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Patient- and Surgeon-Level Variation in Patient-Reported Sexual Function Outcomes Following Radical Prostatectomy Over 2 Years

Results From a Statewide Surgical Improvement Collaborative

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IMPORTANCE Of patient-reported outcomes for individuals undergoing radical prostatectomy, sexual function outcomes are among the most reported and the most detrimental to quality of life. Understanding variations at the patient and surgeon level may inform collaborative quality improvement.

OBJECTIVE To describe patient- and surgeon-level sexual function outcomes for patients undergoing radical prostatectomy in the Michigan Urological Surgery Improvement Collaborative (MUSIC) and to examine the correlation between surgeon case volume and sexual function outcomes.

DESIGN, SETTING, AND PARTICIPANTS This is a prospective cohort study using the MUSIC registry and patient-reported sexual function outcome data. Patient- and surgeon-level variation in sexual function outcomes were examined among patients undergoing radical prostatectomy from May 2014 to August 2019. Sexual function outcome data were collected using validated questionnaires, which were completed before surgery and at 3, 6, 12, and 24 months' follow-up following surgery. All participants were male. Race and ethnicity data were self-reported and were included to examine potential variation in outcomes by race and/or ethnicity. Data were analyzed from January 2021 to March 2021.

MAIN OUTCOMES AND MEASURES There were 4 outcomes in this study, including the 26-item Expanded Prostate Cancer Index Composite (EPIC-26) sexual function scores at 3, 6, 12, and 24 months' follow-up; patient-level sexual function recovery at 12- and 24-month follow-up; surgeon-level variation in sexual function outcomes at 12- and 24-month follow-up; and correlation between surgeon case volume and sexual function outcomes.

RESULTS A total of 1426 male patients met inclusion criteria for this study. The median (IQR) age was 64 (58-68) years. A total of 115 participants (8%) were Black, 1197 (84%) were White, 25 (2%) were of another race or ethnicity (consolidated owing to low numbers), and 89 (6%) were of unknown race or ethnicity. Among patients undergoing bilateral nerve-sparing radical prostatectomy, mean (SD) EPIC-26 sexual function scores at 12- and 24-month follow-up (12 months, 39 [28]; 24 months, 63 [29]) did not return to baseline levels. There was wide variation in EPIC-26 sexual function scores at both 12-month follow-up (range, 23-69; $P < .001$) and 24-month follow-up (range, 27-64; $P < .001$). Similar variations were found in EPIC-26 sexual function scores and recovery of sexual function by surgeon. Recovery rates ranged from 0% to 40% of patients at 12-month follow-up (18 surgeons; $P < .001$) and 3% to 44% of patients at 24-month follow-up (12 surgeons; $P < .001$). Surgeon case volume and sexual function outcomes were not significantly correlated. On multivariable analysis, the following variables were associated with better recovery at 24-month follow-up: younger age ($P < .001$), lower baseline EPIC-26 sexual function score ($P < .001$), lower Gleason score ($P = .05$), and nonobesity ($P = .03$).

CONCLUSIONS AND RELEVANCE In this study, there was significant patient- and surgeon-level variation in sexual function recovery over 2 years following radical prostatectomy. Variation in surgeon-level sexual function outcomes presents an opportunity and model for surgical collaborative quality improvement.

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Radical prostatectomy (RP) is the most frequently selected treatment choice for localized prostate cancer,^{1,2} yet has the potential to negatively affect sexual function, a key patient-reported outcome and integral component of health-related quality of life.³ Population-based studies estimate that 78% to 87% of patients have erectile dysfunction following RP, an outcome associated with patient distress, dissatisfaction, and decision regret.⁴⁻⁶ Patient-reported sexual function outcomes are indispensable in the provision of high-quality care.⁷

Michigan Urological Surgery Improvement Collaborative (MUSIC) Patient Reported Outcomes (PRO) assesses patient recovery following RP. Despite the fact that sexual function outcomes are an important measure of high-quality and high-value care, little has been done to improve these outcomes at the surgeon level. To date, to our knowledge, there are no data on the association of surgeon characteristics with sexual function outcomes among patients undergoing RP. However, data on sexual function have facilitated patient counseling and shared decision-making,⁸ and there remains an opportunity to examine methods to potentially improve these outcomes. Outcome variation at the surgeon level potentially introduces a modifiable process in the structure, process, and outcome framework of health care quality.⁹ In this framework, structural measures impact process measures, which in turn affect outcomes. For example, it is plausible that in a cohort of patients with favorable characteristics, 2 surgeons may have varied sexual function outcomes attributable to surgeon technique and skill level. If this is recognized and examined, collaborative quality improvement may lead to improved sexual function outcomes and subsequently improved patient satisfaction and less decision regret.

