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ORIGINAL RESEARCH

Changes in Patient Satisfaction Related to Hospital Renovation: Experience With a New Clinical Building

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IMPORTANCE: There is an increasing trend toward designing hospitals with patient-centered features like reduced noise, improved natural light, visitor friendly facilities, well-decorated rooms, and hotel-like amenities. It has also been suggested that because patients cannot reliably distinguish positive experiences with the physical environment from positive experience with care, an improved hospital environment leads to higher satisfaction with physicians, nursing, food service, housekeeping, and higher overall satisfaction.

OBJECTIVE: To characterize changes in patient satisfaction that occurred when clinical services (comprised of stable nursing, physician, and unit teams) were relocated to a new clinical building with patient-centered features. We hypothesized that new building features would positively impact provider, ancillary staff, and overall satisfaction, as well as improved satisfaction with the facility.

DESIGN: Natural experiment utilizing a pre-post design with concurrent controls.

SETTING: Academic tertiary care hospital.

PARTICIPANTS: We included all patients discharged from 12 clinical units that relocated to the new clinical building who returned surveys in the 7.5-month period following the move. Premove baseline data were captured from the year prior to the move. Patients on unmoved clinical units who returned satisfaction surveys served as concurrent controls.

EXPOSURE: Patient-centered design features incorporated into the new clinical building. All patients during the baseline period and control patients during the study period were located in usual patient rooms with standard hospital amenities.

MAIN OUTCOMES AND MEASURES: The primary outcome was satisfaction scores on the Press Ganey and Hospital Consumer Assessment of Healthcare Providers and Systems survey, dichotomized at highest category versus lower categories. We performed logistic regression to identify predictors of "top-box" scores.

RESULTS: The move was associated with improved room- and visitor-related satisfaction without significant improvement in satisfaction with clinical providers, ancillary staff, and only 1 of 4 measures of overall satisfaction improved. The most prominent increase was with pleasantness of décor (33.6% vs 64.8%) and visitor accommodation and comfort (50.0% vs 70.3%).

CONCLUSION AND RELEVANCE: Patients responded positively to pleasing surroundings and comfort, but were able to discriminate their experiences with the hospital environment from those with physicians and nurses. The move to a new building had significant impact on only 1 of the 4 measures of overall patient satisfaction, as clinical care is likely to be the most important determinant of this outcome. Hospital administrators should not use outdated facilities as an excuse for suboptimal provider satisfaction scores. *Journal of Hospital Medicine* 2015;10:165–171. © 2015 Society of Hospital Medicine

Hospitals are expensive and complex facilities to build and renovate. It is estimated $200 billion is being spent in the United States during this decade on hospital construction and renovation, and further expenditures in this area are expected.[1] Aging hospital infrastructure, competition, and health system expansion have motivated institutions to invest in renovation and new hospital building construction.[2–7] There is a trend toward patient-centered design in new hospital construction. Features of this trend include same-handed design (ie, rooms on a unit have all beds oriented in the same direction and do not share headwalls); use of sound absorbent materials to reduced ambient noise[7–9]; rooms with improved view and increased natural lighting to reduce anxiety, decrease delirium, and increase sense of wellbeing[10–12]; incorporation of natural elements like gardens, water features, and art[12–18]; single-patient rooms to reduce transmission of infection and enhance privacy and visitor comfort[7,19,20]; presence of comfortable waiting rooms and visitor accommodations to enhance comfort and family participation[21–23]; and hotel-like amenities such as on-demand entertainment and room service menus.[24,25]

There is a belief among some hospital leaders that patients are generally unable to distinguish their positive experience with a pleasing healthcare environment from their positive experience with care, and thus

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improving facilities will lead to improved satisfaction across the board.[26,27] In a controlled study of hospitalized patients, appealing rooms were associated with increased satisfaction with services including housekeeping and food service staff, meals, as well as physicians and overall satisfaction.[26] A 2012 survey of hospital leadership found that expanding and renovating facilities was considered a top priority in improving patient satisfaction, with 82% of the respondents stating that this was important.[27]

