

Preoperative Patient Reported Outcome Measure Thresholds Should Not be Used for Indicating Total Knee Arthroplasty

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INTRODUCTION: While Medicare requires patient reported outcome measures (PROM) for many quality programs, some commercial insurers have begun requiring preoperative PROMs when determining patient eligibility for total knee arthroplasty (TKA). Concerns exist that this data may be used to deny TKA to patients above a specific PROM score, but the optimal threshold is unknown. This study's purpose was to evaluate postoperative outcomes following TKA based on theoretical PROM thresholds.

METHODS: We retrospectively analyzed 25,246 consecutive primary TKA patients from 29 facilities and 44 surgeons from 2016 to 2019. Hypothesized preoperative KOOS-Jr. cutoffs of 40, 50, 60, 70 points were used. Preoperative scores below each threshold were considered "approved" surgery, while preoperative scores above each threshold were considered "denied" surgery. In-hospital complications, 90-day readmissions, discharge disposition were evaluated. KOOS-Jr. scores were collected preoperatively and one year postoperatively. Minimum clinically important difference (MCID) achievement was calculated using previously validated anchor-based methods.

RESULTS: In patients approved for surgery using KOOS-Jr. thresholds of 40, 50, 60, 70 points, MCID achievement at one year was 88.3%, 85.9%, 79.6%, 77%, respectively. In-hospital complication rates for approved patients were 2.16%, 2.25%, 2.14%, 2.13%, respectively. 90-day readmission rates for approved patients were 4.61%, 4.51%, 4.32%, 4.28%, respectively. Approved patients had a higher rate of achieving MCID ($p < 0.001$) for all thresholds, but a higher rate of non-home discharge ($p = 0.01$) for thresholds of 40 ($p < 0.001$), 50 ($p = 0.002$), and 60 ($p = 0.024$) compared to denied patients. Approved patients had similar in-hospital complication and 90-day readmission rates to denied patients.

DISCUSSION AND CONCLUSION: The majority of patients achieved MCID at all theoretical PROMs thresholds for TKA eligibility with low complication and readmission rates. Setting preoperative PROM thresholds to approve TKA did not guarantee clinically successful outcomes. Such a future policy will create access to care barriers for patients who would otherwise

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	Total Data	Denied Group	Approved Group	P Value	PPV	Number of patients denied a positive result
Achieved MCID at 1 Year	N=19347	N=14120	N=5227			
No	2728 (14.1%)	2402 (17.0%)	326 (6.2%)	<0.001	0.80	2,200
Yes	16619 (85.9%)	11718 (83.0%)	4901 (93.8%)			
Any Complication				0.937	0.02	46.87
No	19169 (99.1%)	13801 (97.8%)	5368 (102.6%)			
Yes	418 (2.1%)	305 (2.2%)	118 (2.3%)			
Non-Home Discharge				<0.001	0.20	4.71
No	19729 (100.0%)	14464 (100.0%)	4265 (100.0%)			
Yes	859 (4.3%)	622 (4.4%)	237 (4.5%)			
90 Day Readmission				0.111	0.04	23.47
No	18704 (96.2%)	13543 (95.9%)	5161 (98.4%)			
Yes	420 (2.2%)	577 (4.1%)	262 (5.0%)			

Table 3. Patient Outcomes for Patients with a Preoperative KOOS-Jr. Score Below 40 Points. Denied Group: Patients who were above the theoretical threshold who would have been denied from having surgery. Approved Group: Patients who were below the theoretical threshold who would have been approved for surgery. PPV, positive predictive value; Number of patients denied a positive result in the denied cohort, number of patients who either achieved MCID or improvement of PROMs at one year OR avoided negative outcomes compared to the number of patients who did not, for the denied cohort.