Herein, we describe sexual function recovery over 2 years and examine patient- and surgeon-level variation in sexual function recovery using data from MUSIC, a physician-led quality improvement collaborative established in 2011 in partnership with Blue Cross Blue Shield of Michigan.¹⁰ Our aim is to provide insight into factors associated with patient-level sexual function recovery with the potential for quality improvement to optimize sexual function outcomes after RP.

Methods

MUSIC comprises 46 diverse community and academic urology practices representing approximately 90% of the urologists in the state of Michigan. A key priority of MUSIC is to improve patient-reported outcomes after RP through collaborative quality improvement. This objective led to the development of MUSIC-PRO, a statewide web-based system established in 2014 for measuring and improving outcomes and health-related quality of life; data are collected at baseline (before RP) and 3, 6, 12, and 24 months' follow-up following RP.¹¹ Prior reports have described MUSIC's data acquisition and quality control activities.^{12,13} Each MUSIC practice obtained an exemption or approval for collaborative participation from a local institutional review board, and informed consent was waived as participation is voluntary. The cohort in this study

Key Points

Question Is there patient- and surgeon-level variation in patient-reported sexual function outcomes following radical prostatectomy?

Findings In this cohort study including 1426 male patients, there was wide variation in patient-reported sexual function outcomes at the patient and surgeon level, which persisted when controlling for patient characteristics. There was no significant correlation between surgeon case volume and sexual function outcomes.

Meaning Surgeon-level variation in sexual function outcomes among patients undergoing radical prostatectomy may present an opportunity for collaborative quality improvement.

included all men in the MUSIC registry who underwent RP from May 2014 to August 2019 and enrolled in MUSIC-PRO. Data were analyzed from January 2021 to March 2021.

Measures

The MUSIC-PRO survey administered from May 2014 to September 2016 used the Memorial Sloan Kettering Symptom Tracking and Reporting system. This system includes the International Index of Erectile Function 6 (IIEF-6)¹⁴ to measure sexual function. The subsequent MUSIC-PRO survey administered from September 2016 to the present uses the 26-item Expanded Prostate Cancer Index Composite (EPIC-26).¹⁵ The surveys were administered at baseline (prior to RP) and 3, 6, 12, and 24 months' follow-up following RP. A crosswalk was used to convert the IIEF-6 items to EPIC-26 domain scores.¹⁶

The IIEF-6 measures sexual function. Higher scores indicate better function. Patients who were not sexually active were prompted to bypass the IIEF-6 and were not included in the analyses. EPIC-26 domains include sexual (6 items), urinary irritation or obstruction (4 items), urinary incontinence (4 items), bowel (6 items), and vitality or hormonal (5 items). Each domain is scored from 0 to 100, with increasing scores representing better function. EPIC-26 was specifically designed for measuring health-related quality of life for patients undergoing prostate cancer treatments. Clinical interpretation of the EPIC-26 has been described.¹⁷

The MUSIC registry includes detailed clinical and demographic information, including patient age, race and ethnicity, prostate-specific antigen (PSA), comorbidities, Gleason score, clinical or pathological T stage, body mass index (BMI; calculated as weight in kilograms divided by height in meters squared), nerve sparing (none, unilateral, and bilateral), surgeon, and MUSIC-PRO survey responses.

Outcomes

Four outcomes were examined in this study: mean EPIC-26 sexual domain scores at 3, 6, 12 and 24 months' follow-up; sexual function recovery at 12- and 24-month follow-up; surgeon-level variation in sexual function at 12- and 24-month follow-up; and correlation between surgeon case volume and sexual function outcomes. Sexual function recovery was defined as recovery of 90% or more of baseline EPIC-26 sexual domain score at each time point.

Statistical Analyses

EPIC-26 Sexual Domain Scores

Mean EPIC-26 sexual domain scores at each time (baseline and 3, 6, 12, and 24 months' follow-up) were summarized and stratified by nerve-sparing status (none, unilateral, and bilateral). Among patients with both baseline and 24-month PRO data, clinical and demographic characteristics were summarized using appropriate tests. The proportion of patients achieving sexual function recovery at 12- and 24-month follow-up was compared across different patient subgroups using χ^2 test.

Multivariable Model

To assess independent associations between patient-level factors and sexual function recovery, a mixed-effects logistic regression model was performed. The model included patient demographic characteristics (age and race and ethnicity), clinical characteristics (BMI and diabetes status), baseline EPIC-26 urinary and sexual function score, tumor characteristics (pro-

tate-specific antigen, Gleason score, and clinical T stage), and nerve-sparing status at RP as predictors. All predictors were selected prior to analysis, and the model included random intercepts for surgeons to account for within-surgeon associations. Adjusted odds ratios and 95% CIs were reported for each predictor.