Despite these attitudes, the impact of patient-centered design on patient satisfaction is not well understood. Studies have shown that renovations and hospital construction that incorporates noise reduction strategies, positive distraction, patient and caregiver control, attractive waiting rooms, improved patient room appearance, private rooms, and large windows result in improved satisfaction with nursing, noise level, unit environment and cleanliness, perceived wait time, discharge preparedness, and overall care.[7,19,20,23,28] However, these studies were limited by small sample size, inclusion of a narrow group of patients (eg, ambulatory, obstetric, geriatric rehabilitation, intensive care unit), and concurrent use of interventions other than design improvement (eg, nurse and patient education). Many of these studies did not use the ubiquitous Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) and Press Ganey patient satisfaction surveys.

We sought to determine the changes in patient satisfaction that occurred during a natural experiment, in which clinical units (comprising stable nursing, physician, and unit teams) were relocated from an historic clinical building to a new clinical building that featured patient-centered design, using HCAHPS and Press Ganey surveys and a large study population. We hypothesized that new building features would positively impact both facility related (eg, noise level), non–facility related (eg, physician and housekeeping service related), and overall satisfaction.

METHODS

This was a retrospective analysis of prospectively collected Press Ganey and HCAPHS patient satisfaction survey data for a single academic tertiary care hospital.[29] The research project was reviewed and approved by the institutional review board.

Participants

All patients discharged from 12 clinical units that relocated to the new clinical building and returned patient satisfaction surveys served as study patients. The moved units included the coronary care unit, cardiac step down unit, medical intensive care unit, neuro critical care unit, surgical intensive care unit, orthopedic unit, neurology unit, neurosurgery unit, obstetrics units, gynecology unit, urology unit, cardiothoracic surgery unit, and the transplant surgery and renal transplant unit. Patients on clinical units that did not move served as concurrent controls.

Exposure

Patients admitted to the new clinical building experienced several patient-centered design features. These features included easy access to healing gardens with a water feature, soaring lobbies, a collection of more than 500 works of art, well-decorated and light-filled patient rooms with sleeping accommodations for family members, sound-absorbing features in patient care corridors ranging from acoustical ceiling tiles to a quiet nurse-call system, and an interactive television network with Internet, movies, and games. All patients during the baseline period and control patients during the study period were located in typical patient rooms with standard hospital amenities. No other major patient satisfaction interventions were initiated during the pre- or postperiod in either arm of the study; ongoing patient satisfaction efforts (such as unit-based customer care representatives) were deployed broadly and not restricted to the new clinical building. Clinical teams comprised of physicians, nurses, and ancillary staff did not change significantly after the move.

Time Periods

The move to new clinical building occurred on May 1, 2012. After allowing for a 15-day washout period, the postmove period included Press Ganey and HCAHPS surveys returned for discharges that occurred during a 7.5-month period between May 15, 2102 and December 31, 2012. Baseline data included Press Ganey and HCAHPS surveys returned for discharges in the preceding 12 months (May 1, 2011 to April 30, 2012). Sensitivity analysis using only 7.5 months of baseline data did not reveal any significant difference when compared with 12-month baseline data, and we report only data from the 12-month baseline period.

Instruments

Press Ganey and HCAHPS patient satisfaction surveys were sent via mail in the same envelope. Fifty percent of the discharged patients were randomized to receive the surveys. The Press Ganey survey contained 33 items covering across several subdomains including room, meal, nursing, physician, ancillary staff, visitor, discharge, and overall satisfaction. The HCAHPS survey contained 29 Centers for Medicare and Medicaid Services (CMS)-mandated items, of which 21 are related to patient satisfaction. The development and testing and methods for administration and reporting of the HCAHPS survey have been previously described.[30,31] Press Ganey patient satisfaction survey results have been reported in the literature.[32,33]

Outcome Variables

Press Ganey and HCAHPS patient satisfaction survey responses were the primary outcome variables of the

study. The survey items were categorized as facility related (eg, noise level), non–facility related (eg, physician and nursing staff satisfaction), and overall satisfaction related.

