responsiveness	Patients who reported that they always received help as soon as they wanted	2014	25, 100 (67.8)	67
		2015	11, 100 (68.19)	67
Communication about Medicines	Patients who reported that staff always explained about medicine before giving it to them	2014	25, 100 (64.29)	64
		2015	1, 100 (64.73)	64
Discharge information	Patients who reported that yes they were given information about what to do during their recovery	2014	27, 100 (85.74)	86
		2015	50, 100 (86.49)	87
Cleanliness	Patients who reported that their room and bathroom were "Always" clean	2014	8, 100 (73.57)	73
		2015	7, 100 (73.49)	73
Quietness	Patients who reported that the area around their room was always quite	2014	0, 100 (61.4)	61
		2015	0, 100 (62.01)	62
Overall Rating	Patients who gave their hospital a rating of 9 or 10 on a scale from 0 to 10	2014	10, 100 (70.79)	71
		2015	26, 100 (71.29)	72
Recommendation	Patients who reported yes, they would definitely recommend the hospital	2014	6, 100 (71.1)	72
		2015	8, 100 (71.22)	72

Correlation Analysis (see Table 3 and 4.)

Data from VBP 2014 and 2015 revealed similar correlation pattern. Nursing communication exhibited positive correlation with all other 10 domains, and was strongly correlated with doctor communication, staff responsiveness, pain control, communication about meds, and overall rating (>0.75). Overall rating was also associated with all 10 other domains, and was strongly associated with nurse communication, care transition, and willingness to recommend the hospital.

Table 3. Correlation Matrix VBP 2014

2014	Clean	Nurse	Doc	Staff	Pain	Meds	D/C	Care	Rating	Quiet	Rec
Clean	1.00	0.66	0.52	0.70	0.53	0.56	0.34	0.53	0.597	0.49	0.45
Nurse		1.00	0.75	0.83	0.75	0.76	0.51	0.73	0.78	0.60	0.65
Doc			1.00	0.68	0.63	0.65	0.40	0.59	0.61	0.62	0.48
Staff				1.00	0.69	0.70	0.44	0.63	0.66	0.60	0.51
Pain					1.00	0.65	0.48	0.61	0.68	0.52	0.58
Meds						1.00	0.49	0.63	0.65	0.55	0.52
D/C							1.00	0.52	0.56	0.25	0.50
Care								1.00	0.76	0.47	0.72
Rating									1.00	0.54	0.88
Quiet										1.00	0.39
Rec											1.00

Table 4. Correlation Matrix VBP 2015

2015	Clean	Nurse	Doc	Staff	Pain	Meds	D/C	Care	Rating	Quiet	Rec
Clean	1.00	0.68	0.54	0.68	0.52	0.55	0.29	0.55	0.62	0.49	0.48
Nurse		1.00	0.75	0.81	0.73	0.70	0.41	0.72	0.75	0.60	0.62
Doc			1.00	0.67	0.62	0.61	0.29	0.60	0.62	0.61	0.50
Staff				1.00	0.65	0.64	0.35	0.63	0.65	0.60	0.51
Pain					1.00	0.58	0.35	0.60	0.63	0.50	0.56
Meds						1.00	0.37	0.59	0.59	0.51	0.51
D/C							1.00	0.47	0.50	0.16	0.46
Care								1.00	0.76	0.50	0.72
Rating									1.00	0.54	0.87
Quiet										1.00	0.41
Rec											1.00

Footnote:
Clean – Cleanliness
Nurse – Nurse Communication
Doc – Doctor Communication
Staff – Staff Responsiveness
Pain – Pain Control
Meds – Communication about Medicines
D/C – Discharge Information
Care – Transition Care
Rating – Overall Rating
Quiet – Quietness
Rec – Willingness to Recommend

State Performance

Cluster analysis was performed to classified state based on their performance. Based on the dendrogram, 5 different groups were created (Figure 2.). The HCAHPS mean of each domain in the clusters was compared to overall mean in each domain (Table 5.). Based on this comparison, the five groups were named overall excellent, overall good, overall fair, average,

and overall poor (Table 6.). 12 states were in the overall excellent group, and their performance was above the national HCAHPS domain mean scores. The overall good group performed mostly above the average score; however, hospitals in these states do not have good discharge planning (Discharge Information and Transition Care). 11 States were in the overall good cluster. The overall fair group consisted of 15 states with performance in Nurse Communication, Staff Responsiveness, Communication about Medicines, Discharge Information, and Cleanliness. In 5 states, they did not meet the goals and with the largest room to improve.

