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It's not you, It's me: The influence of patient and surgeon gender on patient satisfaction scores☆

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ABSTRACT

Background: Surgeons face the unique challenge of being responsible for both clinical encounters and surgical outcomes. We aim to explore how patient evaluations of surgeons may be influenced by patient and provider factors.

Methods: Patient responses from the 2016 CGCAHPS survey at a single institution were identified. A Poisson regression model was used to identify patient/provider factors associated with ratings.

Results: 11,007 surveys of 134 surgeons were included. After adjustment, higher overall surgeon ratings were associated with older patient age ($p < 0.001$) and male patient gender ($p = 0.001$). Lower ratings were associated with higher patient education ($p < 0.001$) and lower patient self-health ratings ($p < 0.001$). Although female surgeons tended to have higher communication scores, overall scores did not differ based on any surgeon factors.

Conclusions: Patient satisfaction scores of surgeons are more closely correlated with patient variables than surgeon factors. This may have implications for physician performance evaluation in value-based care models.

Introduction

Patient satisfaction scores are increasingly integrated into measures of quality of care.[1] The shift of healthcare towards value-based bundled payments led to the establishment of hospital-level incentives for quality domains, including patient satisfaction measures such as the Clinician and Group Consumer Assessment of Healthcare Providers and Systems (CGCAHPS) survey.[2] This in turn impacts hospital performance scores and reimbursement patterns.[1,3] Consequently, these quality measures may be used by hospitals as markers for individual physician performance with potential implications for physician grades and compensation.[4]

Surgeons serve a unique role in generating outcomes measures for hospitals, as they are responsible for both surgical outcomes and patient satisfaction.[5] Accordingly, surgeon performance is increasingly measured through both surgical complication rates and patient satisfaction scores.[4] Notably, satisfaction scores may be dictated by patient characteristics and demographics independent of a surgeon's clinical performance.[6] Thus, understanding patient-level factors which may impact patient satisfaction surveys is important to understanding how surgeons may improve their patients' clinical experience, and also to potentially adjust surgeons' scores to account for non-modifiable patient characteristics.[6] In major academic healthcare systems, patient satisfaction ratings for medical professionals in both inpatient and outpatient settings have been shown to vary by age,[6,7] race,[8,9] education status,[9] and insurance status.[9] Furthermore, in non-surgical fields, satisfaction scores are associated with physician characteristics including provider gender.[10–12] As increasing numbers of women continue to enter the field of surgery,[13,14] the evolving demographic composition of surgeons may challenge traditional views of what a surgeon

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'should' look like, increasing the potential for implicit and explicit bias.[15] Thus, as satisfaction ratings start to define surgeon performance, determining if patient satisfaction scores vary by surgeon gender is increasingly important.

The aim of this study was to assess how CGCAHPS survey metrics of patient satisfaction related to surgeon performance varied by patient and provider factors, including surgeon and patient gender, across surgical subspecialties at a major academic institution.

Methods

This retrospective review involves analysis of data extracted from the CGCAHPS surveys of surgical providers within the Department of Surgery, collected through the Department of Performance Services at a single academic institution in the year 2016. Divisions within the Department of Surgery at the time of this analysis included: Acute Care Surgery; Advanced Oncologic and Gastrointestinal Surgery; Cardiovascular and Thoracic Surgery; Dental Services; Head and Neck Surgery, Communication Sciences; Pediatric Surgery; Plastic, Maxillofacial, and Reconstructive Surgery; and Urology. Evaluable subjects were defined as patients who completed the survey (N = 11,093) and the surgeons who were reviewed in the survey (N = 140). We excluded survey results for dental services providers (N = 1) and pediatric surgeons (N = 5). The final effective sample sizes were N = 11,007 patients and N = 134 providers. Out of this sample, all patients had non-missing values for the primary endpoint (overall rating of the physician). Overall provider ratings were based on a scale of 0–10 with 10 being the highest and best score that a patient could give and 0 being the lowest.

Patient characteristics were summarized with N (%) for categorical variables, and mean (standard deviation, SD) and median (interquartile range, IQR) for continuous variables. This was done for all patients in the study cohort and was then repeated with stratification by provider gender. Chi-square or Fisher's Exact tests, as appropriate, and t-tests were used to compare study groups on categorical and continous variables, respectively. Available provider characteristics and responses to the individual survey questions were summarized similarly. Composite responses were also created from groups of study questions, as discussed in the CAHPS documentation. Changes to the raw data for analysis purposes are outlined in the appendix.

A Wilcoxon Rank Sum test was used to examine the unadjusted relationship between physician gender and overall provider rating. A Wilcoxon Rank Sum test was also performed as an exploratory analysis for the unadjusted relationship between physician gender and the composite score of "How Well Providers Communicate with Patients." Due to the skewed nature of the data (more higher overall ratings), a Poisson regression model was used to identify patient and provider factors associated with the likelihood of higher patient satisfactory ratings. This model was adjusted for provider factors (gender, age, specialty), patient factors (age, gender, race, ethnicity, education, self-health rating), and a potential confounding variable in the reason for the visit (from the institutional survey, asking whether the visit was for routine/check-up care). The modeling was conducted in the generalized estimating equations framework with an exchangeable correlation struction in order to account for the correlation of patients treated by the same provider. Risk ratios (RR), 95% confidence intervals (CIs), and p-values were reported for each covariate and for the comparison of interest (provider gender). These analyses were then repeated separately for male and female patients.