	Total Data	Denied Group	Approved Group	P Value	PPV	Number of patients denied a positive result
Achieved MCID at 1 Year	N=19347	N=14120	N=5227			
No	2728 (14.1%)	1871 (13.3%)	857 (16.4%)	<0.001	0.859	1,871
Yes	16619 (85.9%)	12249 (86.7%)	4370 (83.6%)			
Any Complication				0.242	0.023	48.93
No	19169 (99.1%)	13801 (97.8%)	5368 (102.6%)			
Yes	418 (2.1%)	305 (2.2%)	118 (2.3%)			
Non-Home Discharge				0.002	0.193	4.70
No	19729 (100.0%)	14464 (100.0%)	4265 (100.0%)			
Yes	859 (4.3%)	622 (4.4%)	237 (4.5%)			
90 Day Readmission				0.048	0.045	24.44
No	18704 (96.2%)	13543 (95.9%)	5161 (98.4%)			
Yes	420 (2.2%)	577 (4.1%)	262 (5.0%)			

Table 3. Outcomes for Patients with Preoperative KOOS-Jr. Score Below 40 Points. Denied Group: Patients who were above the theoretical threshold who would have been denied from having surgery. Approved Group: Patients who were below the theoretical threshold who would have been approved for surgery. PPV, positive predictive value; Number of patients denied a positive result in the denied cohort, number of patients who either achieved MCID or improvement of PROMs at one year OR avoided negative outcomes compared to the number of patients who did not, for the denied cohort.

	Total Data	Denied Group	Approved Group	P Value	PPV	Number of patients denied a positive result
Achieved MCID at 1 Year	N=19347	N=14120	N=5227			
No	2728 (14.1%)	1910 (13.5%)	818 (15.5%)	<0.001	0.73	1,910
Yes	16619 (85.9%)	12210 (86.5%)	4409 (84.5%)			
Any Complication				0.284	0.02	46.65
No	19169 (99.1%)	13801 (97.8%)	5368 (102.6%)			
Yes	418 (2.1%)	305 (2.2%)	118 (2.3%)			
Non-Home Discharge				0.024	0.18	4.50
No	19729 (100.0%)	14464 (100.0%)	4265 (100.0%)			
Yes	859 (4.3%)	622 (4.4%)	237 (4.5%)			
90 Day Readmission				0.186	0.04	25.75
No	18704 (96.2%)	13543 (95.9%)	5161 (98.4%)			
Yes	420 (2.2%)	577 (4.1%)	262 (5.0%)			

Table 3. Outcomes for Patients with Preoperative KOOS-Jr. Score Below 60 Points. Denied Group: Patients who were above the theoretical threshold who would have been denied from having surgery. Approved Group: Patients who were below the theoretical threshold who would have been approved for surgery. PPV, positive predictive value; Number of patients denied a positive result in the denied cohort, number of patients who either achieved MCID or improvement of PROMs at one year OR avoided negative outcomes compared to the number of patients who did not, for the denied cohort.

	Total Data	Denied Group	Approved Group	P Value	PPV	Number of patients denied a positive result
Achieved MCID at 1 Year	N=19347	N=14120	N=5227			
No	2728 (14.1%)	1910 (13.5%)	818 (15.5%)	<0.001	0.77	1,910
Yes	16619 (85.9%)	12210 (86.5%)	4409 (84.5%)			
Any Complication				1.000	0.02	46.71
No	19169 (99.1%)	13801 (97.8%)	5368 (102.6%)			
Yes	418 (2.1%)	305 (2.2%)	118 (2.3%)			
Non-Home Discharge				0.114	0.18	6.07
No	19729 (100.0%)	14464 (100.0%)	4265 (100.0%)			
Yes	859 (4.3%)	622 (4.4%)	237 (4.5%)			
90 Day Readmission				0.192	0.04	26.75
No	18704 (96.2%)	13543 (95.9%)	5161 (98.4%)			
Yes	420 (2.2%)	577 (4.1%)	262 (5.0%)			

Table 4. Outcomes of Patients with Preoperative KOOS-Jr. Score Below 70 Points. Denied Group: Patients who were above the theoretical threshold who would have been denied from having surgery. Approved Group: Patients who were below the theoretical threshold who would have been approved for surgery. PPV, positive predictive value; Number of patients denied a positive result in the denied cohort, number of patients who either achieved MCID or improvement of PROMs at one year OR avoided negative outcomes compared to the number of patients who did not, for the denied cohort.