Figure 2. Dendrogram (5 Clusters)

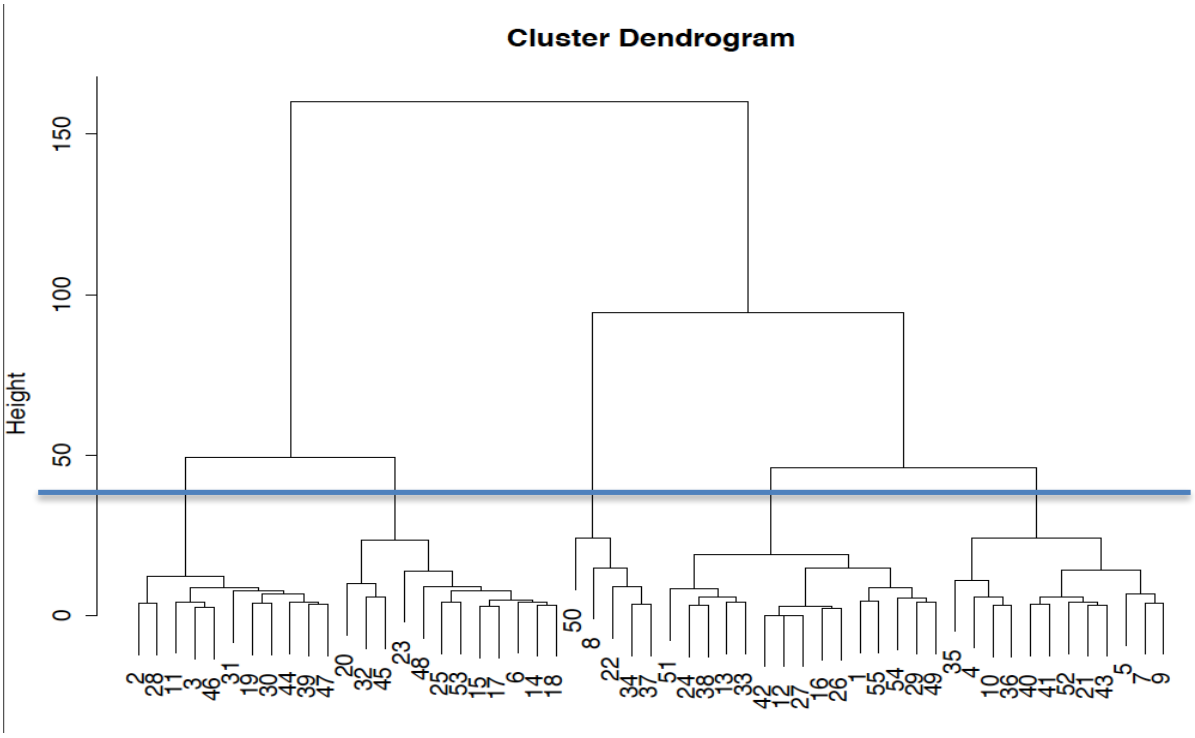


Table 5. Statewide HCAHPS Clustering

	1	2	3	4	5	Mean
Group Classification	Overall Excellent	Overall Good	Overall Fair	Average	Overall Poor	
Nurse Communication	81.17	80.09	79.15	77.63	74.33	79.09
Physician Communication	83.67	83.95	81.47	79.08	78.35	81.76
Staff Responsiveness	71.70	68.79	68.45	65.40	59.48	67.8
Pain Control	72.29	71.62	70.73	69.75	66.85	70.84
Communication about Medicines	66.82	65.39	64.68	62.49	58.75	64.29
Discharge Information	87.57	84.99	86.43	85.22	80.91	85.74
Transition Care	54.73	51.15	51.23	49.70	43.73	51.24
Quietness	64.13	66.69	59.70	55.52	53.77	61.4
Cleanliness	76.83	73.68	73.92	71.54	66.47	73.57
Willingness to Recommend	74.36	70.92	70.54	70.02	63.52	71.1
Overall Rating	74.54	71.04	70.22	68.50	61.89	70.79

Table 6. Clusters Breakdown

Cluster5	No. of States (N=55)	States
Overall Excellent	12 (22%)	CO, IA, ID, IN, KS, LA, ME, MN, NE, SD, UT, and WI
Overall Good	11 (20%)	AL, AR, GA, KY, MS, NC, ND, OK, SC, TN, and TX
Overall Fair	15 (27%)	AK, GU, HI, IL, MI, MO, MP, MT, NH, OH, PR, VA, VT, WV, and WY
Average	12 (22%)	AZ, CA, CT, DE, FL, MA, NM, NV, OR, PA, RI, and WA
Overall Poor	5 (9%)	DC, MD, NJ, NY, VI

Generalized Linear Model (see Appendix 2. for model selection)

A total of three models were built. The first model included all the variables as dependent variables. Physician Communication, Staff Responsiveness, and Communication about Medicines were not significant predictors of overall rating, and were removed in the subsequent models. The highest VIF was 5.95 for Nurse Communication due to the strong correlation with other domains. The removal of these three factors led to a reduced VIF for Nurse Communication (4.07) in Model 2. Correlation analysis also revealed that there was a strong correlation between Pain Control and Nurse Communication, and in Model 3, Pain Management was removed to test the impact. Upon comparing the null and residual deviance (336335, 41642), AIC (23291), and VIF (all <5), Model 2 was determined to have the best fit. The final model included the following domains: Nurse

Communication, Pain Control, Discharge Information, Care Transition, Willingness to Recommend, Cleanliness, and Quietness (Table 5.), and all the factors were highly significant.