Only patients with available data were utilized in each model, and effective sample sizes are included in all tables and figures. No adjustments were made for multiple comparisons in this analysis, and a p-value $\leq$0.05 was considered statistically significant. All statistical analyses were conducted using SAS (version 9.4, SAS Institute, Cary, NC).

Results

Surveys from 11,007 patients associated with 134 providers were included (Fig. 1).

Patient characteristics

Median patient age was 63 years (IQR 52–71 years), and patients were more likely to be males (53.1% males vs 46.9% females). The majority were White (81.3%) and non-Hispanic (92.9%), at least graduated high school (96.5%), and reported their overall health to be at least 'good' (86.4%). Comparing patients by provider gender, those seeing female surgeons were younger (median age 62 vs 64 years, $p < 0.001$), more likely to be female (61.1% vs 41.9%, $p < 0.001$), and more likely to be non-White (22.3% vs 18.7%, $p < 0.001$) (Table 1).

Provider characteristics

Male providers tended to be older (median male age 47 years vs female age 43 years, $p = 0.004$). Provider specialties were not significantly different between provider genders. Male providers had a significantly higher number of surveys returned (median of 87.5 surveys for males vs 33 surveys for females, $p < 0.001$) (Table 2).

Questionnaire responses

Compared to those seeing male surgeons, patients seeing female surgeons were more likely seen for a "check-up or routine care" (42.9% vs 37.8%, $p < 0.001$), and they were less likely to have contacted the provider's office with a medical question within the last 3 months (10.5% vs 12.5%, $p = 0.001$). In terms of surgeon communication, patients seeing female surgeons were more likely to feel that the provider explained things in a way that was easy to understand ("yes, definitely" responses, 94.5% vs 92.6%, $p = 0.004$) and listened carefully to them ("yes, definitely" responses, 94.6% vs 93.2%, $p = 0.05$). Patients seeing female surgeons were also more likely to feel that the provider spent enough time with them, compared to patients seeing male surgeons ("yes, definitely" responses, 92.2% vs 89.9%, $p < 0.001$) (Table 3). The majority of the other patient survey responses did not significantly differ between male and female surgeons (Supplemental Table 1). When comparing overall provider ratings between those seeing female vs male surgeons, the median scores were the same (10 vs 10, on a scale of 1–10 with 10 being the highest), and the distribution of scores was similar (Fig. 2).

Adjusted satisfaction scores

After adjusting for both provider and patient characteristics, higher overall provider ratings were associated with older patient age ($p < 0.001$, RR 1.00, 95% CI 1.00–1.00) and male patient gender ($p = 0.001$, female vs. male RR 0.99, 95% CI 0.98–0.99). Lower overall provider ratings were associated with higher patient education ($p<0.001$, >4-year college degree vs. did not graduate high school RR 0.97, 95% CI 0.96–0.99), lower overall patient self-health ratings ($p < 0.001$, poor vs. excellent RR 0.91, 95% CI 0.87–0.95), and visit type other than routine ($p < 0.001$, RR 0.98, 95% CI 0.97–0.99). Provider gender, age, and specialty were not associated with overall provider ratings (Table 4).