Covariates

Age, sex, length of stay (LOS), insurance type, and all-payer refined diagnosis-related group–associated illness complexity were included as covariates.

Statistical Analysis

"Percent top-box" scores were calculated for each survey item as the percent of patients who responded "very good" for a given item on Press Ganey survey items and "always" or "definitely yes" or "9" or "10" on HCAHPS survey items. CMS utilizes "percent top-box scores" to calculate payments under the Value Based Purchasing (VBP) program and to report the results publicly. Numerous studies have also reported percent top-box scores for HCAHPS survey results.[31–34]

Odds ratios of premove versus postmove percentage of top-box scores, adjusted for age, sex, LOS, complexity of illness, and insurance type were determined using logistic regression for the units that moved. Similar scores were calculated for unmoved units to detect secular trends. To determine whether the differences between the moved and unmoved units were significant, we introduced the interaction term "(moved vs unmoved unit status) × (pre- vs postmove time period)" into the logistic regression models and examined the adjusted *P* value for this term. All statistical analysis was performed using SAS Institute Inc.'s (Cary, NC) JMP Pro 10.0.0.

RESULTS

The study included 1648 respondents in the moved units in the baseline period (ie, units designated to move to a new clinical building) and 1373 respondents in the postmove period. There were 1593 respondents in the control group during the baseline period and 1049 respondents in the postmove period. For the units that moved, survey response rates were 28.5% prior to the move and 28.3% after the move. For the units that did not move, survey response rates were 20.9% prior to the move and 22.7% after the move. A majority of survey respondents on the nursing units that moved were white, male, and had private insurance (Table 1). There were no significant differences between respondents across these characteristics between the pre- and postmove periods. Mean age and LOS were also similar. For these units, there were 70.5% private rooms prior to the move and 100% after the move. For the unmoved units, 58.9% of the rooms were private in the baseline period and 72.7% were private in the study period. Similar to the units that moved, characteristics of the respondents on the unmoved units also did not differ significantly in the postmove period.

TABLE 1. Patient Characteristics at Baseline and Postmove By Unit Status

	Moved Units (N = 3,021)			Unmoved Units (N = 2,642)		
Patient demographics	Pre	Post	*P* Value	Pre	Post	*P* Value
White	75.3%	78.2%	0.07	66.7%	68.5%	0.31
Mean age, y	57.3	57.4	0.84	57.3	57.1	0.81
Male	54.3%	53.0%	0.48	40.5%	42.3%	0.23
Self-reported health						
Excellent or very good	54.7%	51.2%	0.04	38.7%	39.5%	0.11
Good	27.8%	32.0%		29.3%	32.2%	
Fair or poor	17.5%	16.9%		32.0%	28.3%	
Self-reported language						
English	96.0%	97.2%	0.06	96.8%	97.1%	0.63
Other	4.0%	2.8%		3.2%	2.9%	
Self-reported education						
Less than high school	5.8%	5.0%	0.24	10.8%	10.4%	0.24
High school grad	46.4%	44.2%		48.6%	45.5%	
College grad or more	47.7%	50.7%		40.7%	44.7%	
Insurance type						
Medicaid	6.7%	5.5%	0.11	10.8%	9.0%	0.32
Medicare	32.0%	35.5%		36.0%	36.1%	
Private insurance	55.6%	52.8%		48.0%	50.3%	
Mean APRDRG complexity*	2.1	2.1	0.09	2.3	2.3	0.14
Mean LOS	4.7	5.0	0.12	4.9	5.0	0.77
Service						
Medicine	15.4%	16.2%	0.51	40.0%	34.5%	0.10
Surgery	50.7%	45.7%		40.1%	44.1%	
Neurosciences	20.3%	24.1%		6.0%	6.0%	
Obstetrics/gynecology	7.5%	8.2%		5.7%	5.6%	

NOTE: **Abbreviations:** APRDRG, all-payer refined diagnosis-related group; LOS, length of stay.
*Scale from 1 to 4, where 1 is "minor" and 4 is "extreme."