Table 5. Regression Coefficients

Predictors[a]	Coefficient	95% Confidence Interval
Nurse Communication***	0.30	(0.27, 0.33)
Pain Control***	0.071	(0.047, 0.096)
Discharge Information***	0.14	(0.12, 0.17)
Care Transition***	0.053	(0.031, 0.074)
Cleanliness***	0.074	(0.058, 0.090)
Quietness***	0.080	(0.067, 0.093)
Willingness to Recommend***	0.54	(0.53, 0.55)

* p-value < 0.05

** p-value < 0.01

*** p-value < 0.001

a. This model was adjusted for state clusters

Logistic Regression Model (see Appendix 3. for model selection)

A binomial model was used to predict the proportion of patients who would rate the hospital with the highest possible rating, 9 or 10 out of a total of 100%. Similar process of predictor selection was implemented, and a total of 9 models were built. The first model consisted all the independent variables. Physician Communication was removed because it was strongly correlated with Nurse Communication (VIF = 5.54) and it was not a significant predictor. The VIF for Nurse Communication of the second model remained greater 5 (5.15), and in the next three models, domains that have high correlation with Nurse Communication, such as Pain Control, Staff Responsiveness, and Communication about Medicines, were removed one at a time to further reduce collinearity. All models successfully reduced the VIF number to under 5. Additional models were built to remove all and any combination of Pain Control, Staff Responsiveness, and Communication about Medicines. Based on VIF for Nurse Communication (4.77), null and residual deviance (17058.6, 2580.8), and AIC (24805), the final model consisted of Nurse Communication, Staff Responsiveness, Pain Control, Discharge Information, Care Transition, Cleanliness, Quietness, and Willingness to Recommend.

Table 6. Adjusted Odds Ratio for Overall Rating

Predictors[a]	Adj. Odds Ratio	95% confidence Interval
Nurse Communication***	1.012	(1.010, 1.015)
Staff Responsiveness**	1.002	(1.001, 1.004)
Pain Control**	1.003	(1.001, 1.005)
Discharge Information***	1.005	(1.003, 1.007)
Care Transition***	1.005	(1.003, 1.006)
Cleanliness***	1.004	(1.002, 1.005)
Quietness***	1.006	(1.005, 1.007)
Willingness to Recommend***	1.026	(1.025, 1.027)

* p-value < 0.05

** p-value < 0.01

*** p-value < 0.001

a. This model was adjusted for state clusters

Classification and Regression Tree Model

A regression tree was built to predict the percent of patients who would give the hospital a rating of 9 or 10. The original model consisted 17 nodes and used only two variables for splitting (Willingness to Recommend and Nurse Communication, Figure 2.). Two different methods were used to prune the tree to avoid overfitting: 1) finding the cp with the lowest cross-validation error estimates (Model 1), and 2) selecting the cp value based on the 1-SE rule (Model 2). Model 1 and Model 2 were notably more complicated than the original model, and their cp values were 0.00044 and 0.0019. Model 2 incorporated all variables with the exception of Physician Communication for splitting, and there were a total of 753 nodes (Figure 3.). Model 3 included Willingness to Recommend, Nurse Communication, Physician Communication, Staff Responsiveness, Pain Management, and Communication about Medicines for splitting and had 153 nodes (Figure 4.). All three models ranked the variables similarly in terms of importance, and the top three were Willingness to Recommend, Transition Care, and Nurse Communication.

Table 7. Variable Importance for Regression Tree Model

Model	Model 1	Model 2	Model 3
Optimization Method	Original	Minimize Error	1-SE
Willingness to Recommend	38	36	37
Transition Care	16	15	15
Nurse Communication	13	14	14
Pain Control	11	11	11
Communication about Medicines	8	8	8
Discharge Information	7	7	7
Staff Responsiveness	3	4	4
Physician Communication	2	2	2
Quietness	1	1	1
Cleanliness	1	1	1

Figure 2. Original Regression Tree Model

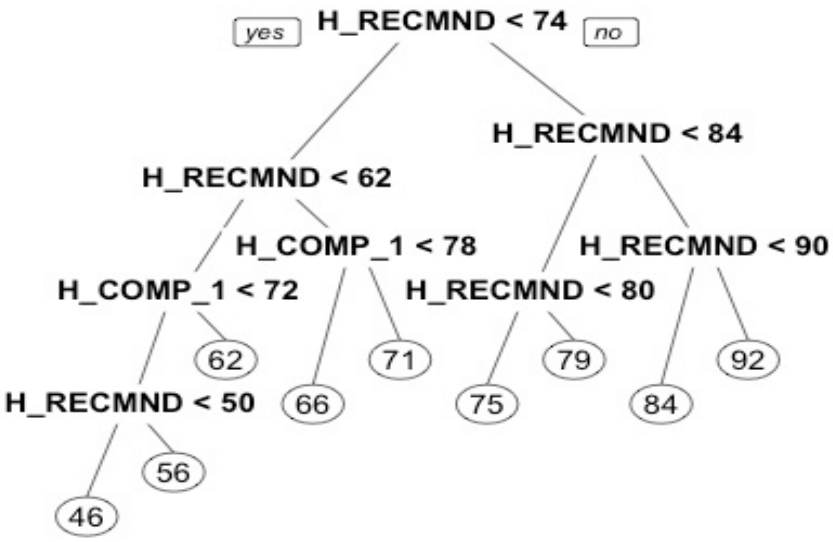


Figure 3. Pruned Regression Tree Model (Lowest Cross Validation Error)

