

PATIENT EXPERIENCE

IMPROVING PATIENT ENGAGEMENT IN HOSPITAL SETTINGS

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OUTLINE

- Patient Satisfaction
 - Healthcare quality and financial impact (VBP)
 - HCAHPS
 - Objectives
- Methods
 - HCAHPS methodology (CMS publically reporting data)
 - Model building
- Results
 - Trends and correlation
 - State cluster
 - Model discussion and comparison
- Discussion
 - Implications for patient experience
 - Future studies

PATIENT EXPERIENCE

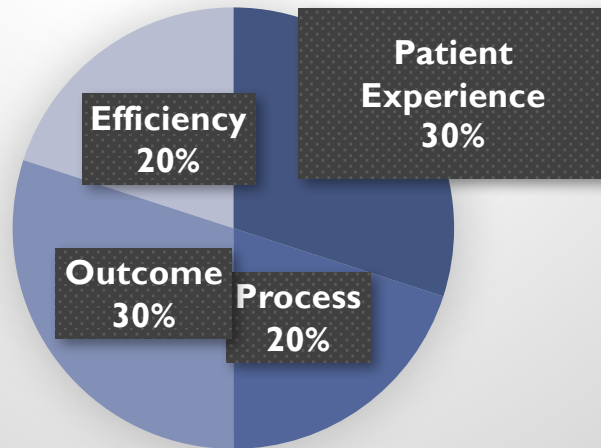
- Patient's perspective of hospital care
 - Summation of all the interactions patients experienced in the hospital (registration, EVS, to nurses and physicians)
- Healthcare Consumerism
 - Patient satisfaction/customer service
 - A paradigm shift from physician-driven to patient-centered care
 - Engaging patients and families in healthcare decision making (Behavior is the most difficult thing to change)
- Impact on patient care
 - Better treatment adherence, outcomes, and medical information retention

HEALTHCARE QUALITY AND FINANCIAL IMPACT

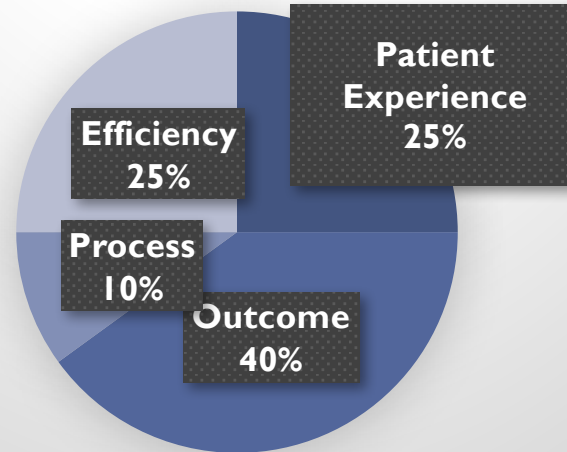
- Affordable Care Act (2010)
 - Increase healthcare coverage
 - Reduce healthcare cost (2014, 3 trillion)
- Value-Based Purchasing
 - Centers for Medicare and Medicaid Services, the largest hospital payer
 - Linkage between quality of care to reimbursement (moving away from fee-for-service)
 - A proportion of hospitals annual reimbursement is allocated based on the quality of care provided by each hospital
 - Officially started in 2013
 - **Patient experience has been a constant quality indicator in VBP**
 - The indicators change every year
 - Usually contains the following domains: Outcomes (readmissions and mortality), efficiency (Medicare spending),

