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Factors Driving Patient Perception of Quality Care After Primary Total Hip and Total Knee Arthroplasty

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Abstract

Introduction: Differences in female and male patient perception of care and satisfaction following primary total hip arthroplasty (THA) and total knee arthroplasty (TKA) were assessed via Hospital Consumer Assessment of Healthcare Providers and Systems survey, demographic, and clinical data.

Methods: After institutional review board approval, a retrospective review of the Hospital Consumer Assessment of Healthcare Providers and Systems survey responses at a private, academic, level-I trauma center was performed from January 2011 to December 2013. Inclusion criteria were primary THA and TKA patients who were 18 years or older and returned the survey.

Results: Overall, 1,166 THA and 1,411 TKA were included, with 55.0% of female THA patients and 64.5% of male THA patients highly satisfied ($P = 0.002$). The mean overall hospital rating was 7.2 for female THA and 7.8 for male THA ($P = 0.003$) patients. No significant differences was found in the TKA cohort. For all cohorts, the Nurse Communication with Nurses domain reported the greatest correlation with overall hospital rating (range, $\rho = 0.418$ to $\rho = 0.502$; $P < 0.0001$).

Discussion: This series indicated that initiatives to improve patient care and patient perception of care should focus on nurse-patient communication, hospital staff responsiveness, the care transition process, and hospital environment. Patient sex was a significant factor in the overall satisfaction for THA, with female patients reporting significantly lower ratings than male patients.

Recent trend of integrating outcomes into hospital reimbursement formulas has increased emphasis on improving patient-reported satisfaction. Patient satisfaction data can also be applied in the development of new models and guidelines for the identification of deficiencies/achievements and improvements in

quality of care and health service delivery. Nationally, hospitals measure patient satisfaction through the Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS), survey from the Centers of Medicare and Medicaid Services and the Agency for Healthcare Research and Quality. Score data of

HCAHPS Surveys are publicly accessible to consumers, and it is a component used for calculating reimbursement from the Centers of Medicare and Medicaid Services Hospital Value-Based Purchasing Program.

Previous studies have demonstrated that patient sex is one variable that significantly affects patient satisfaction scores and perception of care. Rubens et al¹ investigated the associations between patient factors and demographics with patient satisfaction scores (including experience rating, hospital recommended, hospital rating, and helped overall) using the Canadian Patient Experience Survey-Inpatient Care, a modified HCAHPS survey. Departments surveyed included surgical ear, nose, and throat; medicine; and family medicine at an academic, tertiary care, teaching hospital in an urban environment.¹ Female patients and patients with more education demonstrated significantly lower experience ratings, hospital recommendation, and hospital rating; additionally, domains related to patient-centered care, care transition, and emergency admission were identified as areas for improvement to improve patient satisfaction scores.¹ Physician dress was associated with patient perceptions of the following domains related to physician characteristics: knowledgeable, trustworthy, care, approachable, and comfortable.² Significant findings were that patients older than 65 years preferred formal clothing attire with white coats, and all patients preferred surgeons to wear scrubs; also, survey respondents indicated that physician attire was important (53%) and “influenced how happy they were with the care they received” (36%).²

Two of the most common elective orthopaedic procedures performed in the United States are primary total hip arthroplasty (THA) and primary total knee arthroplasty (TKA). The National Hospital Discharge Survey reported that 332,000 THA and 719,000 TKA procedures were performed in the United States in 2010.³ The aims of this study were (1) to investigate differences in patient perception of care and satisfaction among TKA and THA patients, using HCAHPS data and demographic and clinical variables and (2) to investigate patient demographic differences, focusing on patient sex, in TKA and THA patient satisfaction, to elucidate the domains and subdomains with the greatest potential for improvement with respect to overall hospital rating at our institution.