Surgeon-Level Analysis

Surgeon-level variation in EPIC-26 sexual domain score and sexual function recovery was assessed. To reduce between-surgeon variability as a result of patient case mix, only men who underwent bilateral nerve-sparing RP and had a baseline EPIC-26 sexual domain score of 73 or higher were included for this analysis, with the cutoff selected a priori based on published definitions of potency.¹⁶ In addition, only surgeons with at least 10 patients meeting the aforementioned criteria at 12- or 24-month follow-up were included for comparison. Caterpillar plots were used to demonstrate surgeon-level variation on postsurgical EPIC-26 scores and sexual recovery. To examine the correlation between surgeon case volume and sexual function outcomes, Pearson and Spearman correlation coefficients were calculated for mean EPIC-26 sexual function score and proportion of patients achieving sexual function recovery, respectively. All statistical analyses were performed using SAS version 9.4 (SAS Institute). Two-tailed *P* values were considered statistically significant at *P* < .05.

Table 1. Clinical and Demographic Characteristics of Study Sample

Characteristic	No. (%)
Age, median (IQR), y	64 (58-68)
BMI, median (IQR) ^a	28 (26-32)
Marital status	
Married/in relationship/dating	1146 (90)
Single/divorced/widowed	129 (10)
Race ^b	
Black	115 (8)
White	1197 (84)
Other ^c	25 (2)
Unknown	89 (6)
Gleason grade group	
1	310 (22)
2	648 (46)
3	252 (18)
4	118 (8)
5	88 (6)
Clinical stage	
cT1	1054 (74)
cT2/3	371 (26)
Nerve sparing	
None	209 (15)
Unilateral	143 (10)
Bilateral	1074 (75)
Radical prostatectomy type	
Laparoscopic/robotic	1370 (96)
Open	56 (4)

Abbreviation: BMI, body mass index.

^a Calculated as weight in kilograms divided by height in meters squared.

^b Race and ethnicity data were collected by self-report.

^c Other race designation includes American Indian, Asian, and Native Hawaiian/Pacific Islander, combined owing to low overall numbers.

Results

Sample Description

A total of 1426 male patients with baseline and 24-month EPIC-26 sexual domain scores were included in the current analysis (Table 1). The median (IQR) age was 64 (58-68) years. Regarding race and ethnicity, 115 patients (8%) were Black; 1197 (84%) were White; 25 (2%) were of another race or ethnicity, including Asian, Native American, or Hawaiian/Pacific Islander, combined owing to low numbers; and there were 89 patients (6%) for whom race and ethnicity were unknown. The median (IQR) BMI was 28 (26-32), and most (1146 [90%]) were married, in a relationship, or dating. Of 1416 patients with Gleason grade group score data, 958 (68%) had Gleason grade group 1 or 2 prostate cancer. Most patients (1074) underwent bilateral nerve-sparing RP (75%).

EPIC-26 Sexual Domain Scores

Table 2 shows mean EPIC-26 sexual domain scores by nerve-sparing type. The mean (SD) EPIC-26 sexual domain score at baseline was 48 (31) for those who underwent no nerve sparing, 62 (28) for those who underwent unilateral nerve sparing, and 63 (29) for those who underwent bilateral nerve sparing (*P* < .001). At 3-month follow-up, mean (SD) EPIC-26 sexual domain score was 17 (16) for those who underwent no nerve sparing, 22 (19) for those who underwent unilateral nerve sparing, and 27 (24) for those who underwent bilateral nerve sparing (*P* < .001). At 24-month follow-up, the mean (SD) EPIC-26 sexual domain score was 23 (23) for those who underwent no nerve sparing, 30 (25)

Table 2. EPIC-26 Sexual Domain Scores at Each Assessment Time by Nerve Sparing

Metric	Nerve sparing			P value
	None	Unilateral	Bilateral	
Baseline				
Respondents, No.	842	569	3300	<.001
EPIC-26 score, mean (SD)	48 (31)	62 (28)	63 (29)	
3 mo				
Respondents, No.	581	429	2479	<.001
EPIC-26 score, mean (SD)	17 (16)	22 (19)	27 (24)	
6 mo				
Respondents, No.	513	359	2107	<.001
EPIC-26 score, mean (SD)	17 (16)	25 (21)	30.2 (25)	
12 mo				
Respondents, No.	448	297	1780	<.001
EPIC-26 score, mean (SD)	21 (19)	27.6 (23)	35 (28)	
24 mo				
Respondents, No.	209	143	1074	<.001
EPIC-26 score, mean (SD)	23 (23)	30.3 (25)	39 (28)	

Abbreviation: EPIC-26, 26-item Expanded Prostate Cancer Index Composite.

for those who underwent unilateral nerve sparing, and 39 (28) for those who underwent bilateral nerve sparing ($P < .001$).