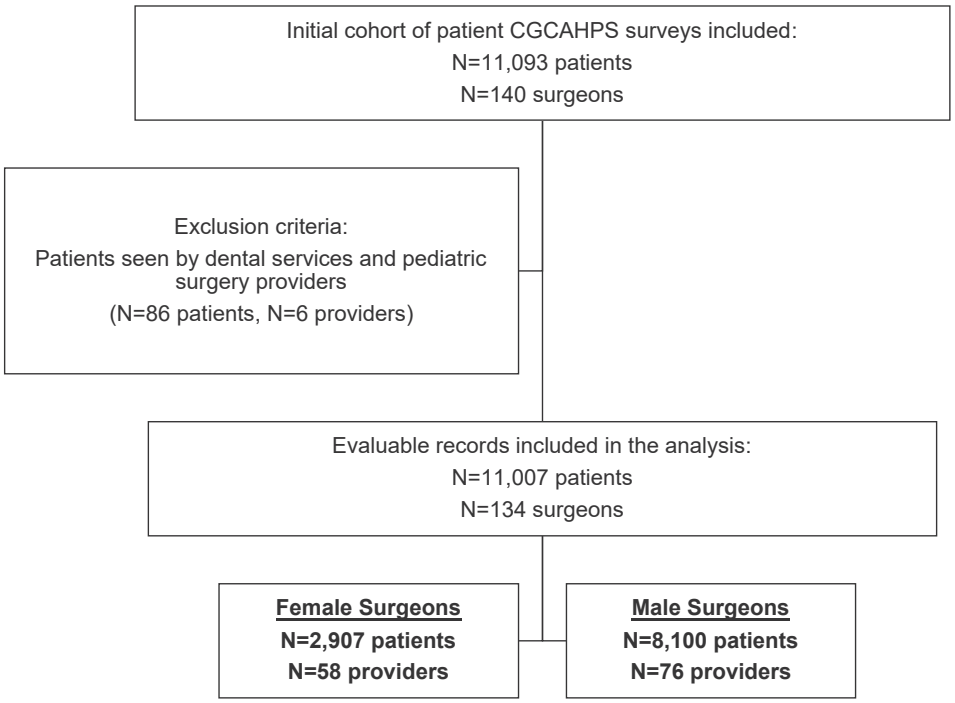

Fig. 1. Selection of patient CGCAHPS surveys at a single academic institution in 2016. CGCAHPS: Clinician and Group Consumer Assessment of Healthcare Providers and Systems.

Table 1
Characteristics of patients who submitted a CGCAHPS survey at a single academic institution in 2016 (N = 11,007). CGCAHPS: Clinician and Group Consumer Assessment of Healthcare Providers and Systems.

	All patients (N = 11,007)n (%)[a]	Patients seeing female surgeons (N = 2,907)n (%)[a]	Patients seeing male surgeons (N = 8,100)n (%)[a]	p-value[b]
Age (years)				<0.001
Mean (SD)	58.9 (18.2)	56.2 (20.3)	59.9 (17.2)	
Median (IQR)	63 (52–71)	62 (49–70)	64 (53–71)	
Gender				<0.001
Female	5167 (46.9%)	1776 (61.1%)	3391 (41.9%)	
Male	5840 (53.1%)	1131 (38.9%)	4709 (58.1%)	
Race				<0.001
White	8954 (81.3%)	2260 (77.7%)	6694 (82.6%)	
Black or African American	1177 (10.7%)	374 (12.9%)	803 (9.9%)	
Asian	193 (1.8%)	58 (2.0%)	135 (1.7%)	
Multiple	105 (1.0%)	34 (1.2%)	71 (0.9%)	
Other	578 (5.3%)	181 (6.2%)	397 (4.9%)	
Ethnicity				0.09
Hispanic or Latino	239 (2.2%)	74 (2.5%)	165 (2.0%)	
Not Hispanic or Latino	10224 (92.9%)	2663 (91.6%)	7561 (93.3%)	
Highest Level of School Completed				0.03
Did not graduate high school	384 (3.5%)	123 (4.2%)	261 (3.2%)	
High school graduate, <4 year college	4278 (38.9%)	1154 (39.7%)	3124 (38.6%)	
4-year college graduate	2420 (22.0%)	632 (21.7%)	1788 (22.1%)	
More than 4-year college degree	3779 (34.3%)	960 (33.0%)	2819 (34.8%)	
Overall Health Rating				0.02
Excellent	1611 (14.6%)	444 (15.3%)	1167 (14.4%)	
Very Good	4234 (38.5%)	1177 (40.5%)	3057 (37.7%)	
Good	3602 (32.7%)	907 (31.2%)	2695 (33.3%)	
Fair	1282 (11.6%)	310 (10.7%)	972 (12.0%)	
Poor	215 (2.0%)	59 (2.0%)	156 (1.9%)	
Overall Mental or Emotional Health Rating				0.18
Excellent	1411 (12.8%)	274 (9.4%)	1137 (14.0%)	
Very Good	1299 (11.8%)	290 (10.0%)	1009 (12.5%)	
Good	714 (6.5%)	157 (5.4%)	557 (6.9%)	
Fair	187 (1.7%)	42 (1.4%)	145 (1.8%)	
Poor	35 (0.3%)	11 (0.4%)	24 (0.3%)	

[a] Percentages may not add up to 100 due to rounding or missing values.
[b] P-values for categorical variables are from chi-square tests. P-values from continuous variables are from Satterthwaite t-tests.

Table 2
Characteristics of surgeons (N = 134) included in the patient CGCAHPS surveys at a single academic institution in 2016. CGCAHPS: Clinician and Group Consumer Assessment of Healthcare Providers and Systems.