Methods

The HCAHPS Survey is a 32-question survey administered to random samples of adult hospital inpatients admitted to medical, surgical, and maternity care services within 48 days of discharge. The questions are further categorized into 8 primary domains, 19 subdomains, and an overall hospital rating (Table 1). These domains measure patient perception of care in the hospital setting. Patients are asked to respond to the items on a Likert scale for how often an item occurred or how much they agree with a statement and to give an overall hospital rating on a scale of 0 to 10 (0 = worst; 10 = best). Data of HCAHPS are publicly reported as “Top Box” responses. The most positive response options available

are “Always” for HCAHPS composites, “Yes” for discharge information, “9” or “10” for hospital rating, and “Definitely” for recommend the hospital.

After obtaining approval from the Institutional Review Board at the Beaumont Health Research Institute, a retrospective review of HCAHPS Survey responses from patients at a private, academic, level-I trauma center was performed from January 2011 to December 2013. Patients were included if they were 18 years or older, underwent primary THA or TKA, and returned the HCAHPS Survey; otherwise, they were excluded. Data from HCAHPS Surveys (Table 1), demographic data, and clinical variables were extracted from patient electronic health records, including age, sex, race, ethnicity, primary payer, length of stay (LOS), discharge month, and day of the week that surgery was performed (Supplemental Table 1, <http://links.lww.com/JG9/A27>). Individual survey responses that were incomplete were excluded from analysis.

Patient sex was coded as male or female, and age was categorized into the age intervals that are reported publicly by HCAHPS (ie, 18 to 24, 25 to 34, 35 to 44, 45 to 54, 55 to 64, 65 to 74, 75 to 84, 85+ years of age). The University HealthSystem Consortium Primary Payer values were classified into three main groups: private, government, and other. Payers categorized as “other” were excluded from analyses. Discharge month was converted to a numerical value from 1 to 12 (eg, 1 = January), and day of the week the patient underwent surgery was converted to a numerical value from 1 to 7 (eg, Sunday = 1). The individual domain responses were

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converted into a composite, top-box domain score using the top-box scoring criteria previously described. For example, a patient who answered a domain's questions with one top-box response and one non-top-box response would receive a top-box domain score of 50%. Finally, using the overall hospital rating score, a patient's response was converted to a measurement of high satisfaction where a rating of 9 or 10 was coded as 1, or highly satisfied, and a rating of less than 9 was coded as zero, or not highly satisfied.

The data set was analyzed for correlations between domains, subdomains, surgical factors, and demographics (SigmaPlot 11.0; Systat Software). The THA and TKA data sets were treated as individual data sets, and statistical analyses were completed within these sets separately; these data sets were also compared. Statistical significance was defined as $\alpha \leq 0.05$. Mean overall hospital rating and mean percent top-box scores for each domain were calculated for each patient population group. Because of data failing normality, Mann-Whitney rank sum tests were used to test for statistical differences in patient sex, patient age, LOS, overall hospital rating, and percent of patients with high satisfaction (scoring a 9 or 10 on overall hospital rating). Spearman correlation tests were used to assess significant relationships between the demographic variables, clinical variables, overall hospital rating, domains, and subdomains for each patient group. The strengths of the correlation coefficients were defined as weak ($0.20 < \rho \leq 0.40$), moderate ($0.40 < \rho \leq 0.60$), strong ($0.60 < \rho \leq 0.80$), and very strong ($0.80 < \rho \leq 1.00$).^{4,5} In addition, multivariable linear regression models were generated to assess the relationship between sex, age, primary payer, and LOS in predicting patients' overall hospital rating and domain scores.

Table 1

Hospital Consumer Assessment of Healthcare Providers and Systems Survey Primary Domains and Subdomains

Primary Domains	Subdomains
Doctor communication	Doctors explained in way you understand Doctors listened carefully to you Doctors treated you with courtesy and respect
Nurse communication	Nurses explained in way you understand Nurses listened carefully to you Nurses treated you with courtesy/respect
Medication communication	Tell you what new medicine was for Staff described medicine(s) and side effect(s) to you
Discharge information	Staff talk about help when you left Written information about symptoms and health problems to look for was provided to you
Hospital environment	Cleanliness of patient room and bathroom Quietness of area around patient room
Hospital staff	Call button help as soon as wanted it Help toileting as soon as you wanted
Pain management	Staff communication about pain level Staff communication about treating pain
Care transitions	During stay, staff took your/family/caregiver preferences into account After discharge, you had a good understanding of managing health After discharge, you understood the purpose of taking medication