Sexual Function Recovery

At 24-month follow-up, 336 of 1426 patients (24%) of patients recovered sexual function (ie, recovered 90% or more of their individual baseline EPIC-26 score). Patients who recovered sexual function had lower baseline EPIC-26 sexual domain scores (median [IQR] score: recovered, 59 [21-87]; unrecovered, 72 [44-87]; $P < .001$). Regarding Gleason grade groups, 1210 of 1416 patients (85%) who recovered 90% or more of sexual function were in Gleason grade groups 1, 2, and 3 and 206 of 1426 (15%) were in Gleason grade groups 4 and 5.

Table 3 shows the multivariable model for sexual function recovery. BMI, age, Gleason score, and baseline EPIC-26 sexual domain score were associated with sexual function recovery. Patients with gross obesity (BMI 35 or greater) had less recovery than patients with normal weight (BMI less than 25; odds ratio, 0.55; 95% CI, 0.33-0.93); lower odds of recovery were also observed in older patients (odds ratio, 0.77; 95% CI, 0.69-0.85), patients with better baseline sexual function (odds ratio 0.82; 95% CI, 0.78-0.87), and those with Gleason grade group 5 (odds ratio, 0.49; 95% CI, 0.24-1.00).

Regarding margin status, 379 of 1426 patients (27%) in the 24-month cohort had positive margins. Of these, 87 (23%) recovered sexual function at 24-month follow-up. Of 1047 patients with negative margins, 249 (24%) recovered sexual function. Of 1074 patients who underwent bilateral nerve sparing, 264 (25%) had positive margins. Of 143 patients who underwent unilateral or no nerve sparing, 36 (25%) and 79 (38%), respectively, had positive margins.

Surgeon-Level Analyses

At 12-month follow-up, 18 surgeons and 649 patients met inclusion criteria for the surgeon-level analyses. At 24-month follow-up, 12 surgeons and 408 patients met criteria. The eTable in the Supplement includes characteristics of these patients. Figure 1 illustrates wide surgeon-level variation in mean EPIC-26 sexual domain scores at 12- and 24-month follow-up. Figure 2 illustrates surgeon-level variation in sexual function recovery at 12- and 24-month follow-up for the select cohort of patients with favorable baseline characteristics.

For EPIC-26 sexual domain, mean (SD) scores ranged from 23 (4) to 69 (8) ($P < .001$) at 12-month follow-up across 18 surgeons and from 27 (3) to 64 (7) ($P < .001$) at 24-month follow-up across 12 surgeons. The proportion of patients achieving sexual function recovery ranged from 0 to 10 (0%) to 4 of 10 (40%) (median [IQR], 20.1 [6.3-26.7]) at 12 months follow-up across 18 surgeons and from 1 of 37 (3%) to 7 of 16 (44%) (median [IQR], 27.1 [15.3-36.6]) at 24-month follow-up across 12 surgeons. Among the 18 surgeons included in the analysis, median (IQR; range) RP volume was 42 (30-73; 15-133) cases per year. Among the 12 surgeons included for the 24-month analysis, median (IQR; range) annual RP volume was 38 (31-55; 22-133) cases. At the surgeon level, the Pearson correlation coefficient between case volume and mean EPIC-26 sexual domain score was 0.05 (95% CI, -0.45 to 0.48) at 12-month follow-up and 0.08 (95% CI, -0.52 to 0.62) at 24-month follow-up. The Spearman correlation coefficient between case volume and the proportion of patients achieving sexual function recovery was 0.02 (95% CI, -0.45 to 0.48) at 12-month follow-up and -0.16 (95% CI, -0.67 to 0.46) at 24-month follow-up.

For the 12- and 24-month cohorts, 90% of surgeons in the 12-month analyses had been in practice for more than 10 years

Table 3. Multivariable Model for Sexual Function Recovery

Variable	OR (95% CI)
BMI ^a	
<25	1 [Reference]
25-<30	0.94 (0.65-1.36)
30-<35	0.84 (0.56-1.28)
≥35	0.55 (0.33-0.93) ^b
Race ^c	
White	1 [Reference]
Black	0.92 (0.56-1.51)
Other ^d	0.92 (0.34-2.50)
Unknown	0.83 (0.45-1.50)
No diabetes	1.43 (0.90-2.27)
Gleason grade group	
1	1 [Reference]
2	1.27 (0.90-1.77)
3	0.85 (0.55-1.31)
4	0.72 (0.40-1.31)
5	0.49 (0.24-1.00)
Clinical stage	
cT1 disease	1 [Reference]
cT2/3 disease	1.08 (0.79-1.49)
Nerve sparing	
None	1 [Reference]
Bilateral	1.29 (0.84-2.00)
Unilateral	0.70 (0.38-1.29)
Age (per 5 y)	0.77 (0.69-0.85) ^b
PSA	0.85 (0.70-1.03)
Baseline EPIC-26 (per 10-point units)	
Sexual domain score	0.82 (0.78-0.87) ^b
Urinary domain score	0.92 (0.83-1.02)
Radical prostatectomy type	
Laparoscopic/robotic	1 [Reference]
Open	0.88 (0.40-1.92)