The move was associated with significant improvements in facility-related satisfaction (Tables 2 and 3). The most prominent increases in satisfaction were with pleasantness of décor (33.6% vs 66.2%), noise level (39.9% vs 59.3%), and visitor accommodation and comfort (50.0% vs 70.3 %). There was improvement in satisfaction related to cleanliness of the room (49.0% vs 68.6 %), but no significant increase in satisfaction with courtesy of the person cleaning the room (59.8% vs 67.7%) when compared with units that did move.

With regard to non–facility-related satisfaction, there were statistically higher scores in several nursing, physician, and discharge-related satisfaction domains after the move. However, these changes were not associated with the move to the new clinical building as they were not significantly different from improvements on the unmoved units. Among non–facility-related items, only "staff attitude toward visitors" showed significant improvement (68.1% vs 79.4%). There was a significant improvement in hospital rating (75.0% vs 83.3% in the moved units and 75.7% vs 77.6% in the unmoved units). However, the other 3 measures of overall satisfaction did not show significant improvement associated with the move to

TABLE 2. Changes in HCAHPS Patient Satisfaction Scores From Baseline to Postmove Period By Unit Status

Satisfaction Domain	Moved Units % Top Box Pre	Moved Units % Top Box Post	Moved Units Adjusted Odds Ratio* (95% CI)	Unmoved Units % Top Box Pre	Unmoved Units % Top Box Post	Unmoved Units Adjusted Odds Ratio* (95% CI)	*P* Value of the Difference in Odds Ratio Between Moved and Unmoved Units
FACILITY RELATED							
Hospital environment							
Cleanliness of the room and bathroom	61.0	70.8	1.62 (1.40-1.90)	64.0	69.2	1.24 (1.03-1.48)	0.03
Quietness of the room	51.3	65.4	1.89 (1.63-2.19)	58.6	60.3	1.08 (0.90-1.28)	<0.0001
NON–FACILITY RELATED							
Nursing communication							
Nurses treated with courtesy/respect	84.0	86.7	1.28 (1.05-1.57)	83.6	87.1	1.29 (1.02-1.64)	0.92
Nurses listened	73.1	76.4	1.21 (1.03-1.43)	74.2	75.5	1.05 (0.86-1.27)	0.26
Nurses explained	75.0	76.6	1.10 (0.94-1.30)	76.0	76.2	1.00 (0.82-1.21)	0.43
Physician communication							
Doctors treated with courtesy/respect	89.5	90.5	1.13 (0.89-1.42)	84.9	87.3	1.20 (0.94-1.53)	0.77
Doctors listened	81.4	81.0	0.93 (0.83-1.19)	77.7	77.1	0.94 (0.77-1.15)	0.68
Doctors explained	79.2	79.0	1.00(0.84-1.19)	75.7	74.4	0.92 (0.76-1.12)	0.49
Other							
Help toileting as soon as you wanted	61.8	63.7	1.08 (0.89-1.32)	62.3	60.6	0.92 (0.71-1.18)	0.31
Pain well controlled	63.2	63.8	1.06 (0.90-1.25)	62.0	62.6	0.99 (0.81-1.20)	060
Staff do everything to help with pain	77.7	80.1	1.19 (0.99-1.44)	76.8	75.7	0.90 (0.75-1.13)	0.07
Staff describe medicine side effects	47.0	47.6	1.05 (0.89-1.24)	49.2	47.1	0.91 (0.74-1.11)	0.32
Tell you what new medicine was for	76.4	76.4	1.02 (0.84-1.25)	77.1	78.8	1.09(0.85-1.39)	0.65
Overall							
Rate hospital (0–10)	75.0	83.3	1.71 (1.44-2.05)	75.7	77.6	1.06 (0.87-1.29)	0.006
Recommend hospital	82.5	87.1	1.43 (1.18-1.76)	81.4	82.0	0.98 (0.79-1.22)	0.03

NOTE: Abbreviations: CI, confidence interval. *Adjusted for age, race, sex, length of stay, complexity of illness, and insurance type.

the new clinical building when compared to the concurrent controls.