Results

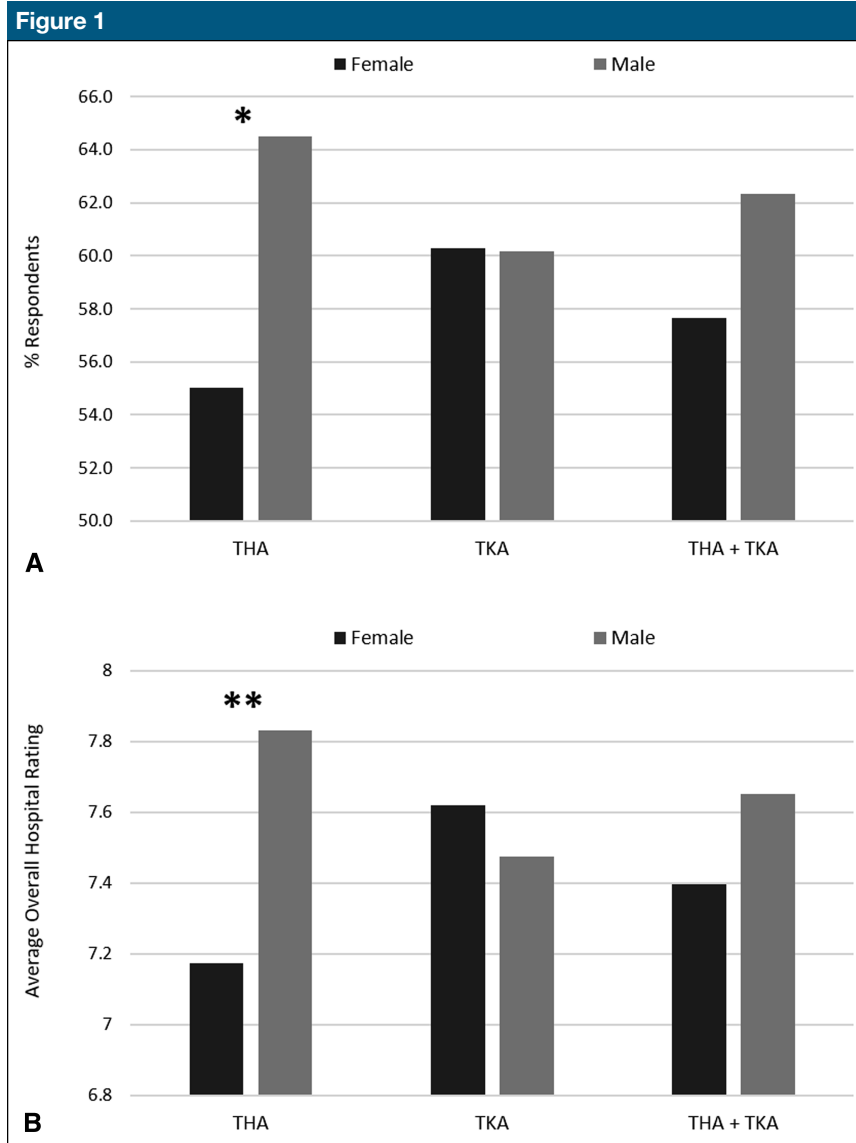
Patient Population

In total, 1,166 THA and 1,411 TKA patients met inclusion criteria (Supplemental Table 1, <http://links.lww.com/JG9/A27>). No statistical difference was found in age between male and female patients for both THA ($P = 0.069$) and TKA ($P = 0.144$). The mean LOS for female THA patients was 3.1 days (range, 1 to 20 days), and 2.7 days (range, 1 to 14 days) for male THA patients ($P < 0.001$). Female TKA patients had a mean LOS of 3.1 days (range, 1 to 14 days) and 3.0 days (range, 1 to 21 days) for male TKA patients ($P < 0.001$). Most patients in all groups were in the 65-to-74 age interval, identified as white and of non-Hispanic origin, and

used a government-based primary payer.