	All providers (N = 134)n (%)[a]	Female surgeons (N = 58)n (%)[a]	Male surgeons (N = 76)n (%)[a]	p-value[b]
Age (years)				0.004
Mean (SD)	45.7 (9.6)	42.9 (9.9)	47.8 (9.0)	
Median (IQR)	45.5 (37–52)	43 (34–50)	47 (41–54)	
Specialty				0.10
Acute Care Surgery	9 (6.7%)	5 (8.6%)	4 (5.3%)	
Advanced Oncologic and GI Surgery	41 (30.6%)	25 (43.1%)	16 (21.1%)	
Cardiovascular and Thoracic Surgery	23 (17.2%)	8 (13.8%)	15 (19.7%)	
Head and Neck Surgery, Communications Science	25 (18.7%)	9 (15.5%)	16 (21.1%)	
Plastic, Maxillofacial & Reconstructive	11 (8.2%)	3 (5.2%)	8 (10.5%)	
Urology	25 (18.7%)	8 (13.8%)	17 (22.4%)	
Number of surveys returned				<0.001
Mean (SD)	82.1 (79.05)	50.1 (46.42)	106.6 (89.70)	
Median (IQR)	62.5 (17.0–125.0)	33.0 (13.0–72.0)	87.5 (35.5–163.5)	

[a] Percentages may not add up to 100 due to rounding or missing values.
[b] P-values for categorical variables are from Fisher exact tests. P-values from continuous variables are from Satterthwaite t-tests.

Subgroup analysis comparing female and male surgeons for female and male patients separately noted significantly higher scores for female providers (vs male providers) from female patients (p = 0.003); no differences were noted for male patients. This did not remain significant after adjusting for provider and patient characteristics (Table 4).

Discussion

As the importance of patient satisfaction scores continue to rise, determining the extent to which these are accurate reflections of physician and hospital-level performance, or are instead influenced by patient characteristics, becomes increasingly relevant.[1,3,6] In this institutional sample of CGCAHPS surveys of academic surgeons' clinical performance, we found that patient satisfaction scores were significantly correlated with non-modifiable patient and visit characteristics, including age, race, education, health status, and type of visit. We also identified that patients rated female surgeons higher in terms of time spent during their visit and ease of explanations. However, while female patients ranked female surgeons' performances higher in an unadjusted model, satisfaction scores did not vary by surgeon gender after adjustment, suggesting that

Table 3
Sample of questionnaire responses from patient CGCAHPS surveys (N = 11,007) at a single academic institution in 2016. CGCAHPS: Clinician and Group Consumer Assessment of Healthcare Providers and Systems.

	All patients (N = 11,007)n (%)[a]	Patients seeing female surgeons (N = 2,907)n (%)[a]	Patients seeing male surgeons (N = 8,100)n (%)[a]	p-value[b]
Was this visit with this provider an appointment for a check-up or routine care?				<0.001
Yes	4309 (39.1%)	1246 (42.9%)	3063 (37.8%)	
No	4068 (37.0%)	1004 (34.5%)	3064 (37.8%)	
During this visit, did this provider explain things in a way that was easy to understand?				0.004
Yes, definitely	10249 (93.1%)	2746 (94.5%)	7503 (92.6%)	
Yes, somewhat	595 (5.4%)	123 (4.2%)	472 (5.8%)	
No	112 (1.0%)	28 (1.0%)	84 (1.0%)	
During this visit, did this provider listen carefully to you?				0.05
Yes, definitely	10297 (93.5%)	2750 (94.6%)	7547 (93.2%)	
Yes, somewhat	534 (4.9%)	120 (4.1%)	414 (5.1%)	
No	124 (1.1%)	27 (0.9%)	97 (1.2%)	
During this visit, did you talk with this provider about any health questions or concerns?				0.68
Yes	10083 (91.6%)	2672 (91.9%)	7411 (91.5%)	
No	851 (7.7%)	220 (7.6%)	631 (7.8%)	
During this visit, did this provider give you easy to understand information about these health questions or concerns?				0.47
Yes, definitely	9353 (85.0%)	2490 (85.7%)	6863 (84.7%)	
Yes, somewhat	643 (5.8%)	158 (5.4%)	485 (6.0%)	
No	114 (1.0%)	28 (1.0%)	86 (1.1%)	
During this visit, did this provider show respect for what you had to say?				0.02
Yes, definitely	10412 (94.6%)	2775 (95.5%)	7637 (94.3%)	
Yes, somewhat	414 (3.8%)	89 (3.1%)	325 (4.0%)	
No	125 (1.1%)	26 (0.9%)	99 (1.2%)	
During this visit, did this provider spend enough time with you?				<0.001
Yes, definitely	9960 (90.5%)	2681 (92.2%)	7279 (89.9%)	
Yes, somewhat	774 (7.0%)	161 (5.5%)	613 (7.6%)	
No	216 (2.0%)	48 (1.7%)	168 (2.1%)	

[a] Percentages may not add up to 100 due to rounding or missing values.
[b] P-values for categorical variables are from chi-square tests. P-values from continuous variables are from pooled t-tests.