DISCUSSION

Contrary to our hypothesis and a belief held by many, we found that patients appeared able to distinguish their experience with hospital environment from their experience with providers and other services. Improvement in hospital facilities with incorporation of patient-centered features was associated with improvements that were largely limited to increases in satisfaction with quietness, cleanliness, temperature, and décor of the room along with visitor-related satisfaction. Notably, there was no significant improvement in satisfaction related to physicians, nurses, housekeeping, and other service staff. There was improvement in satisfaction with staff attitude toward visitors, but this can be attributed to availability of visitor-friendly facilities. There was a significant improvement in 1 of the 4 measures of overall satisfaction. Our findings also support the construct validity of HCAHPS and Press Ganey patient satisfaction surveys.

Ours is one of the largest studies on patient satisfaction related to patient-centered design features in the inpatient acute care setting. Swan et al. also studied patients in an acute inpatient setting and compared satisfaction related to appealing versus typical hospital rooms. Patients were matched for case mix, insurance, gender, types of medical services received and LOS, and were served by the same set of physicians and similar food service and housekeeping staff.[26] Unlike our study, they found improved satisfaction related to physicians, housekeeping staff, food service staff, meals, and overall satisfaction. However, the study had some limitations. In particular, the study sample was self-selected because the patients in this group were required to pay an extra daily fee to utilize the appealing room. Additionally, there were only 177 patients across the 2 groups, and the actual differences in satisfaction scores were small. Our sample was larger and patients in the study group were admitted to units in the new clinical buildings by the same criteria as they were admitted to the historic building prior to the move, and there were no significant differences in baseline characteristics between the comparison groups.

Jansen et al. also found broad improvements in patient satisfaction in a study of over 309 maternity unit patients in a new construction, all private-room maternity unit with more appealing design elements and comfort features for visitors.[7] Improved satisfaction was noted with the physical environment, nursing care, assistance with feeding, respect for privacy, and discharge planning. However, it is difficult to extrapolate the results of this study to other settings, as maternity unit patients constitute a unique patient demographic with unique care needs. Additionally,

TABLE 3. Changes in Press Ganey Patient Satisfaction Scores From Baseline to Postmove Period by Unit Status