Patient-rated Hospital Rating and Hospital Consumer Assessment of Healthcare Providers and Systems Domain Top-box Scores

Overall, 687 THA patients (58.9%) and 850 TKA patients (60.2%) were highly satisfied with their hospital experience, rating their overall hospital experience as a 9 or 10. The difference in high satisfaction between THA and TKA patients was not statistically significant ($P = 0.564$). In the THA group, 55.0% of female patients were highly satisfied with their overall hospital experience, compared with 64.5% of male patients ($P = 0.002$) (Figure 1).



Percentage of female and male respondents from the TKA and THA populations who were highly satisfied (overall hospital score of 9 or 10) (A) and average patient-reported overall hospital rating of female and male patients in THA and TKA populations (B). There were significant differences between the percentage of highly satisfied female patients in the THA population (* $P = 0.002$) and between the overall hospital rating of female and male patients in the THA population (** $P = 0.003$). THA = total hip arthroplasty, TKA = total knee arthroplasty

Female and male TKA patients were highly satisfied at approximately the same ratio, with 60.3% of female and 60.2% of male patients reporting a 9 or 10 score ($P = 0.932$). Overall hospital rating within all patient populations ranged from 0 to 10. Within the THA patient population, the mean overall hospital rating was 7.2 for female patients and 7.8 for

male patients ($P = 0.003$). In the TKA patient population, the mean overall hospital rating was 7.6 for female patients and 7.5 for male patients ($P = 0.777$) (Figure 1).

Mean percent top-box scores for HCAHPS domains were calculated (Figure 2). The two highest scoring HCAHPS domains for all patients were Doctor Communication and

Discharge Information. The domain of Hospital Staff consistently scored as the lowest or second to lowest domain in all patient groups.

Spearman Correlation Analyses of Hospital Consumer Assessment of Healthcare Providers and Systems Domains and Subdomains, Patient-reported Hospital Rating, and Patient Demographics

Significant associations were identified between overall hospital rating and HCAHPS domains, with all P values less than 0.0001 and Spearman correlation coefficients ranging from weakly to moderately correlated (Table 2). All patient cohorts reported the Nurse Communication domain to be the greatest correlation with overall hospital rating, and this domain moderately correlated in all cohorts. The Discharge Information domain did not show a significant correlation with overall hospital rating for any patient groups. Female and male THA patients differed in their top three correlated domains. In female THA patients, the domains were Nurse Communication, Hospital Staff, and Care Transitions; the top domains for male THA patients were Nurse Communication, Hospital Environment, and Hospital Staff. For both male and female TKA patients, the top three correlated domains were Nurse Communication, Care Transitions, and Hospital Staff.

Weak and moderate correlations were identified between overall hospital rating and specific HCAHPS subdomains (Table 3). Across all patient groups, a positive correlation for “nurses listening carefully to patients” was observed. Additionally, for both female and male THA patients, having a “good understanding of managing health” positively correlated with overall hospital rating. Hospital staff “taking a patient’s