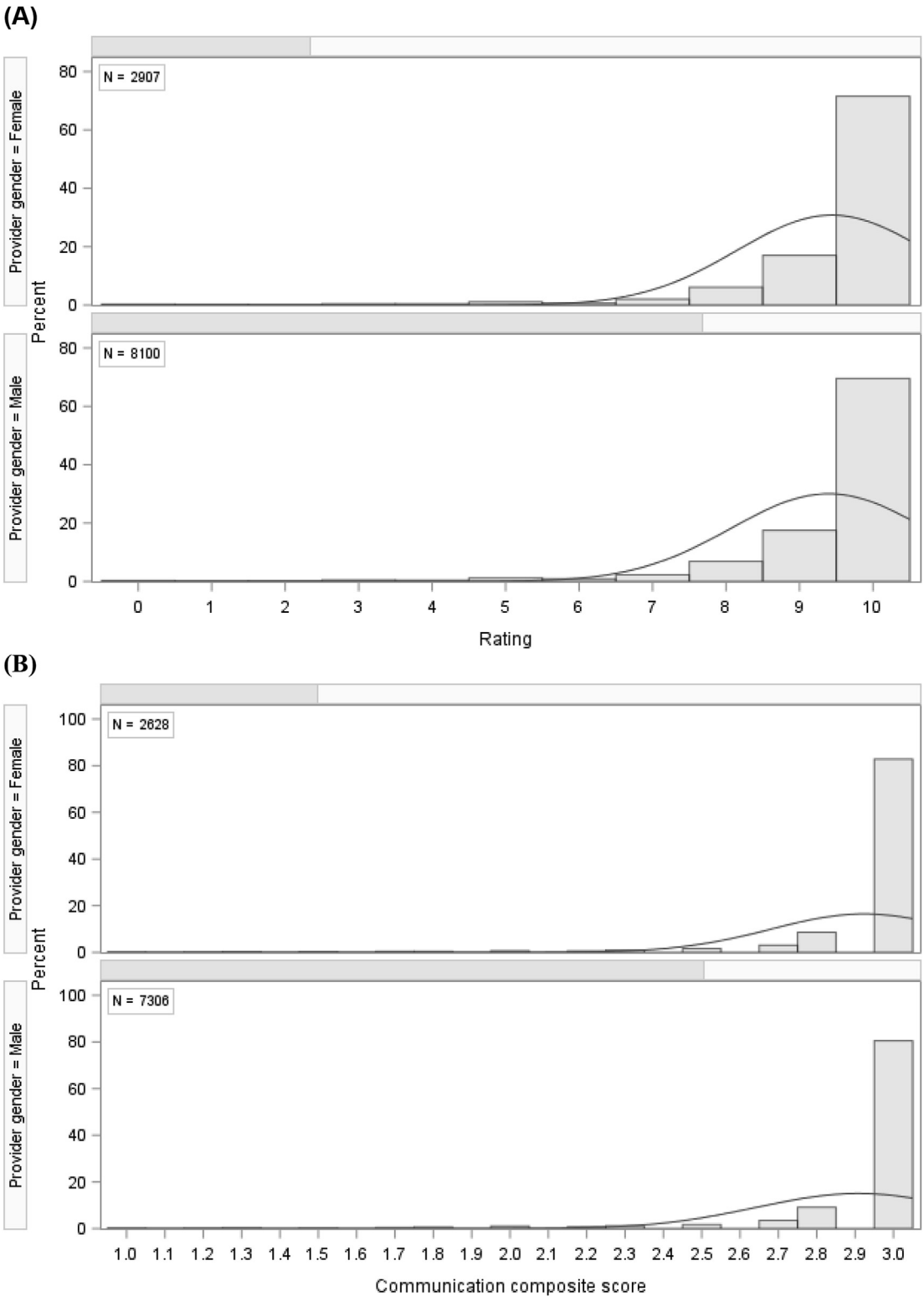

Fig. 2. Patient satisfaction scores from CGCAHPS surveys at a single academic institution in 2016. (A) Overall provider ratings by provider gender (N = 11,007) and (B) Communication composite scores by provider gender (N = 9,934). CGCAHPS: Clinician and Group Consumer Assessment of Healthcare Providers and Systems.

patient satisfaction scores of surgeons may correlate more closely with patient variables than surgeon factors. At the institutional level, patient satisfaction scores have been associated with measures of surgical efficiency and quality, with higher scores among hospitals with lower risk-adjusted length of stay, readmission rates, minor complications, and overall mortality.[1,3] However, other studies have reported that surgical patient satisfaction did not correlate with hospital safety culture score or hospital performance on safety measures, creating uncertainty as to whether satisfaction scores could be used as proxies for quality of care.[4]

Table 4
Adjusted Poisson regression model of 'Overall Provider Rating' for all patients combined (N = 7,939), female patients only (N = 3,700), and male patients only (N = 4,239). Analysis based on patient CGCAHPS surveys at a single academic institution in 2016. CGCAHPS: Clinician and Group Consumer Assessment of Healthcare Providers and Systems. RR: relative risk. CI: confidence intervals.