Satisfaction Domain	Moved Unit			Unmoved Unit			*P* Value of the Difference in Odds Ratio Between Moved and Unmoved Units
	% Top Box		Adjusted Odds Ratio* (95% CI)	% Top Box		Adjusted Odds Ratio* (95% CI)	
	Pre	Post		Pre	Post		
FACILITY RELATED							
Room							
Pleasantness of room décor	33.6	64.8	3.77 (3.24-4.38)	41.6	47.0	1.21 (1.02-1.44)	<0.0001
Room cleanliness	49.0	68.6	2.35 (2.02-2.73)	51.6	59.1	1.32 (1.12-1.58)	<0.0001
Room temperature	43.1	54.9	1.64 (1.43-1.90)	45.0	48.8	1.14 (0.96-1.36)	0.002
Noise level in and around the room	40.2	59.2	2.23 (1.92-2.58)	45.5	47.6	1.07 (0.90-1.22)	<0.0001
Visitor related							
Accommodations and comfort of visitors	50.0	70.3	2.44 (2.10-2.83)	55.3	59.1	1.14 (0.96-1.35)	<0.0001
NON–FACILITY RELATED							
Food							
Temperature of the food	31.1	33.6	1.15 (0.99-1.34)	34.0	38.9	1.23 (1.02-1.47)	0.51
Quality of the food	25.8	27.1	1.10 (0.93-1.30)	30.2	36.2	1.32 (1.10-1.59)	0.12
Courtesy of the person who served food	63.9	62.3	0.93 (0.80-1.10)	66.0	61.4	0.82 (0.69-0.98)	0.26
Nursing							
Friendliness/courtesy of the nurses	76.3	82.8	1.49 (1.26-1.79)	77.7	80.1	1.10 (0.90-1.37)	0.04
Promptness of response to call	60.1	62.6	1.14 (0.98-1.33)	59.2	62.0	1.10 (0.91-1.31)	0.80
Nurses' attitude toward requests	71.0	75.8	1.30 (1.11-1.54)	70.5	72.4	1.06 (0.88-1.28)	0.13
Attention to special/personal needs	66.7	72.2	1.32 (1.13-1.54)	67.8	70.3	1.09 (0.91-1.31)	0.16
Nurses kept you informed	64.3	72.2	1.46 (1.25-1.70)	65.8	69.8	1.17 (0.98-1.41)	0.88
Skill of the nurses	75.3	79.5	1.28 (1.08-1.52)	74.3	78.6	1.23 (1.01-1.51)	0.89
Ancillary staff							
Courtesy of the person cleaning the room	59.8	67.7	1.41 (1.21-1.65)	61.2	66.5	1.24 (1.03-1.49)	0.28
Courtesy of the person who took blood	66.5	68.1	1.10 (0.94-1.28)	63.2	63.1	0.96 (0.76-1.08)	0.34
Courtesy of the person who started the IV	70.0	71.7	1.09 (0.93-1.28)	66.6	69.3	1.11 (0.92-1.33)	0.88
Visitor related							
Staff attitude toward visitors	68.1	79.4	1.84 (1.56-2.18)	70.3	72.2	1.06 (0.87-1.28)	<0.0001
Physician							
Time physician spent with you	55.0	58.9	1.20 (1.04-1.39)	53.2	55.9	1.10 (0.92-1.30)	0.46
Physician concern questions/worries	67.2	70.7	1.20 (1.03-1.40)	64.3	66.1	1.05 (0.88-1.26)	0.31
Physician kept you informed	65.3	67.5	1.12 (0.96-1.30)	61.6	63.2	1.05 (0.88-1.25)	0.58
Friendliness/courtesy of physician	76.3	78.1	1.11 (0.93-1.31)	71.0	73.3	1.08 (0.90-1.31)	0.89
Skill of physician	85.4	88.5	1.35 (1.09-1.68)	78.0	81.0	1.15 (0.93-1.43)	0.34
Discharge							
Extent felt ready for discharge	62.0	66.7	1.23 (1.07-1.44)	59.2	62.3	1.10 (0.92-1.30)	0.35
Speed of discharge process	50.7	54.2	1.16 (1.01-1.33)	47.8	50.0	1.07 (0.90-1.27)	0.49
Instructions for care at home	66.4	71.1	1.25 (1.06-1.46)	64.0	67.7	1.16 (0.97-1.39)	0.54
Staff concern for your privacy	65.3	71.8	1.37 (1.17-0.85)	63.6	66.2	1.10 (0.91-1.31)	0.07
Miscellaneous							
How well your pain was controlled	64.2	66.5	1.14 (0.97-1.32)	60.2	62.6	1.07 (0.89-1.28)	0.66
Staff addressed emotional needs	60.0	63.4	1.19 (1.02-1.38)	55.1	60.2	1.20 (1.01-1.42)	0.90
Response to concerns/complaints	61.1	64.5	1.19 (1.02-1.38)	57.2	60.1	1.10 (0.92-1.31)	0.57
Overall							
Staff worked together to care for you	72.6	77.2	1.29 (1.10-1.52)	70.3	73.2	1.13 (0.93-1.37)	0.30
Likelihood of recommending hospital	79.1	84.3	1.44 (1.20-1.74)	76.3	79.2	1.14 (0.93-1.39)	0.10
Overall rating of care given	76.8	83.0	1.50 (1.25-1.80)	74.7	77.2	1.10 (0.90-1.34)	0.03