VBP ALLOCATION

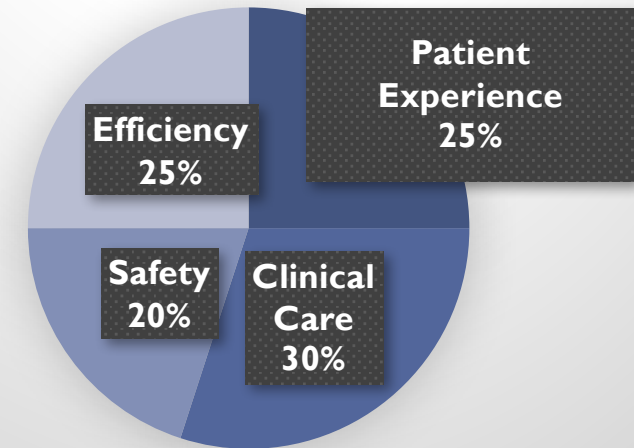
VBP 2015



VBP 2016



VBP 2017



**While indicators have changed through out the years,
patient experience has remained constant**

OBJECTIVE

- Hospital administrators have devoted copious resources to improve patient experience
 - Customer service education
 - Facility upgrades
 - Quiet time
- Many hospitals are still performing below the benchmark
- 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

-HCHAPS

- Hospital Consumer Assessment of Healthcare Providers and Services (HCAHPS) Survey
 - Hospitals or CMS-approved vendor
 - Four different modes:
 - Phone
 - Mail
 - Phone + mail
 - Active interactive voice recognition (IVR)
 - Randomly selected sample
 - 48 hours to 6 weeks after discharge
 - Allow several follow-up phone calls
 - Conducted in patients' language spoken at home
 - A total of 32 questions (substantive questions, congressional mandate, and demographics)

HOSPITAL CONSUMER ASSESSMENT OF HEALTHCARE PROVIDERS AND SERVICES (HCAHPS)

Type of Item	No.	Publically Reported Data	Example
Composite Items	1	Nurse Communication	Courtesy, respect,
	2	Doctor Communication	Listen carefully, explain things
	3	Pain Management	Frequency of pain well-controlled
	4	Care Transition	Understanding of care outside of hospital
	5	Responsiveness of Hospital Staff	Frequency of getting help
	6	Communication about Medicines	Possible side effects
	7	Discharge Information	Discharge information in writing
Individual Items	8	Cleanliness	Room condition
	9	Quietness	Room condition
Global Items	10	Overall Rating of Hospital	0 - 10
	11	Willingness to Recommend Hospital	Would you recommend the hospital

HCAHPS SURVEY

- Likert-type Responses –
 - Example, During this hospital stay, how often did nurses treat you with courtesy and respect?
 1. Never (strongly disagree)
 2. Sometimes (disagree)
 3. Usually (agree)
 4. Always (strongly agree)
- Yes/no Responses
- Overall rating: 1-10 (9 or 10 were included)
- Top box score: the percentage of patients who responded always

DEMOGRAPHIC QUESTIONS

- Patient Origin – did the patient come in from emergency department
- Overall Health
- Education Level
- Ethnicity
- Race
- Language Spoken at Home
- demographic questions were included to adjust for the mix of patients across for the hospital for publically reported data

PUBLICALLY REPORTED DATA

- Hospital Compare Datasets (<https://data.medicare.gov/data/hospital-compare>)
 - VBP 2013 was excluded because Care Transition domain was added in VBP 2014
- VBP 2014 data (performance period: 1/1/2013-12/31/2013)
- VBP 2015 (performance period: 7/1/2014 – 6/30/15)
 - This was the most updated dataset at the time of extraction
- Data from 50 states, District of Columbia (DC), Guam, Northern Mariana Islands, Puerto Rico, and Virgin Islands were included
- Missing data – imputed using means from each domain

METHODS

-PREDICTIVE MODEL BUILDING

- Overall Rating of hospital sums up the accumulation of all occurrences and encounters with hospital staff throughout patients' continuum of care (key performance indicator)
 - Truven Top 100 hospitals and 15 health systems methodology
- Predictive models were built to predict the percent of patients who gave their hospital a 9 or 10 rating using other HCAHPS domains
 - Generalized linear model
 - Binomial regression (logistic)
 - Regression tree
 - Random forest
 - R version 3.2.3
- VBP 2014 data was used as the training dataset
- VBP 2015 data was used to validate the model

Independent Variables

- Nurse Communication
- Doc Communication
- Staff Responsiveness
- Pain Control
- Communication about Meds
- Discharge Information
- Care Transition
- Willingness to Recommend
- Cleanliness
- Quietness