Abbreviations: BMI, body mass index; EPIC-26, 26-item Expanded Prostate Cancer Index Composite; OR, odds ratio; PSA, prostate-specific antigen.

^a Calculated as weight in kilograms divided by height in meters squared.

^b $P < .05$.

^c Race and ethnicity data were collected by self-report.

^d Other race designation includes American Indian, Asian, and Native Hawaiian/Pacific Islander, combined given low overall numbers.

and 72% were fellowship trained. For the surgeons included in the 24-month analysis, 90% had been in practice for more than 10 years, and 75% were fellowship trained. Percentages are given in lieu of raw numbers to protect the privacy of the surgeons.

Discussion

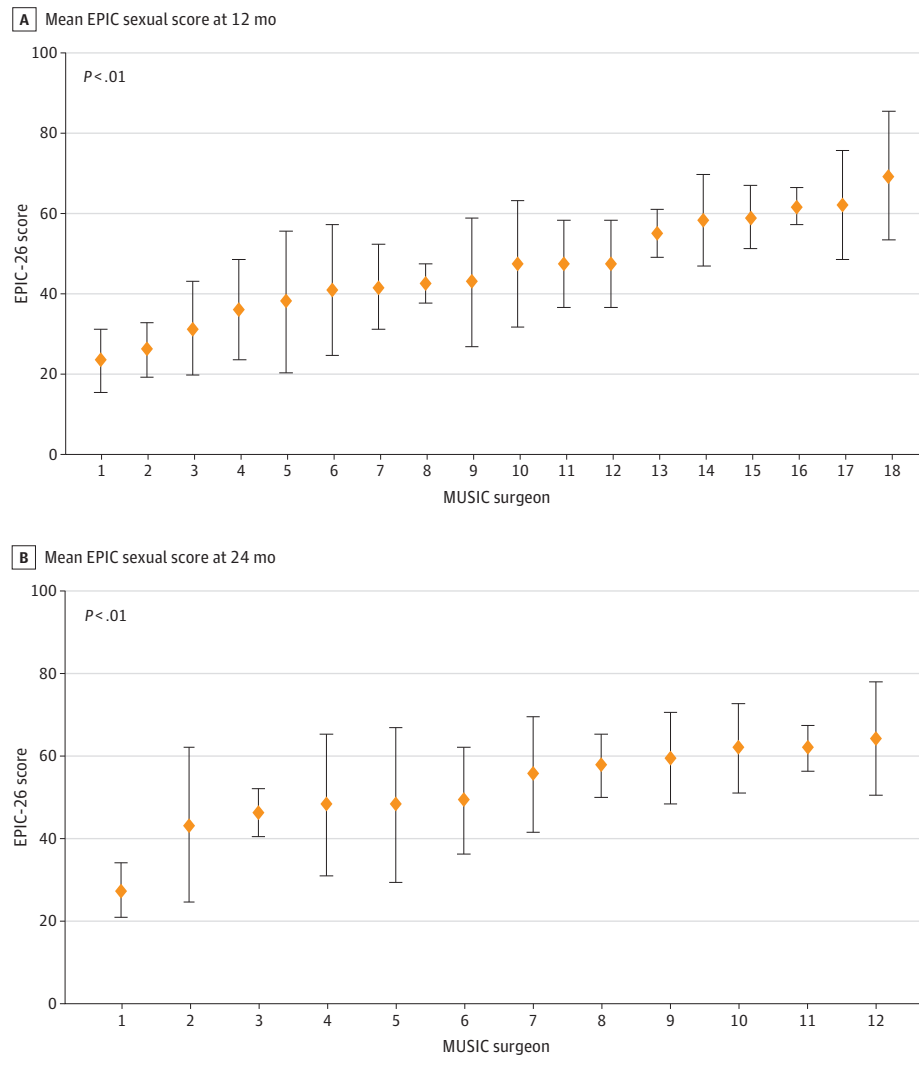
In this study, we reported patient- and surgeon-level variation of EPIC-26 sexual domain scores and sexual function recovery.