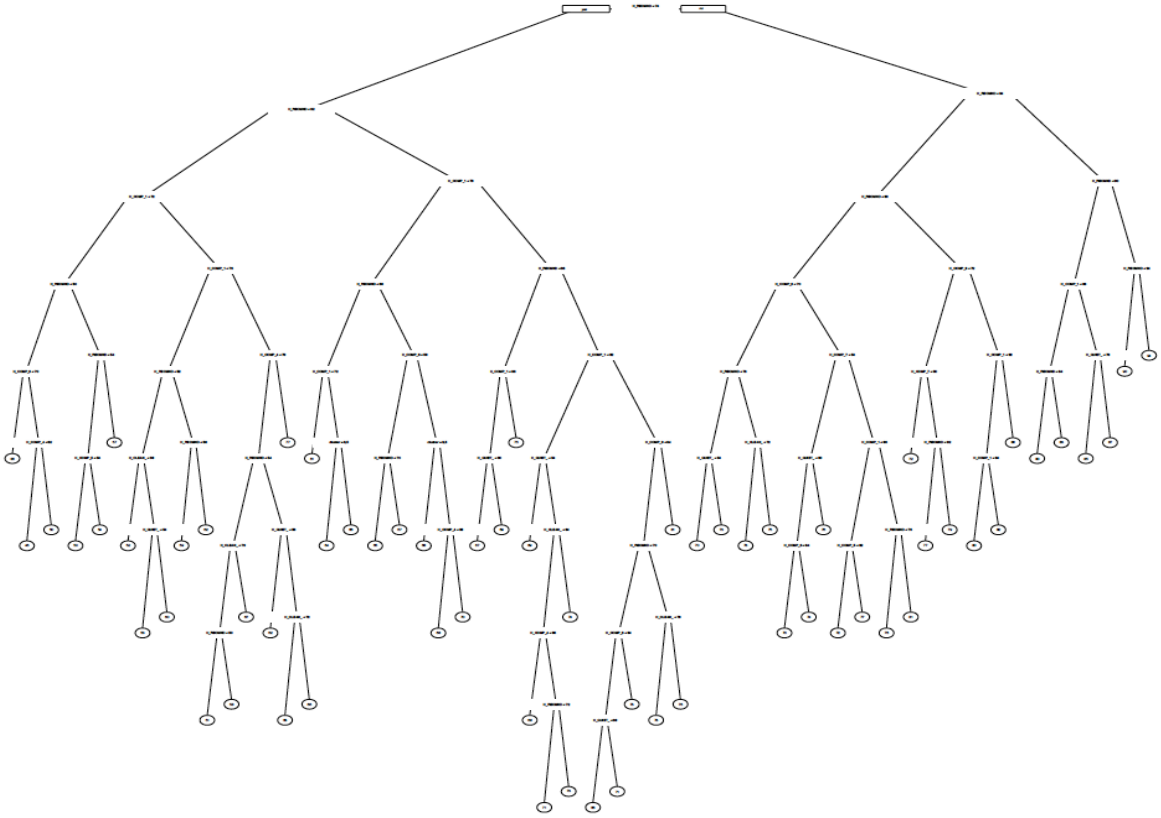
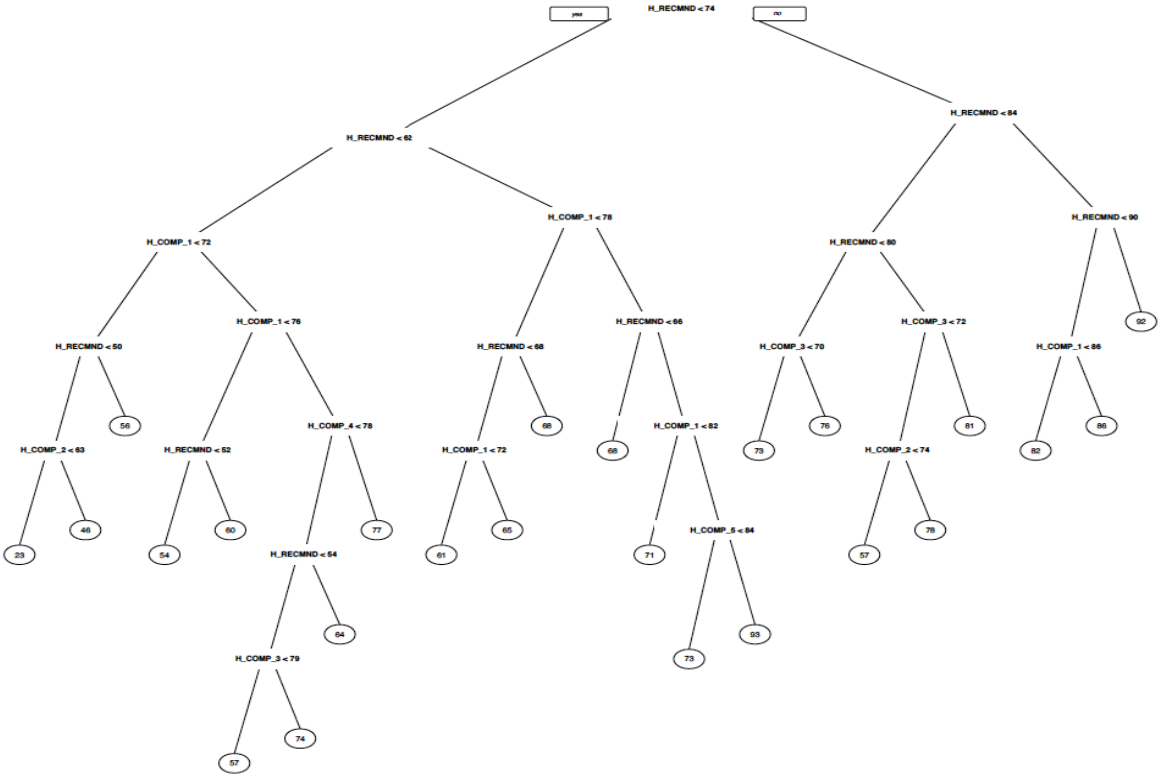