	All Patients			Female Patients			Male Patients		
	RR (95% CI)	p-value	Overall p-value[a]	RR (95% CI)	-value	Overall p-value[a]	RR (95% CI)	p-value	Overall p-value[a]
Provider Gender			0.16			0.18			0.86
Male	REF			REF			REF		
Female	1.01 (1.00–1.02)	0.16		1.01 (0.99–1.03)	0.18		1.00 (0.99–1.01)	0.86	
Provider Age (years)	1.00 (1.00–1.00)	0.48	0.47	1.00 (1.00–1.00)	0.35	0.35	1.00 (1.00–1.00)	0.51	0.52
Provider Specialty			0.83			0.83			0.33
Acute Care Surgery	REF			REF			REF		
Advanced Oncologic and GI Surgery	1.01 (0.98–1.04)	0.63		1.03 (0.98–1.07)	0.25		0.99 (0.97–1.01)	0.28	
Cardiovascular and Thoracic Surgery	1.02 (0.98–1.05)	0.33		1.03 (0.99–1.08)	0.15		1.00 (0.98–1.02)	0.92	
Head and Neck Surgery, Communications Science	1.01 (0.98–1.04)	0.62		1.03 (0.98–1.08)	0.23		0.98 (0.97–1.00)	0.07	
Plastic, Maxillofacial & Reconstructive	1.02 (0.99–1.06)	0.24		1.04 (0.99–1.09)	0.12		1.00 (0.97–1.02)	0.78	
Urology	1.01 (0.98–1.04)	0.38		1.04 (0.99–1.09)	0.12		0.99 (0.97–1.01)	0.25	
Patient Age (years)	1.00 (1.00–1.00)	<0.001	<0.001	1.00 (1.00–1.00)	<0.001	<0.001	1.00 (1.00–1.00)	<0.001	<0.001
Patient Gender			0.001			*n/a*			*n/a*
Male	REF			*n/a*	*n/a*		*n/a*	*n/a*	
Female	0.99 (0.98–0.99)	<0.001		*n/a*	*n/a*		*n/a*	*n/a*	
Patient Race			0.003			0.01			0.08
White	REF			REF			REF		
Black or African American	0.99 (0.98–1.00)	0.22		1.00 (0.98–1.02)	0.87		0.99 (0.97–1.00)	0.04	
Asian	0.95 (0.92–0.99)	0.007		0.95 (0.91–1.00)	0.05		0.95 (0.90–1.00)	0.04	
Multiple	1.02 (1.00–1.05)	0.09		1.06 (1.02–1.09)	0.001		0.99 (0.96–1.03)	0.67	
Other	0.97 (0.95–0.99)	0.006		0.96 (0.92–1.00)	0.03		0.98 (0.96–1.01)	0.15	
Patient Ethnicity			0.26			0.21			0.64
Hispanic or Latino	REF			REF			REF		
Not Hispanic or Latino	0.99 (0.96–1.01)	0.26		0.97 (0.94–1.01)	0.2		0.99 (0.96–1.02)	0.65	
Highest Level of School Completed			<0.001			0.005			0.001
Did not graduate high school	REF			REF			REF		
High school graduate, <4 year college	0.99 (0.98–1.01)	0.45		0.99 (0.96–1.02)	0.65		1.00 (0.98–1.01)	0.63	
4-year college graduate	0.98 (0.96–1.00)	0.02		0.98 (0.95–1.01)	0.25		0.98 (0.96–0.99)	0.01	
More than 4-year college degree	0.97 (0.96–0.99)	0.002		0.97 (0.94–1.00)	0.04		0.98 (0.96–1.00)	0.03	
Patient Overall Health Self Rating			<0.001			<0.001			<0.001
Excellent	REF			REF			REF		
Very Good	0.97 (0.97–0.98)	<0.001		0.97 (0.96–0.98)	<0.001		0.98 (0.97–0.99)	<0.001	
Good	0.96 (0.95–0.97)	<0.001		0.95 (0.94–0.97)	<0.001		0.96 (0.95–0.97)	<0.001	
Fair	0.95 (0.93–0.96)	<0.001		0.93 (0.91–0.96)	<0.001		0.96 (0.94–0.97)	<0.001	
Poor	0.91 (0.87–0.95)	<0.001		0.88 (0.83–0.94)	<0.001		0.93 (0.89–0.97)	0.001	
Appointment for a check-up or routine care			<0.001			0.003			<0.001
Yes	REF			REF			REF		
No	0.98 (0.97–0.99)	<0.001		0.98 (0.97–0.99)	0.001		0.98 (0.97–0.99)	<0.001	

[a] Overall p-values are from generalized score statistics.

The complex interplay between patient, physician, and hospital-level factors which influence patient satisfaction scores may explain some of the conflicting results regarding the correlation between satisfaction scores and surgical quality of care. First, overall patient satisfaction may be tied to intrinsic patient characteristics, including both current health status and demographic-specific expectations for care, rather than reflecting the quality of care provided. In our sample of surgical patients, older age was associated with higher satisfaction scores, while other patient factors such as female gender, Asian race, higher education, and poorer overall health status were associated with lower scores. Further, visit type other than "routine" was associated with lower satisfaction ratings. Similar to our findings, other researchers have shown that surgical patient satisfaction scores have been found to be influenced by age, race, marital status, current health status, and education level, with studies reporting higher dissatisfaction among certain races,[8,9] younger patients,[6,16] unmarried patients,[6] and patients with poorer health and lower education levels.[6,9,16] Furthermore, visit characteristics have been shown to influence satisfaction, with scores significantly lower at first outpatient visits.[6] Considering that these factors may not correlate with actual clinical experience, adjusting surgeon patient satisfaction scores to account for these non-modifiable characteristics may enable these scores to more accurately reflect quality of care delivered.