Dependent Variable

- Overall Rating (9 or 10)

RESULTS -TRENDS

- Overall all hospitals improved from VBP 2014 to VBP 2015
- Steadily improving or minor change:
 - Discharge Information
 - Nurse Communication
 - Doctor Communication
 - Pain Control
 - Overall Rating
 - Willingness to recommend
- Weaknesses:
 - Cleanliness is the only domain that did not show improvement (73.57% to 73.49%)
 - Care Transition (~50%)
 - Most improvement
 - Quietness (~60%)
 - Staff Responsiveness (~60%)
 - Communication about Medicines (~60%)

RESULTS

- CORRELATION ANALYSIS

- Nurse Communication was strongly correlated with Doctor Communication, Staff Responsiveness, Pain Control, Communication about Medes, and Overall Rating
- Transition Care was strongly related to Overall Rating
- Willingness to Recommend was strongly related to Overall Rating

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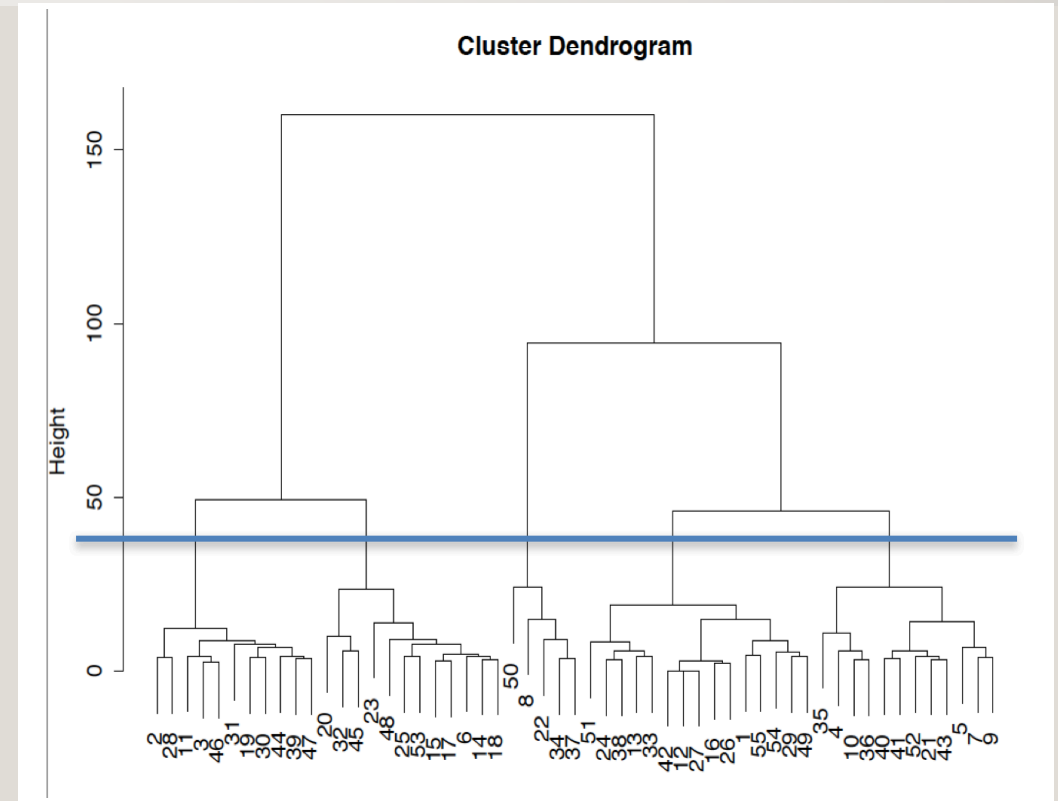
RESULTS

- STATE CLUSTER

- The data was already adjusted for patient mixed
- The performance is sometimes depended on state-level infrastructure and support
 - Training and support provided by the state
- There are over 50 unique locations – too cumbersome to adjust
- Conducted a hierarchical cluster analysis to re-categorize them into smaller numbers of groups