We found that, at the patient-level, sexual function was recoverable. At 24-month follow-up, approximately 25% of patients recovered 90% or more of sexual function. We also found that that surgeon characteristics were associated with sexual function outcomes, a factor that may be associated with surgeon skill. Surgeon-level analyses in a select cohort with favorable characteristics demonstrated significant variation across MUSIC surgeons at 12- and 24-month follow-up in both mean EPIC-26 sexual domain scores and proportion of patients who recovered sexual function. No significant correlation was observed between surgeon case volume and sexual function outcomes. As skill is a modifiable factor, improving surgical skill may lead to better sexual function outcomes and, in turn, decrease decision regret and improve patient satisfaction. These findings suggest that collaborative quality improvement may be needed to effect change in sexual function outcomes.

Prior studies have demonstrated similar trends in patient-reported sexual function outcomes following RP.^{4,5,18} The Prostate Cancer Outcomes Study 3⁴ demonstrated that 79% of patients who underwent RP had erectile dysfunction at 2-year follow-up and 56% were bothered by sexual dysfunction. Of all patient-reported outcomes following RP, erectile dysfunction was the most prevalent and bothersome.⁴ In our study, we also found that age, BMI, baseline sexual function, and Gleason grade group were predictive of sexual function recovery. The finding of age, BMI, and Gleason grade group as predictive of recovery is consistent with the literature.¹⁹⁻²¹ Our finding that patients with higher baseline sexual function had less recovery of sexual function may be because a patient with a high baseline EPIC-26 score has to recover more function to reach a level within 10% of that baseline value; conversely, patients with lower baseline sexual function do not have as far to go. Regardless of sexual function recovery at the patient level, the association with surgeon-level characteristics presents an opportunity for improvement. Given the success of improving care and outcomes within the collaborative process of MUSIC, a collaborative quality improvement process could be considered in this context.

To our knowledge, this is the first study to methodically examine surgeon variation in patient-reported sexual function outcomes following RP. In this study, we build on a prior report of variation in patient-reported urinary outcomes in MUSIC.²² This variation was not associated with volume and was present even in a cohort of patients with favorable characteristics and good baseline function who underwent bilateral nerve sparing. The stratification of patients into a cohort with favorable characteristics (bilateral nerve sparing and a baseline EPIC-26 score of 73 or higher) in this study allowed for an in-depth examination of outcomes associated with individual surgeons. Surgeon-level outcomes are a potential avenue for collaborative quality improvement. The use of EPIC-26 allowed for examination of not only erectile dysfunction but also other sexual functions, including erectile frequency, erectile and sexual ability, climax, and bother. Our finding that sexual function outcomes by surgeon were not directly proportional to case volume was an original finding, not described or investigated in the literature, to our knowledge. Case volume and outcome associations explored in the literature

Figure 1. Mean 26-Item Expanded Prostate Cancer Index Composite (EPIC-26) Sexual Domain Scores at 12- and 24-Month Follow-up by Michigan Urological Surgery Improvement Collaborative (MUSIC) Surgeon