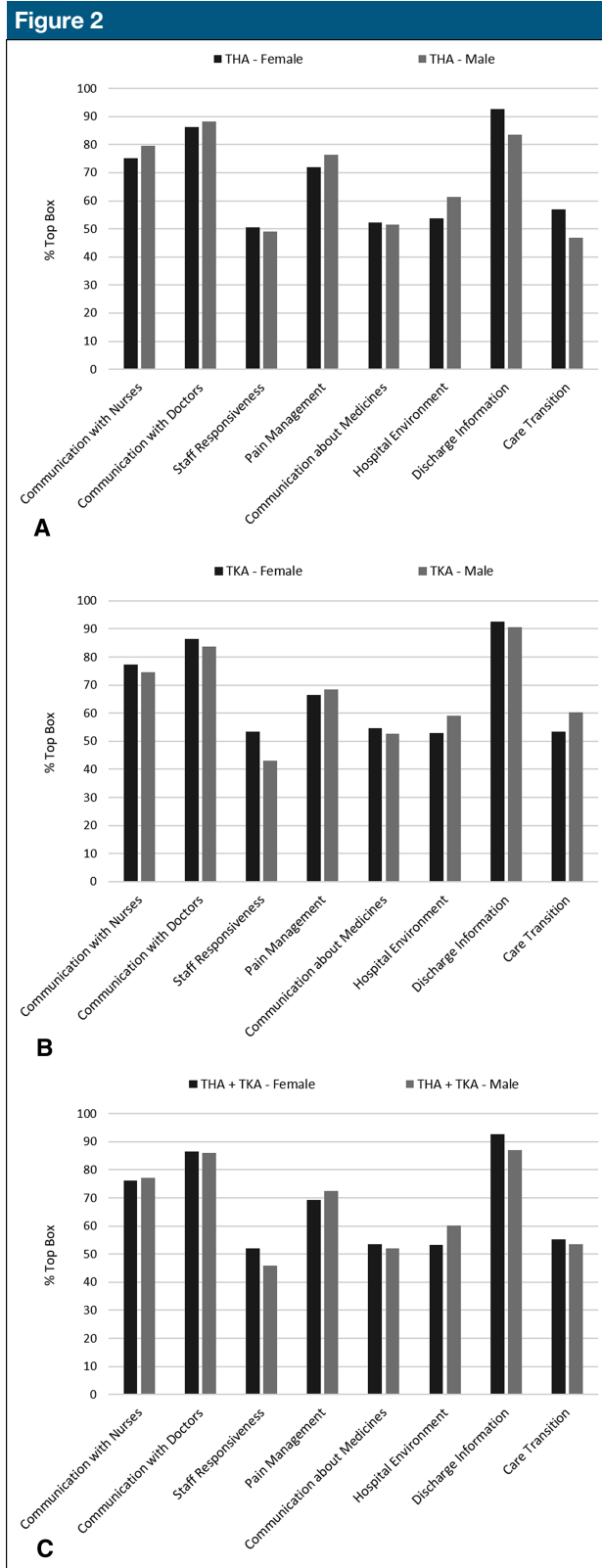
preferences into account” positively correlated for both female and male TKA patients.

Multivariable Linear Regression Analysis of Hospital Consumer Assessment of Healthcare Providers and Systems Domains and Subdomains, Patient-reported Hospital Rating, and Patient Demographics

Multivariable linear regression analyses were performed to evaluate the effects of sex, age, primary payer, and LOS on predicting patients’ overall hospital rating (Table 4). In the THA regression model, sex ($P = 0.005$) and age ($P = 0.015$) independently predicted the overall hospital rating, whereas primary payer ($P = 0.099$) and LOS ($P = 0.697$) did not. Conversely, in the TKA regression model, primary payer ($P = 0.010$) and LOS ($P = 0.002$) predicted patients’ hospital rating, whereas sex ($P = 0.507$) and age ($P = 0.233$) did not.

Discussion

Studies have identified and reported factors that are drivers of patient satisfaction, and physician-patient interactions have been reported to affect patient satisfaction.⁶⁻¹⁰ Physicians who undergo patient-centered communication skills training have demonstrated significantly improved HCAHPS scores, compared with those who did not receive training.^{9,10} High-quality nursing care has consistently been associated with higher patient satisfaction; specifically, nurse-patient communication, nursing staff attentiveness, optimized nurse-patient ratio, and work environments are cited as key factors.^{6,8,11,12} The influence of patient age on patient satisfaction



Mean percent top-box domain scores for each male/female patient and THA (A), TKA (B), and all female and male patients for both THA and TKA populations (C). THA = total hip arthroplasty, TKA = total knee arthroplasty

Table 2

Spearman Correlation Coefficients for Overall Hospital Rating and Hospital Consumer Assessment of Healthcare Providers and Systems Domains^a

Domain	THA		TKA	
	Female	Male	Female	Male
Doctor communication	0.268	0.315	0.295	0.346
Nurse communication	0.418	0.466	0.423	0.502
Medication communication	0.327	0.312	0.290	0.320
Discharge information	—	—	—	—
Hospital environment	0.329	0.407	0.336	0.342
Hospital staff	0.412	0.332	0.360	0.372
Pain management	0.288	0.319	0.291	0.357
Care transitions	0.370	0.301	0.392	0.463

THA = total hip arthroplasty, TKA = total knee arthroplasty
^a All *P* < 0.0001.