STATE CLUSTER

- 5 groups
 - Overall Excellent (all HCAHPS domains above average) - 12
 - Overall Good (mostly above average except Discharge Information and Transition Care) - 11
 - Overall Fair (5 domains above average) - 15
 - Average (all domains around average) - 12
 - Overall Poor (all domains significantly below average) - 5



GENERALIZED LINEAR MODEL

- Dependent variable: Overall Rating (% of patients who gave the hospital a 9 or 10 rating)
- R: Glm(family = gaussian)
 - Lm: reduction of errors
 - Glm: distribution centric (applies to a wider data)
- Variance Inflation Factor, Correlation Coefficient, and R^2 were used for model selection

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)

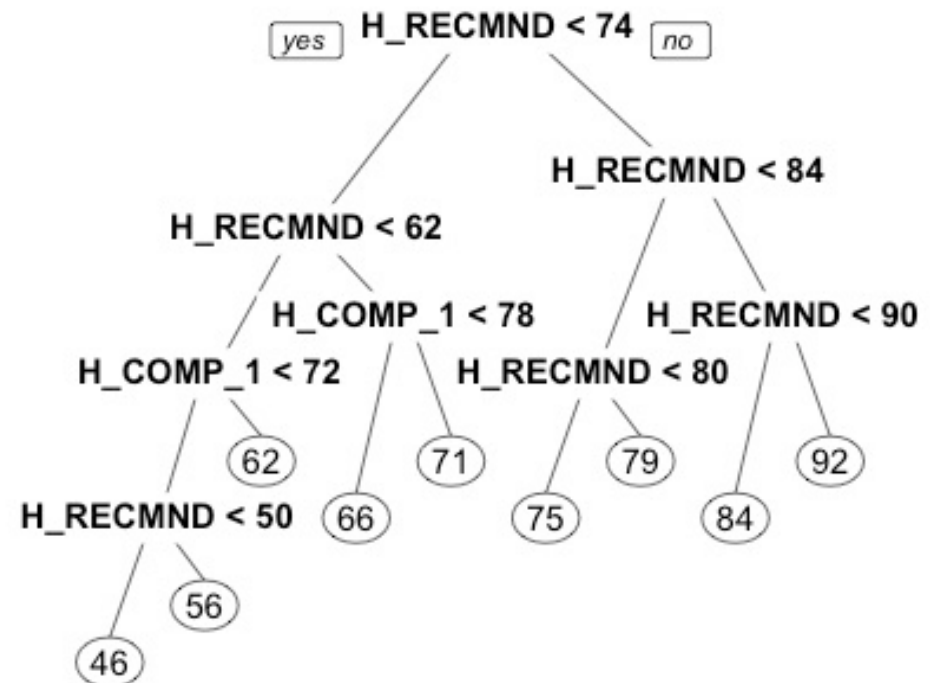
BINOMIAL REGRESSION MODEL

- Dependent variable:
 - the proportion of patients who would rate the hospital with the highest possible rating, 9 or 10 out of a total of 100%
 - Overall Rating vs. Opportunity (100-Overall Rating): Binomial
- Variance Inflation Factor, Correlation Coefficient, and R^2 were used for model selection

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)

