How Accurate Is the CMS Definition of Success for Patients Undergoing Total Knee Arthroplasty?

Hua Zheng, Arlene Sandra Ash, Mohamed A Yousef, David Christopher Ayers

INTRODUCTION: Total knee arthroplasty (TKA) is a highly effective treatment for patients with advanced arthritis. The U.S. Centers for Medicare & Medicaid Services (CMS) defines a successful TKA as achieving a minimum 20-point improvement in the KOOS-JR score. However, the accuracy of this criterion and how it correlates with patient satisfaction remains unclear. This study aimed to evaluate the validity of the CMS success criteria following primary TKA.
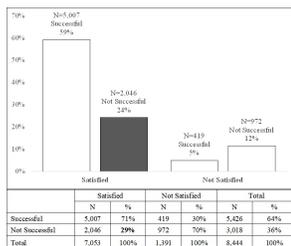
METHODS: A multicenter cohort of 8,444 patients undergoing primary TKA was prospectively enrolled. Patient demographics, medical and musculoskeletal comorbidities, and patient reported outcomes including SF-36 MCS and KOOS-JR scores were collected preoperatively and at one year after TKA. Patient satisfaction was assessed using the International Society of Arthroplasty Registries (ISAR) satisfaction scale at one year after TKA. Patients were categorized as successful or unsuccessful based on CMS criteria and as satisfied or dissatisfied based on the ISAR scale. Univariate analysis (Mann-Whitney U test for continuous variables and Chi-square test for categorical variables) was performed to show the differences between the satisfied and successful groups. Cross-classification of outcomes was performed, and a multivariate logistic regression model was used to identify factors associated with patients satisfied after TKA yet labelled as "unsuccessful" by the CMS-definition.

RESULTS:

At one year postoperatively, 84% of patients reported satisfaction; however, only 64% met the CMS criteria for success. Among satisfied patients, just 71% were classified as successful by CMS standards (**Figure 1**). There were significant differences between the satisfied and successful patients' groups with respect to age, gender, BMI, health literacy, narcotic use, back pain, contralateral knee pain, and presence of diabetes and connective tissue disease (**Figure 2**). There was strong discordance of baseline KOOS JR and mental health scores between the 2 patients' groups (**Figure 3**). Among satisfied patients with low baseline scores (KOOS-JR < 40), 91% met the CMS success definition. Conversely, only 39% of satisfied patients with higher baseline scores (KOOS-JR ≥ 60) were deemed successful. Predictors of satisfied patients classified as unsuccessful based on the CMS-definition included younger age, back pain, contralateral knee pain, limited health literacy, diabetes, liver disease, and poor SF-36 mental health and KOOS JR scores (**Figure 4**).

DISCUSSION AND CONCLUSION:

A substantial discrepancy exists between patient satisfaction and the CMS definition of success following primary TKA. A more nuanced, risk-adjusted success metric that accounts for preoperative baseline scores may better align with patient satisfaction.

	Satisfied		Not Satisfied		Total	
	N	%	N	%	N	%
Successful	5,007	71%	419	30%	5,426	64%
Not Successful	2,046	29%	972	70%	3,018	36%
Total	7,053	100%	1,391	100%	8,444	100%

Variables	N	%	% Satisfied		% Successful	
	8,444	100%	83.5		64.3	
Age						
<65	2,888	34%	80.3	***	65.8	*
≥65	5,493	66%	85.2		63.5	
Sex						
Female	5,584	67%	83.4		66.6	***
Male	2,762	33%	83.7		59.5	
Body Mass Index						
<20	61	1%	91.8		60.7	**
20 to <30	3,145	38%	83.5		62.2	
30 to <40	4,135	50%	83.5		64.7	
≥40	890	11%	83.6		70.0	
Health Literacy (Comfort Filling Out Medical Forms by Yourself)						
Extremely	5,147	65%	84.2	**	65.3	
Quite a bit	1,642	21%	83.1		63.0	
Somewhat	718	9%	80.4		61.7	
A little bit	254	3%	83.5		68.5	
Not at all	200	3%	76.5		60.5	
Narcotic Use for >90 Days						
Yes	569	7%	78.9	**	65.2	
No	7,403	93%	83.7		64.4	
Back Pain						
None	4,150	52%	86.1	***	65.2	
Mild	2,036	25%	83.3		61.7	
Moderate	1,485	18%	79.8		63.8	
Severe	363	5%	77.9		65.0	
Pain in non-surgical Knee						
None	2,251	27%	87.6	***	65.3	***
Mild	2,439	29%	84.5		59.9	
Moderate	2,209	26%	82.6		64.4	
Severe	1,529	18%	77.4		69.3	
Liver Disease						
Yes	102	1%	82.4		61.8	
No	8,342	99%	83.5		64.3	
Diabetes						
Yes	1,444	17%	81.7	*	61.4	*
No	7,000	83%	83.9		64.9	
Connective Tissue Disease						
Yes	1,026	12%	81.4	*	66.2	
No	7,418	88%	83.8		64.0	

Patient Reported Outcome Measures	N	%	% Satisfied		% Successful	
	8,444	100%	83.5		64.3	
SF-36 Mental Health Score[b]						
<40	1,138	13%	76.5	***	65.9	
40-49	1,682	20%	79.9		63.1	
≥50	5,612	67%	86.1		64.3	
Baseline KOOS-JR[a]						
<40	2,723	24%	80.2	***	83.3	***
40-49	1,665	24%	83.6		72.8	
50-59	2,586	34%	84.2		55.1	
≥60	1,470	19%	88.3		34.6	

Variables	Multivariate Logistic Regression Model			
	N	Odds Ratio (OR)	95% CI	P value
Age in 10 years	6,999	0.85	0.79 0.92	<0.0001
Male	2,313	1.05	0.91 1.20	0.524
BMI:				
<20	56	1.31	0.68 2.51	
≥20 and <30 (Reference)	2,626	1	1	0.652
≥30 and <40	3,454	0.96	0.83 1.10	
≥40	744	0.91	0.72 1.15	
Health Literacy (Comfort Filling Out Medical Forms by Yourself): Extremely (Reference)	4,334			
Quite a bit	1,364	1.21	1.03 1.42	<0.0001
Somewhat	577	1.45	1.15 1.82	
A little bit	212	1.40	0.96 2.04	
Not at all	153	2.41	1.57 3.72	
Narcotic Use for >90 Days	449	1.07	0.82 1.40	0.619
Back Pain: None (Reference)	3,571			
Mild	1,695	1.38	1.19 1.61	<0.0001
Moderate	1,185	1.46	1.22 1.75	
Severe	363	1.87	1.37 2.55	
Pain in non-surgical Knee: None (Reference)	1,972			
Mild	2,060	1.69	1.43 1.99	<0.0001
Moderate	1,825	1.87	1.57 2.24	
Severe	1,183	2.14	1.70 2.70	
Liver Disease	84	1.77	1.01 3.10	0.047
Diabetes	1,179	1.36	1.15 1.61	0.000
Connective Tissue Disease	835	1.03	0.83 1.27	0.798
Cardiac Disease	339	1.00	0.74 1.34	0.978
Peripheral Vascular Disease	187	1.47	1.00 2.16	0.050
Kidney Disease	193	1.31	0.90 1.90	0.162
SF-36 MCS - Global Mental Health Score in 10 points	7,047	0.78	0.74 0.84	<0.0001
Baseline KOOS-JR Score in 10 points	7,053	2.79	2.61 2.98	<0.0001
AUC		0.79		