Figure 4. Pruned Regression Tree Model (1-SE Model)



Random Forest Model

The original model was built using all of the HCAHPS domains. The model selected Willingness to Recommend, Nurse Communication, and Transition Care as the most important predictors in the model (Table 8.). Based on the importance values, a threshold level was determined and any domain with an importance value that was below a 3% increase in error was removed from the second model. The second model included Willingness to Recommend, Nurse Communication, Staff Responsiveness, Pain Control, and Care Transition.

Table 8. Scaled Importance

Variable	% increase in Error
Willingness to Recommend	89.33
Nurse Communication	10.94
Transition Care	7.34
Staff Responsiveness	3.57
Pain Control	3.24
Communication about Medicines	2.67
Cleanliness	2.46
Physician Communication	2.39
Quietness	2.06
Discharge Information	1.54
State Cluster	0.16

Errors Comparison

Final models from each method were validated using VBP 2015 data, and Sum of Square Errors (SSEs) and Root-Mean Sum of Square Errors (RMSEs) were calculated for each model (Table 9.). Final linear model and random forest model were determined to provide the best prediction in terms of errors.

Table 9. Sum of Square Errors and Root-Mean Sum of Square Errors by Regression Models

Method	Model	SSE	RMSE
Linear	Nurse Communication, Pain Control, Discharge Information, Care Transition, Willingness to Recommend, Cleanliness, and Quietness	53060.44	3.38
Logistic	Nurse Communication, Staff Responsiveness, Pain Control, Discharge Information, Care Transition, cleanliness, Quietness, and Willingness to Recommend	56751.12	3.50
Tree	Model 1 (original)	90104.61	4.41
	Model 2 (Minimize Errors)	69555.43	3.87
	Model 3 (1-SE)	77193.35	4.08
Forest	Model 1 (Full Model)	53372.75	3.39
	Model 2 (Importance)	61149.19	3.63

DISCUSSION

Upon comparing the different models, we concluded that we can predict the percentages of patients that will give their hospital a 9 or 10 rating with a high probability using a linear model or a random forest model. In all the models, Nurse Communication and Willingness to Recommend were the key predictors. In terms of caregivers, while both Staff Responsiveness and Physician Communication were highly correlated with Nurse Communication, neither played an important role in determining patients' overall experience. Nurses spend the most time in direct patient care, and therefore, it is no surprise that patients' overall experience during a stay is heavily dependent upon nurses' performance. In many community hospitals, physicians may only spend limited time with the patients since most community physicians also have their private practices. In addition, most patients tend to have minimal interaction with supportive staff, such as administrators or engineers. However, nurses are often inundated with customer service requests that hinder their ability to provide quality care. For example, when the room is cold or dirty, patients often complain to the nurses. If the nurses are overwhelmed by other patients, they may not be able to direct the request to appropriate staff members. Hospitals need to establish appropriate support network and systems to allow nurses to focus on patient care and experience. Some solutions include interactive patient care system and patient rounding. Many hospitals have installed electronic interactive patient care system that allows concerns to be directly sent to the responsible departments. Hospitals have also included engineering department, Environmental Services (EVS), and others in director rounding to proactively address patients' need. Hospitals need to establish appropriate support network and system to allow nurses to focus on patient care and experience.

Discharge Information and Care Transition are also significant predictors of overall experience. This signifies the importance of not only inpatient services but also post-discharge care. Studies have

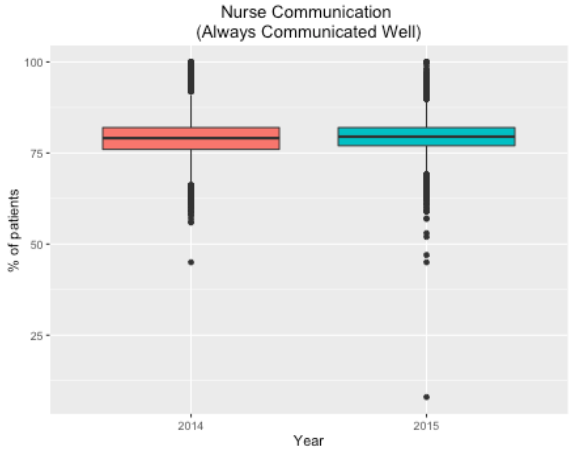
suggested that insufficient discharge instruction and education often result in readmission and mortality. With the recent emphasis of continuum of care in healthcare, hospitals are now focusing on strengthening transition from hospital to home through 1) linkage to post-hospital care and financial support, 2) medication and life style education (dietary and exercise), 3) signs and symptoms education, and 4) patient and family involvement in discharge care. The result from this study indicated by creating a seamless transition in and out of hospital, hospitals are not only reducing adverse outcomes but also increasing patient satisfaction.