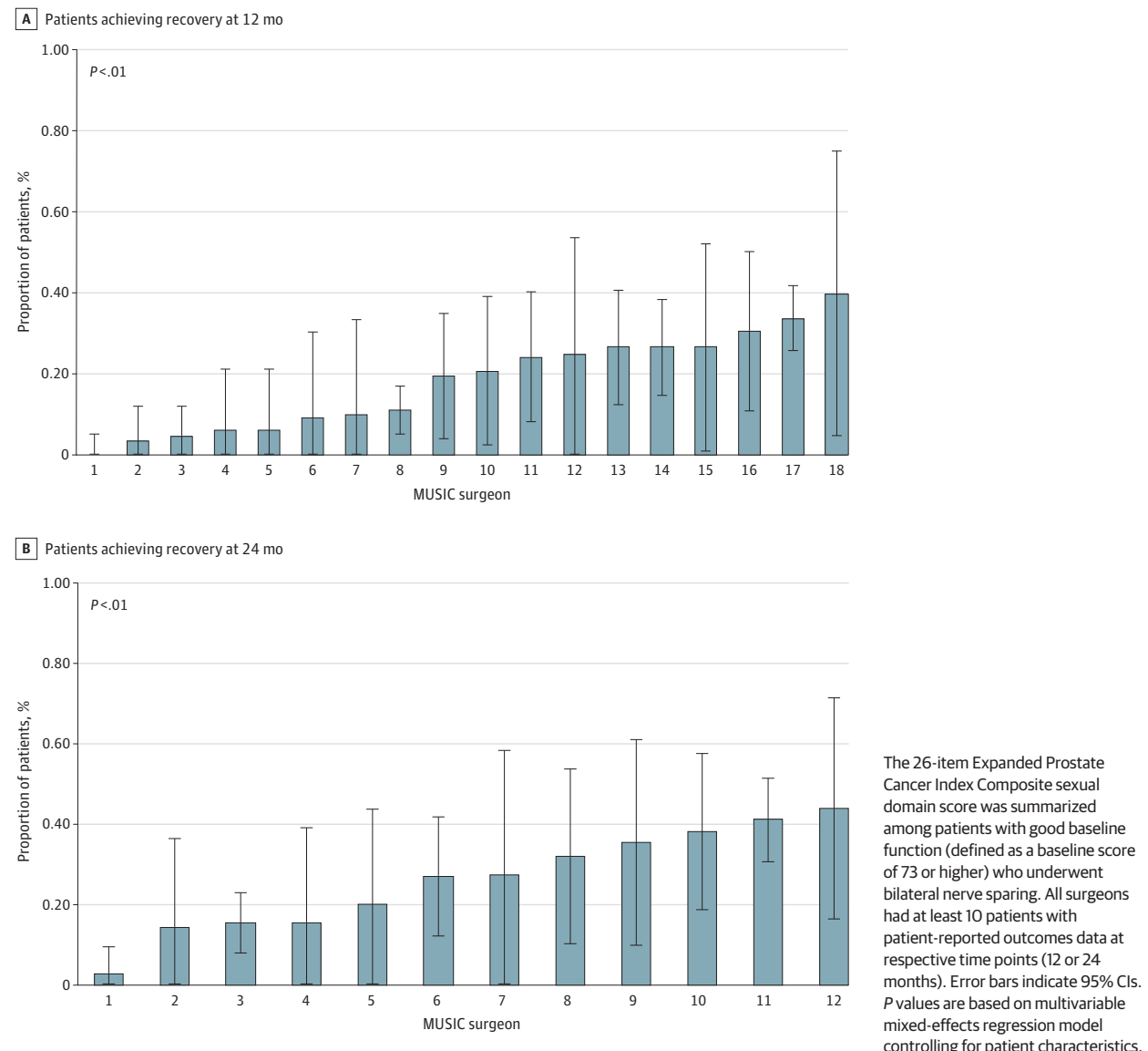


have primarily focused on perioperative outcomes, such as length of stay, readmission rate, treatment effects, and cancer control, not on sexual function outcomes.^{23,24} Traditionally, the highest-volume surgeons serve as the source of instruction and refinement within the literature, meetings, and social media platforms. Whether volume alone correlates with higher quality and superior outcomes is a complex, debated issue, as some low-volume surgeons with experience also have superior outcomes.²⁵ This study indicated that for sexual function outcomes, case volume did not correlate with sexual function outcomes (ie, the highest-volume surgeons did not have the best sexual function outcomes). The surgeon-level factors that impact functional outcomes are likely multifactorial, encompassing experience, technique, and approach, among others.

There is an opportunity for a paradigm shift in PROs, which may enhance care quality and value. A shift from solely re-

porting to reporting for improvement is essential and may be transformative.²⁶ The wide use and adaptation of robotics for prostatectomy has many benefits; one major benefit that may be transformative for quality improvement is video recording and review. Video review can allow for peer review and peer rating, which can establish a baseline and serve as a benchmark from which to improve. Peer rating of operative skill has been demonstrated as an effective method to measure proficiency.^{22,27} Given technical variations in robotic assisted prostatectomy, this may be a starting point to correlate technique and outcomes.^{28,29} Nerve sparing, for example, which is closely associated with erectile function, is done using several variations in technique and energy use (eg, cold incision, pinpoint cautery, Weck clips, and bipolar).²⁸ In addition, there are several methods of nerve sparing (eg, interfascial, intrafascial, extrafascial, and retrograde release).^{30,31} It is unclear which approach may lead to the best outcomes. Once

Figure 2. Proportion of Patients Achieving Sexual Function Recovery at 12- and 24-Month Follow-up by Michigan Urological Surgery Improvement Collaborative (MUSIC) Surgeon



technique and outcome relationships are clarified, this can facilitate coaching for surgeons to improve patient-reported outcomes.³² Moreover, video review and coaching may be a critical step in identifying and establishing best practices.

Limitations

This study has limitations. First, we only evaluated practices in the state of Michigan; however, the practices have diverse patient composition, practice size, and surgeons, including both high- and low-volume surgeons. Second, we did not report specific data on surgeon experience, such as training and years of experience. Despite this, we did limit our surgeon-level analysis to a case volume of 10 or more per year in a cohort of patients with favorable characteristics who underwent bilateral nerve-sparing RP and had baseline EPIC-26 scores of 73 or higher.