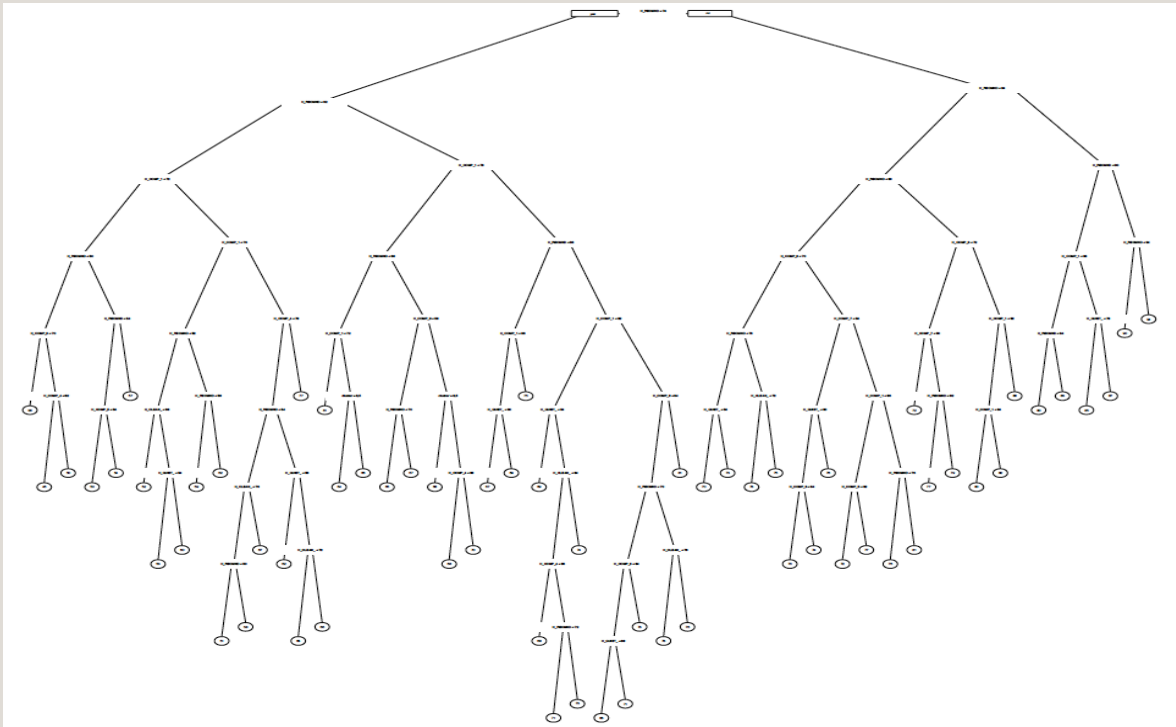
REGRESSION TREE ORIGINAL MODEL

- Rpart package in R
- The model consisted of 17 nodes
- Only used Willingness to recommend and Nursing Communication for splitting
- Complexity parameter (Cp) was used for pruning:
 - Cp with the lowest relative error
 - 1-SE rule – lowest cp + SE
- All three models:
 - Top three important variables: Willingness to Recommend, Care Transition, and Nursing Communication