The current study has a few limitations. This study data was cross-sectional, and therefore, we could not establish the casual relationship between HCAHPS domains and Overall Rating. In addition, the study used aggregate data from each hospital, and may suffer from ecological fallacy in making inference. Future studies should focus on using temporal and individual-level data to gain more in depth understanding of patient experience.

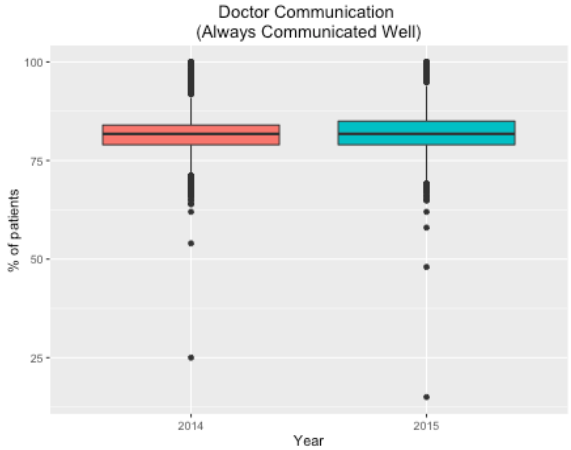
The results of this study indicated that compassionate staff, proper post-hospital care instruction/education, and high quality are at the core of patient care. Many hospital administrators have focused on facility renovation or upgrading as a patient experience initiative - some patients may associate aged facility with unsanitary/uncleaned. While facility first impression is important, in the resource scarce healthcare settings today, hospitals should focus on improving support network for nurses and post-discharge care linkage to optimize patient experience.