Table 3

Top Three Spearman Correlation Coefficients of Each Arthroplasty and Patient Sex for Overall Hospital Rating and Hospital Consumer Assessment of Healthcare Providers and Systems Subdomains^a

Subdomain	THA		TKA	
	Female	Male	Female	Male
Nurses explained in way you understand	—	—	—	0.435
Nurses listened carefully to you	0.377	0.440	0.384	0.411
Staff described medicine(s) and side effect(s) to you	—	0.416	—	—
Call button help as soon as wanted	0.444	—	0.386	—
During stay, staff took your/family/caregiver preferences into account	—	—	0.412	0.479
After discharge, you had a good understanding of managing health	0.393	0.400	—	—

THA = total hip arthroplasty, TKA = total knee arthroplasty
^a All *P* < 0.0001.

Table 4

Multivariable Linear Regression Analysis for Prediction of Patient-reported Overall Hospital Rating^a

Variable	THA		TKA	
	Beta Weight	<i>P</i> Value	Beta Weight	<i>P</i> Value
Patient sex	0.638	0.005	-0.136	0.507
Patient age	0.034	0.015	0.017	0.233
Primary payer	-0.505	0.099	0.709	0.010
Length of stay	-0.037	0.697	-0.249	0.002

THA = total hip arthroplasty, TKA = total knee arthroplasty
^a Power of performed test with $\alpha = 0.050$ was 0.964 for THA and 1.000 for TKA datasets.

has also been investigated, with studies showing that younger age is associated with lower HCAHPS scores, higher HCAHPS scores, or has no effect on patient satisfaction scores.^{8,13-15}

This study assessed drivers of patient satisfaction among female and male THA and TKA patients from HCAHPS survey responses, demographics, and surgical data. In this patient population, patient sex was a factor in overall patient satisfaction for THA but not TKA patient populations. Reports regarding the influence of patient sex on patient satisfaction have been inconsistent. When analyzing HCAHPS data among 182 patients in a trauma and acute surgery population, Kahn et al⁸ determined that patient sex was not significantly associated with patient satisfaction. Conversely, Elliott et al¹⁵ analyzed HCAHPS data from almost 2 million patients across the United States. They found that patient sex was a significant driver of patient satisfaction, with females reporting increased dissatisfaction in all HCAHPS domains, except Doctor Communication. Similarly, in the orthopaedic outpatient setting, female patients, and especially younger female patients, are more dissatisfied with their health care experience than male patients.¹⁶ Peres-da-Silva et al¹⁷ published an analysis of HCAHPS data in 580-TKA patient series. They reported that patients who are male, African American, and at lower socioeconomic status, with shorter LOSs are more likely to report higher levels of inpatient satisfaction.

In all patient groups (TKA and THA), regardless of patient sex, patient satisfaction most positively correlated with Nurse Communication. The relationship of patient satisfaction and communication with nurses has been extensively studied and consistently identified as a key influencer of patient satisfaction.^{8,11,12} Our results correspond

with the results of Mistry et al and Delanois et al who reported that THA patients' perception of nurses was a significant driver of patient satisfaction as measured through the Press-Ganey Survey.^{18,19} Interventions aimed at improving patient satisfaction emphasize enhancing the nurse-patient relationship, especially with respect to nursing communication; specifically, regular nurse rounding to allow additional time to listen to patients and discuss care has been shown to increase the overall patient perception of care and satisfaction.²⁰⁻²² Similarly, utilization of bedside reporting by nurses has been reported to improve nursing communication and patient satisfaction.²³ A study evaluating modifications in nursing communication and subsequent effects on HCAHPS scores found increasing trends in HCAHPS scores after implementing nurse manager rounding, postdischarge phone follow-up, and improved discharge teaching skills.²⁴ A randomized controlled trial evaluating the use of therapy dogs with arthroplasty patients found that therapy dogs had a positive effect on patients' satisfaction during the hospital stay, with significantly greater scores in nursing communication.²⁵