NOTE: **Abbreviations:** CI, confidence interval; IV, intravenous. *Adjusted for age, race, sex, length of stay, complexity of illness, and insurance type.

when compared with patients in the control group, the patients in the study group were cared for by nurses who had a lower workload and who were not assigned other patients with more complex needs. Because nursing availability may be expected to impact satisfaction with clinical domains, the impact of private and appealing room may very well have been limited to improved satisfaction with the physical environment.

Despite the widespread belief among healthcare leadership that facility renovation or expansion is a vital strategy for improving patient satisfaction, our study shows that this may not be a dominant factor.[27] In fact, the Planetree model showed that improvement in satisfaction related to physical environment and nursing care was associated with implementation of both patient-centered design features as well as with utilization of nurses that were trained to provide personalized care, educate patients, and involve patients and family.[28] It is more likely that provider-level interventions will have a greater impact on provider level and overall satisfaction. This idea is supported

by a recent JD Powers study suggesting that facilities represent only 19% of overall satisfaction in the inpatient setting.[35]

Although our study focused on patient-centered design features, several renovation and construction projects have also focused on design features that improve patient safety and provider satisfaction, workflow, efficiency, productivity, stress, and time spent in direct care.[9] Interventions in these areas may lead to improvement in patient outcomes and perhaps lead to improvement in patient satisfaction; however, this relationship has not been well established at present.

In an era of cost containment, healthcare administrators are faced with high-priced interventions, competing needs, limited resources, low profit margins, and often unclear evidence on cost-effectiveness and return on investment of healthcare design features. Benefits are related to competitive advantage, higher reputation, patient retention, decreased malpractice costs, and increased Medicare payments through VBP programs that incentivize improved performance on quality metrics and patient satisfaction surveys. Our study supports the idea that a significant improvement in patient satisfaction related to creature comforts can be achieved with investment in patient-centered design features. However, our findings also suggest that institutions should perform an individualized cost-benefit analysis related to improvements in this narrow area of patient satisfaction. In our study, incorporation of patient-centered design features resulted in improvement on 2 VBP HCAHPS measures, and its contribution toward total performance score under the VBP program would be limited.

Strengths of our study include the use of concurrent controls and our ability to capitalize on a natural experiment in which care teams remained constant before and after a move to a new clinical building. However, our study has some limitations. It was conducted at a single tertiary care academic center that predominantly serves an inner city population and referral patients seeking specialized care. Drivers of patient satisfaction may be different in community hospitals, and a different relationship may be observed between patient-centered design and domains of patient satisfaction in this setting. Further studies in different hospital settings are needed to confirm our findings. Additionally, we were limited by the low response rate of the surveys. However, this is a widespread problem with all patient satisfaction research utilizing voluntary surveys, and our response rates are consistent with those previously reported.[34,36–38] Furthermore, low response rates have not impeded the implementation of pay-for-performance programs on a national scale using HCHAPS.

In conclusion, our study suggests that hospitals should not use outdated facilities as an excuse for achievement of suboptimal satisfaction scores. Patients respond positively to creature comforts, pleasing surroundings, and visitor-friendly facilities but can distinguish these positive experiences from experiences in other patient satisfaction domains. In our study, the move to a higher-amenity building had only a modest impact on overall patient satisfaction, perhaps because clinical care is the primary driver of this outcome. Contrary to belief held by some hospital leaders, major strides in overall satisfaction across the board and other subdomains of satisfaction likely require intervention in areas other than facility renovation and expansion.

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