Appendix 1. HCAHPS Domain Box Plot VBP 2014 and VBP 2015

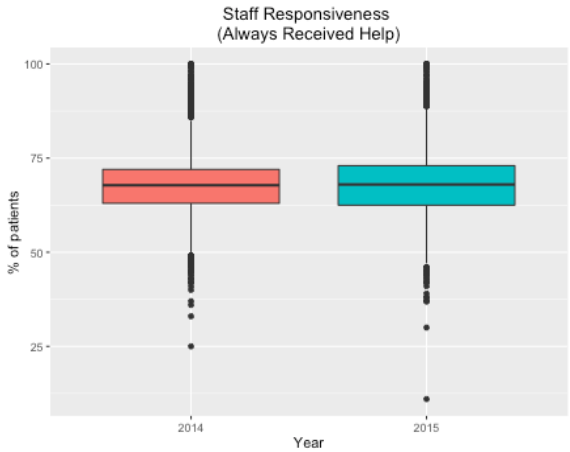
Nurse Communication



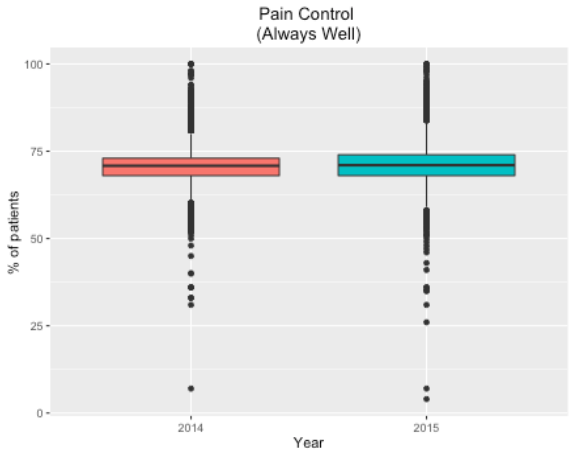
Doctor Communication



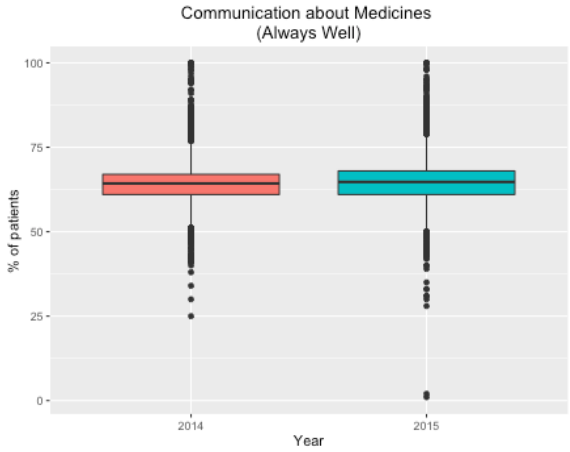
Staff Responsiveness



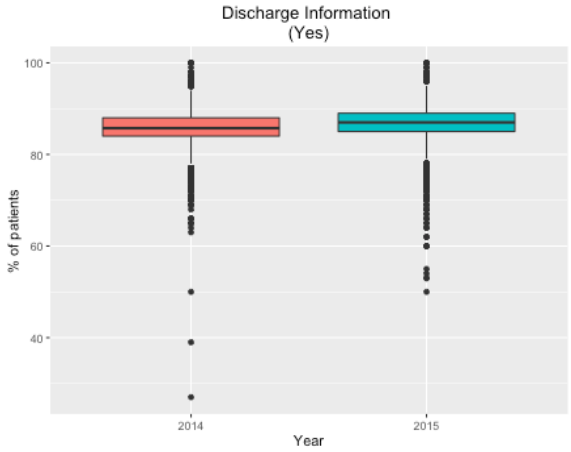
Pain Control



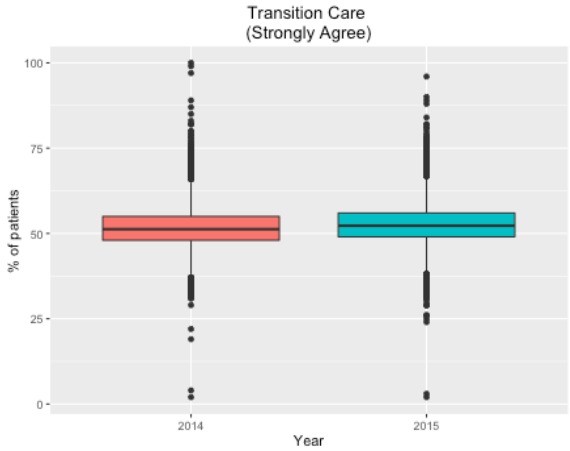
Communication about Medicines



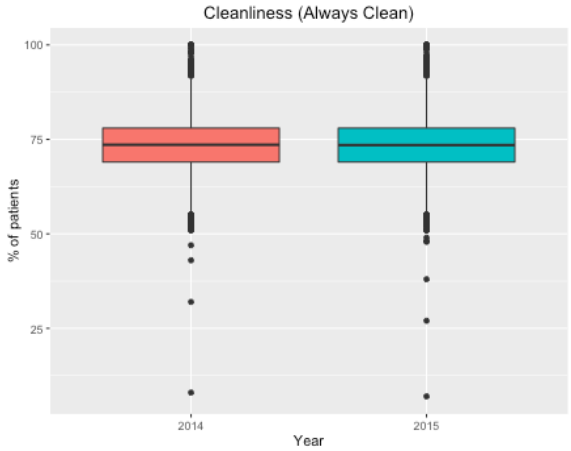
Discharge Inforamtion



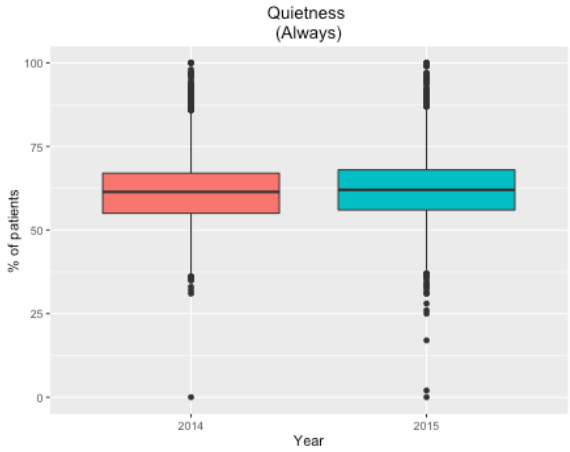
Transition Care



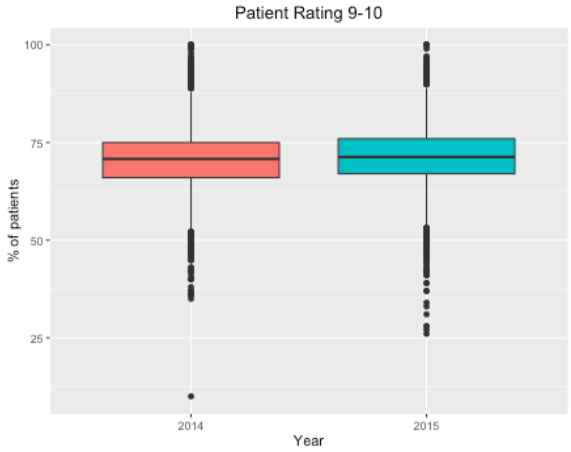
Cleanliness



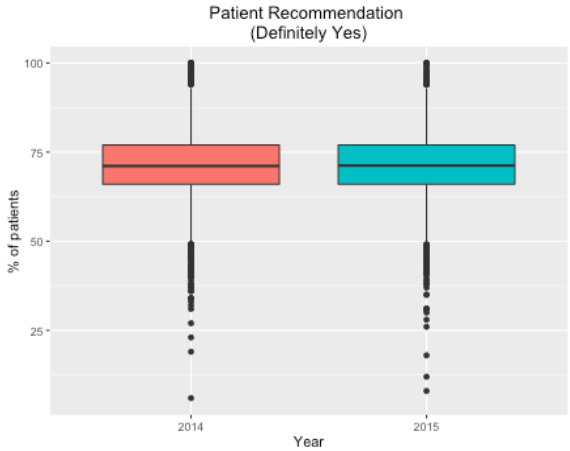
Quietness



Overall Rating



Patient Recommendation



Appendix 2. Model Building: Linear Model

Linear	Residual Deviance	AIC	Comments	Model Selected
Full Models	41571	23289	Highest VIF > 5 (Nurse, 5.95) Physician, Staff, and Meds were insignificant, and removed in the next model	
Nurse, Pain, D/C, Care, Cleanliness, Quietness, Recommend	41642	23291	All VIF < 5 All predictors were significant	V
Nurse, D/C, Care, Cleanliness, Quietness, Recommend	42530	23378	Further removal of pain management, because it was highly correlated with Nurse Comm.	

Appendix 3. Model Building: Logistic Model

Logistic	Residual Deviance	AIC	Comments	Model Selected
Full Models	2553.3	24789	Physician was insignificant, and removed VIF > 5 (Nurse, 5.54)	
Nurse, Staff, Pain, Meds, D/C, Care, Cleanliness, Quietness, Recommend	2553.3	24787	VIF > 5 (Nurse, 5.15) Begin to remove predictors that are highly correlated with Nurse Comm.	
Nurse, Pain, Meds, D/C, Care, Cleanliness, Quietness, Recommend	2559.4	24791	VIF < 5 (Nurse, 4.29) Removed Staff	
Nurse, Meds, D/C, Care, Cleanliness, Quietness, Recommend	2569.5	24799	VIF < 5 (Nurse, 3.78) Removed Staff and Pain	
Nurse, Pain, D/C, Care, Cleanliness, Quietness, Recommend	2566.4	24796	VIF < 5 (Nurse, 3.81) Removed Staff and Meds	
Nurse, Staff, Meds, D/C, Care, Cleanliness, Quietness, Recommend	2561.3	24793	VIF < 5 (Nurse, 4.80) Removed Pain	
Nurse, Staff, D/C, Care, Cleanliness, Quietness, Recommend	2568	24798	VIF < 5 (Nurse, 4.41) Removed Pain and Meds	
Nurse, Staff, Pain, D/C, Care, Cleanliness, Quietness, Recommend	2558.6	24790	VIF < 5 (Nurse, 4.83) Removed Meds	V
Nurse, D/C, Care, Cleanliness, Quietness, Recommend	2578.6	24806	VIF < 5 (Nurse, 3.17) Removed Meds, Staff, and Pain	

HCAHPS Survey

Nurse Communication	1	During this hospital stay, how often did nurses treat you with courtesy and respect?
	2	During this hospital stay, how often did nurses listen carefully to you?
	3	During this hospital stay, how often did nurses explain things in a way you could understand?
	4	During this hospital stay, after you pressed the call button, how often did you get help as soon as you wanted it?
Physician Communication	5	During this hospital stay, how often did doctors treat you with courtesy and respect?