The mean top-box score of the Hospital Staff domain was consistently lower than all other domains for all patient groups, and it was also one of the top three domains positively correlated with patient satisfaction. This domain assesses the attentiveness of hospital staff in responding to patient call button requests and assisting with toileting; these clearly are important to patients, particularly those undergoing THA and TKA procedures. Improvement in this capacity also may increase patient safety by preventing patient falls and further injury because Tzeng et al²⁶ showed that fall rates and injury-related fall rates are associated with faster call button responses by hospital staff. Call button responsive-

ness may be improved by emphasizing the importance of responsiveness by all nursing and ancillary staff in preventing patient injury and increasing patient satisfaction.^{26,27}

Another finding of this study was that the domain of Care Transitions had a significant positive correlation with overall patient satisfaction. The recovery period for both THA and TKA is accelerated because most patients usually walk within one day of surgery and are discharged 1 to 2 days after the surgery. This rapid recovery process gives the hospital, doctor, and nursing staff a compact time frame to explain and arrange all aspects of patient care. Therefore, transition of care must be coordinated. Jackson et al²⁸ cited that the key to effective Care Transitions is communication and participation by all parties involved, including the patient and family. This is consistent with our finding that TKA patients value their "personal preferences being taken into account" (subdomain of Care Transitions) for their health and care management. Various methods have been reported to improve Care Transitions, including postdischarge phone calls, direct hand-off communication between providers, and medical student care transitions education in the teaching hospital setting.²⁸⁻³⁰

Male THA patient satisfaction showed greater correlation with the Hospital Environment, specifically cleanliness and quietness, than any other patient group. Previous reports indicate that patients' environment may affect how they perceive their overall hospital experience, which implies that nonclinical factors are also important in overall patient satisfaction.^{31,32}

Our study is limited by the 3-year period and single institution from which data were obtained; therefore, our findings do not necessarily translate to all populations at all institutions. Also, the 3-year period is only a snapshot in time, which might not effectively take variations in

patient reporting and clinical provider behavior into account. The results presented are influenced by intrinsic structural characteristics that are different at all institutions. Such influences have been demonstrated previously when comparing HCAHPS scores across different hospitals.^{33,34} Another limitation of this study is the lack of complete HCAHPS data for the Care Transitions domain because the Care Transitions domain was not added to the survey until 2012. Also, the effect of race or ethnicity on predicting patient satisfaction by multivariable linear regression was not investigated because the patient population was relatively homogeneous, with most patients in all groups identifying as white and of non-Hispanic origin. Race and ethnicity are important drivers of patient HCAHPS responses, which certainly warrants further investigation into the influence of these factors on patient satisfaction in the unique populations of THA and TKA patients.³⁵ In addition, because of the retrospective, observational study design, a power analysis was not performed. Because not all variables affecting patient-reported scores are known and/or collected, comprehensive and precise data analyses and conclusions are difficult to design and quantify. Finally, the HCAHPS survey does not allow patients to indicate who completed the survey. In some cases, these forms may be filled out by family members or other caregivers, which may influence domain, subdomain, and overall hospital rating scoring.

In conclusion, patient satisfaction following primary THA and TKA correlated with multiple HCAHPS Survey domains and predicted by patient factors. This series suggested that initiatives to improve patient care and perceived patient care should focus on nurse-patient communication, hospital staff responsiveness, the

care transition process, and hospital environment. Female THA patients were more dissatisfied than male THA patients. Although patient sex is not a variable that is modifiable by clinical care teams, this patient cohort could be a primary focus because continuous improvement practices to increase patient satisfaction are developed and implemented. However, improvements in patient satisfaction may be influenced through both directly through communication, modifications of physical environment, and the like and indirectly by modern (eg, introduction of therapy dogs) approaches. Further investigation of diverse THA and TKA populations in different hospital systems will also broaden the understanding of drivers of THA and TKA patient satisfaction.

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