Aside from patient characteristics, provider factors may also affect patient satisfaction scores. While the number of female trainees entering surgical fields are increasing, females continue to be underrepresented in senior positions in academic surgery, creating potential for bias from patients.[17] In other fields, patient satisfaction scores have been found to vary by gender. In an analysis of Press-Ganey outpatient satisfaction scores at a gynecology clinic, female physicians were significantly less likely to receive top satisfaction ratings compared to their male counterparts.[12] While differences in ratings are multifactorial, they are likely influenced by patient expectations and whether the provider did or did not meet those expectations. In a similar manner, patients may prefer a provider based on gender, as they may associate that gender with certain expectations on how the care will be delivered. For example, in a survey distributed to patients in an orthopedic clinic, the majority of patients had no preference for physician gender; however, among those who did, male physicians were preferred.[10] Other studies have reported patient preference based on gender concordance for other surgical subspecialties, which may be correlated in part with patient expectations. Before adjustment, we found that gender concordance may enhance patient satisfaction, with female patients more likely to rate female surgeons higher. However, in all models, male patients showed no preference for provider gender. Similarly, preference for a gender concordant physician has been reported for both male and female patients in outpatient urology,[18,19] and female patients have been shown to prefer female surgeons for outpatient exams before breast surgery[20] and for aesthetic plastic surgery.[21] While many of these findings may reflect subspecialty-specific trends, such as the personal nature of breast or urologic examinations, our study provides a unique opportunity to study this trend in a large sample spanning surgical subspecialties.

The enhanced satisfaction gained from gender-concordant pairs of female patients and physicians in clinical settings may be explained by gender differences in communication style. Female physicians have been shown across specialties to have improved patient-centered communication and to spend more time with patients.[11,15,22–24] In our study, patients were more likely to select "Yes, Definitely" for female surgeons spending sufficient time with them during their appointment and explaining things in a way that was "easy to understand" compared to male surgeons. Further, while not significant, a higher percentage of patients reported that female providers listened "carefully" to them compared to male providers. Previous studies have shown that female congruent communication styles, including increased empathy often displayed by female providers, leads to higher satisfaction when female patients see female physicians.[23] However, this communication difference has been reported to not impact the overall satisfaction of male patients.[23] Thus, underlying gender differences in communication preference could potentially account for our observed increased satisfaction among female patients seeing female surgeons, a finding which warrants consideration, especially by male providers, during clinical encounters.

Ultimately, we aim for this study to inform policymakers, insurance providers, institutional leaders, and surgeons about the numerous factors that may contribute to surgical patients' satisfaction in clinic. Moving toward value-based compensation systems, adjusting satisfaction ratings for our identified non-modifiable patient characteristics that influence these scores, such as age, race, gender, and health status, may make these models more accurate estimations of patient experience applicable across diverse surgical patient populations. Further, as surgeons look to enhance patient care and their ratings, increasing awareness of patient demographics that influence satisfaction as well as gender-specific differences in communication styles may enable surgeons to identify areas in which they can improve patients' overall clinical experiences. Therefore, as healthcare institutions seek to improve their ratings, it will be important to consider the perspective of a diverse patient population.

Although our study provides meaningful insight into the correlation between surgeons and patient satisfaction scores, it has several limitations. While the Department for Performance Services linked CGCAHPS scores with various patient demographic characteristics, complications and outcomes from surgeries were not collected, both of which have been shown to influence patient satisfaction[7] and could contribute to satisfaction reported during post-operative visits. We also note that the distribution of CGCAHPS scores are highly skewed, necessitating a Poisson regression analysis. Variability in provider-level demeanor and communication style limits our ability to draw conclusions about the influence of surgeon gender across providers as a whole. Furthermore, the demographic composition of our patient population may not be representative of surgical patient populations in other regions of the country. For example, we noted a higher than anticipated education level in our study population of surgical patients that returned a survey. However, our analysis included an adjusted Poisson regression model, which likely helped to minimize the impact of these differences. Finally, we report significant variability in the proportion of surveys returned between provider gender (median of 87.5 surveys for males vs 33 surveys for females), which likely creates potential for response bias. Unfortunately, the underlying cause of the observed differences in the number of returned surveys is unknown. It could be that male surgeons saw more patients in clinic at our institution in 2016, which could be related to male surgeons doing more surgeries and/or male surgeons seeing more patients in clinic in general. Since the male providers were slightly older, they could have had more established clinics and larger patient populations. Alternatively, response rates could have also been influenced by reminders or suggestions given by providers and/or their team members. Regrettably, we do not have information on the population that was sent the survey, which could help inform this question. Nevertheless, our study represents one of the largest analyses of factors influencing surgeon performance ratings in outpatient settings. Our finding that patient factors, rather than surgeon factors, may be more closely correlated with ratings should be considered in value-based models to more

accurately correlate patient satisfaction scores with physician performance.