Third, our case volume–outcome analysis did not include all surgeons and was limited to surgeons with a case volume of 10 or more per year. This was done because inclusion of lower-volume surgeons would potentially bias or attenuate the results. This threshold was established to create a reliable measure of the case volume–outcome association. Fourth, we did not include erectile aid use in this study. While this data point is collected in MUSIC, a high level of missingness for this variable limits its utility. However, we did observe that the rate of erectile aid use across surgeons was unsubstantial and do not expect that exclusion of erectile aid use in this analysis impacted our findings in a meaningful way.

These limitations notwithstanding, our findings have implications for patients, surgeons, and policy makers. By understanding factors associated with sexual recovery, patients

can optimize BMI, which may improve their chances for a satisfying sexual recovery and engage them in the recovery process. These data may also give patients more realistic expectations for recovery and encompass not only the physiologic return of erections but also the psychologic aspect of intimacy. Our findings are important for surgeons; collaborative quality improvement using video review and coaching is crucial to ensure the best techniques are undertaken to achieve optimal outcomes for patients undergoing nerve-sparing RP. For policy makers and hospital leaders interested in value-based payment reform and quality, this study demonstrates that collecting standardized PROs, which has previously been described as a limitation to incorporating PROs into value-based payment initiatives,³³ can be feasible on a large scale for evaluation of health care delivery and quality.

Conclusions

Of all patient-reported outcomes for RP, sexual function outcomes are among the most reported and the most detrimental to quality of life. Our study found wide variation in sexual function recovery associated with both patient- and surgeon-level characteristics. Surgeons have an opportunity to potentially improve outcomes through collaborative quality improvement. Counterintuitive and challenging to traditional teaching, this study found no significant correlation between surgeon volume and sexual function outcomes. In the quest for a cure, we should not neglect patient-reported outcomes (eg, sexual function) that patients care very deeply about and that directly impact quality of life.

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Study concept and design: Agochukwu-Mmonu, Montie, Wittmann, Miller, Kim, Peabody.

Acquisition, analysis, or interpretation of data: Agochukwu-Mmonu, Qi, Dunn, Montie, Miller, Martin, Kim, Johnston, Peabody.

Drafting of the manuscript: Agochukwu-Mmonu, Montie, Wittmann, Miller, Johnston.

Critical revision of the manuscript for important intellectual content: All authors.

Statistical analysis: Agochukwu-Mmonu, Qi, Dunn.
Administrative, technical, or material support: Agochukwu-Mmonu, Montie, Miller, Martin, Kim, Johnston.

Study supervision: Montie, Wittmann, Miller, Peabody.

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Invited Commentary

Identifying Top Talent to Improve Prostatectomy Sexual Outcomes Is the Juice Worth the Squeeze?

Jeffery Vehawn; Brock O'Neil, MD

Agochukwu-Mmonu and colleagues report surgeon-level variation in sexual function outcomes over a 2-year period among men undergoing radical prostatectomy. In a selected group of patients with good baseline function, they show substantial variation in outcomes achieved. Some surgeons had up to 40% of patients recover sexual function while others had none.¹

The foundation of this study is remarkable. Through the Michigan Urological Surgery Improvement Collaborative (MUSIC), the authors examine the effects of individual surgeons on sexual function and recovery. It remains quite rare for surgeons to permit such detailed information about outcomes tied to surgical skill to be compared to others. This speaks to the incredible trust cultivated among members of MUSIC and serves as a model for transformative surgical collaborations. Nevertheless, the study also raises important issues.

First, the authors report outcomes of a large proportion of men with low-grade prostate cancer with almost a quarter having grade 1 disease.¹ However, patients such as these who are managed with active surveillance are likely to experience bet-

ter sexual function outcomes compared to those managed with radical prostatectomy.^{2,3} Surgical improvements are important, but in this case, focusing on encouraging active surveillance in patients with low-risk cancer could have equal or greater improvements in sexual function outcomes.

Second, the authors did not identify a correlation between surgical volume and sexual function. This contradicts results of other larger studies examining the relationship between surgical volume and complications, quality of life, and sexual function.^{4,5} It is possible that the inclusion criterion requiring surgeons to have operated on at least 10 men with good baseline sexual function over a 5-year period obscured this previously observed phenomenon. That is, a volume-outcome relationship may not be observed among surgeons who are well established on the learning curve.

Additionally, included surgeons accounted for fewer than 30% of patients with good baseline sexual function. This further raises questions about the generalizability of results and feasibility of interventions aimed at improving surgical skills. What about the other 70% of patients operated on by surgeons without a high enough volume? If a perfectly designed and implemented intervention raised all surgeons to the level



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