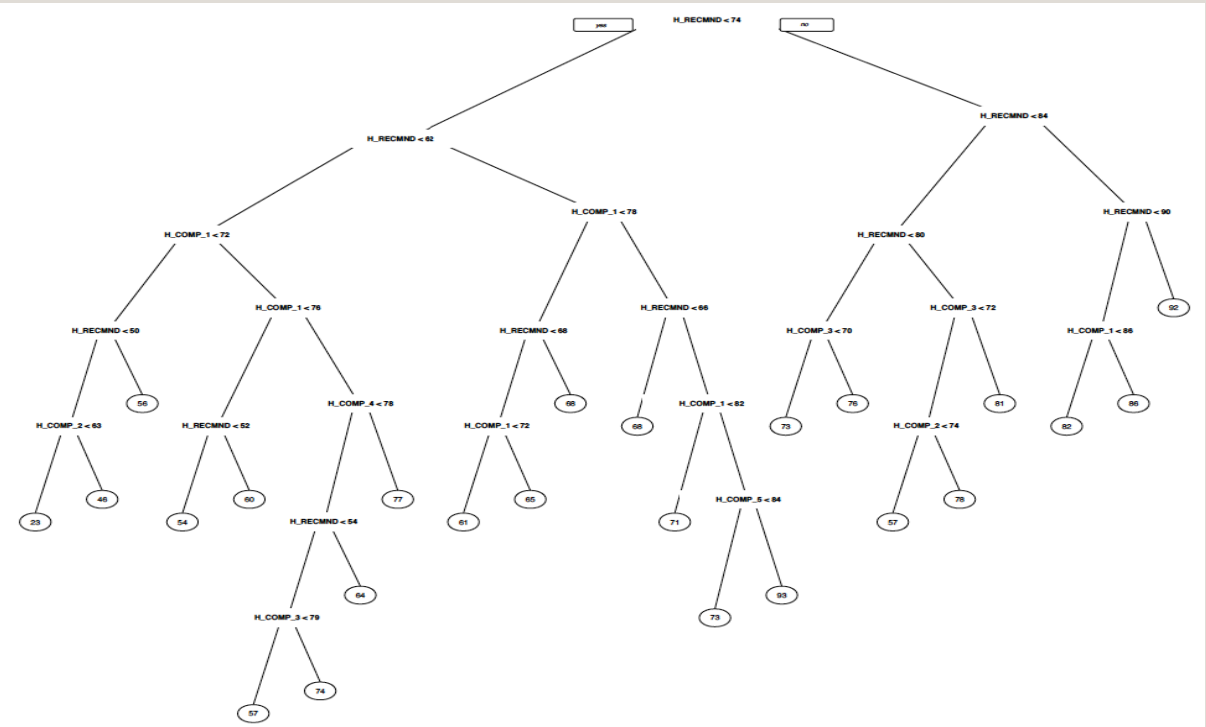


REGRESSION TREE -PRUNED MODEL

LOWEST REL ERROR



I-SE



RANDOM FOREST

- Tree models tend to over-fit and random forest provides a more accurate prediction
- randomForest in R
- 2 models
 - Full model
 - Threshold level of 3.0 importance level

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

VALIDATION WITH VBP 2015 DATA

- 2 indicators were used
 - Sum of Square Errors (SSEs)
 - Root-Mean Sum of Square Errors (RMSEs)

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 (I-SE)	77193.35	4.08
Forest	Model 1 (Full Model)	53372.75	3.39
	Model 2 (Importance)	61149.19	3.63

DISCUSSION

-MODEL SELECTION

- 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:
 - Generalized Linear model (RMSE = 3.38)
 - Random Forest model (RMSE = 3.39)

DISCUSSION

- CAREGIVERS

- For all the models, Nursing Communication is one of the most significant predictor
 - Nurses spend the most time in direct patient care
 - Physician Communication and Staff Responsiveness remained largely unimportant in overall patient experience
 - Physician – rounds and call nurses for order
 - Staff – patients mostly complain to the nurses: inundated with customer service requests (coldness, hotness, hunger)
 - We cannot expect nurses to do everything - their main function must be patient care
 - Overwhelmed with patient care (understaffed)
 - Inundated with customer service requests
 - Delayed in services
 - Reduced patient satisfaction

DISCUSSION

- CAREGIVERS

- Hospitals need to establish appropriate support network and systems to allow nurses to focus on patient care and experience.
 - Staff/director Rounding - involving everyone in patient care
 - More frequent
 - Engage different departments
 - Proactively addressing patients' needs
 - Interactive patient care system
 - Kaiser – in-room computers that empower patients to express their concerns
 - These complaints then are sent to the appropriate staff directly
 - Room temperature -> engineering department

DISCUSSION

- CARE CONTINUUM

- Discharge Information and Care Transition are also significant predictors
 - Patients don't care just about their inpatient experience but their care after discharge
 - Strong association with readmission or mortality
- A paradigm shift from focusing on episode of care to care continuum
 - The need to create a seamless transition for patients in and out of hospitals:
 - Linkage to post-hospital care and financial support
 - Medication and life style education (dietary and exercise)
 - Signs and symptoms education
 - Patient and family involvement in discharge care

LIMITATIONS

- Cross sectional – lack of any causation
- Aggregate level data – hospital level
 - Ecological fallacy
 - Future studies need to focus on using individual-level data to understand patient experience

FUTURE SUGGESTIONS

- Compassionate staff and appropriate discharge education and linkage to care are the keys to improving patient experience
 - A lot of administrators are focusing on the wrong thing – renovation projects
 - While first impression is important, the environmental factors did not play an important role in overall patient experience.
- Two main suggestions:
 - Establish a support network for nurses to focus on patient care and experience
 - Create a seamless transition in and out of hospitals for patients

THANK YOU

- Questions or Comments?