Conclusions

Our work suggests that patient satisfaction scores of surgeons may be more closely correlated with patient characteristics and demographics than with surgeon factors, including surgeon gender. However, further studies are needed to further explore these potential confounders and their impact on patient satisfaction. As satisfaction scores become incorporated into measures of hospital and provider performance, increased awareness of nonmodifiable factors which drive patient satisfaction scores in surgical clinics may inform adjusted rating and compensation models to more accurately reflect surgeon performance.

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Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.amjsurg.2020.07.036.

Appendix

Variables Recoded for Reporting Purposes

- Patient race
  - o If multiple races were selected, race was set to "Multiple."
  - o Native Hawaiian or Other Pacific Islander, American Indian or Alaska Native, and patients who did not select a race were grouped in the "Other" category.
  - o All other races were presented as listed in the survey.
- Provider specialty
  - o "General and Advanced GI" and "Trauma and Critical Care" were grouped into "Acute Care Surgery."
  - o "Abdominal Transplant" was grouped with "Advanced Oncologic and GI Surgery."
  - o "Thoracic Surgery" and "Vascular" were grouped into "Cardiovascular and Thoracic Surgery."
  - o All other provider specialties were presented as categorized by the Department of Performance Services at (name withheld).
- Patient education
  - o "8th grade or less" and "Some high school, but did not graduate" were grouped into "Did not graduate high school."
  - o "High school graduate or GED" and "Some college or 2-year degree" were grouped into "High school graduate, <4 year college."
  - o All other education groups were presented as listed in the survey.
- Questionnaire composite scores
  - o The method for composite scores was taken from Patient Experience Measures from the CAHPS Clinician & Group Survey (Four-Point Scale) (last updated 9/26/2014).

Applying the Proportional Scoring Method to Clinician & Group Survey Composites

Given a composite with five items, where each item has four response options, a provider's score for that composite is the proportion of responses (excluding missing data) in each response category. The following steps show how those proportions are calculated:

Step 1 – Calculate the proportion of cases in each response category for the first question:

P11 = Proportion of respondents who answered "never".
P12 = Proportion of respondents who answered "sometimes".
P13 = Proportion of respondents who answered "usually".
P14 = Proportion of respondents who answered "always".

Follow the same steps for the second question:

P21 = Proportion of respondents who answered "never".
P22 = Proportion of respondents who answered "sometimes".
P23 = Proportion of respondents who answered "usually".
P24 = Proportion of respondents who answered "always".

Repeat the same procedure for each of the questions in the composite.

Step 2 – Combine responses from the questions to form the composite

Calculate the average proportion responding to each category across the questions in the composite. For example, in the "Getting Appointments and Health Care When Needed" composite (five questions), calculations would be as follows:

PC1 = Composite proportion who said "never" = (P11 + P21 + P31 + P41 + P51)/5.

PC2 = Composite proportion who said "sometimes" = (P12 + P22 + P32 + P42 + P52)/5.

PC3 = Composite proportion who said "usually" = (P13 + P23 + P33 + P43 + P53)/5.

PC4 = Composite proportion who said "always" = (P14 + P24 + P34 + P44 + P54)/5.

Question Groups for Composite Scores

Note question numbering on the (name withheld) CAHPS survey is different.

Getting Timely Appointments, Care, and Information

The survey asked patients how often they got appointments for care as soon as needed and timely answers to questions when they called the office.

The survey also asked patients how often they saw the provider within 15 minutes of their appointment time.

Q6	Patient got appointment for urgent care as soon as needed	**Response Options** • Never • Sometimes • Usually • Always
Q8	Patient got appointment for non-urgent care as soon as needed	
Q10	Patient got answer to medical question the same day he/she phoned provider's office	
Q12	Patient got answer to medical question as soon as he/she needed when phoned provider's office after hours	
Q13	Patient saw provider within 15 minutes of appointment time	

How Well Providers (or Doctors) Communicate with Patients

The survey asked patients if their providers explained things clearly, listened carefully, showed respect, provided easy to understand instructions, knew their medical history, showed respect, and spent enough time with the patient during the most recent visit.

Q16	Provider explained things in a way that was easy to understand	**Response Options** • Yes, definitely • Yes, somewhat • No
Q17	Provider listened carefully to patient	
Q19	Provider gave easy to understand information about health questions or concerns	
Q20	Provider knew the important information about patient's medical history	
Q21	Provider showed respect for what patient had to say	
Q22	Provider spent enough time with patient	

Helpful, Courteous, and Respectful Office Staff

The survey asked patients if office staff were helpful and treated them with courtesy and respect during the most recent visit.

Q27	Clerks and receptionists helpful	**Response Options** • Yes, definitely • Yes, somewhat • No
Q28	Clerks and receptionists courteous and respectful	

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