	6	During this hospital stay, how often did doctors listen carefully to you?
	7	During this hospital stay, how often did doctors explain things in a way you could understand?
Environment	8	During this hospital stay, how often were your room and bathroom kept clean?
	9	During this hospital stay, how often was the area around your room quiet at night?
Staff Responsiveness	10	During this hospital stay, did you need help from nurses or other hospital staff in getting to the bathroom or in using a bedpan?
	11	How often did you get help in getting to the bathroom or in using a bedpan as soon as you wanted?
Pain Control	12	During this hospital stay, did you need medicine for pain?
	13	During this hospital stay, how often was your pain well controlled?
	14	During this hospital stay, how often did the hospital staff do everything they could to help you with your pain?
Communication about Medicines	15	During this hospital stay, were you given any medicine that you had not taken before?
	16	Before giving you any new medicine, how often did hospital staff tell you what the medicine was for?
	17	Before giving you any new medicine, how often did hospital staff describe possible side effects in a way you could understand?
Discharge Information	18	After you left the hospital, did you go directly to your own home, to someone else's home, or to another health facility?
	19	During this hospital stay, did doctors, nurses or other hospital staff talk with you about whether you would have the help you needed when you left the hospital?
	20	During this hospital stay, did you get information in writing about what symptoms or health problems to look out for after you left the hospital?
Overall Rating	21	Using any number from 0 to 10, where 0 is the worst hospital possible and 10 is the best hospital possible, what number would you use to rate this hospital during your stay?
Willingness to Recommend	22	Would you recommend this hospital to your friends and family?
Care Transition	23	During this hospital stay, staff took my preferences and those of my family or caregiver into account in deciding what my health care needs would be when I left.
	24	When I left the hospital, I had a good understanding of the things I was responsible for in managing my health.
	25	When I left the hospital, I clearly understood the purpose for taking each of my medications.
Demographics	26	During this hospital stay, were you admitted to this hospital through the Emergency Room?
	27	In general, how would you rate your overall health?

	28	In general, how would you rate your overall mental or emotional health?
	29	What is the highest grade or level of school that you have completed?
	30	Are you of Spanish, Hispanic or Latino origin or descent?
	31	What is your race? Please choose one or more.
	32	What language do you mainly speak at home?