Preoperative Psychiatric Diagnosis Predicts Worse PROMs and Higher Dissatisfaction Following TKA: A Prospective Cohort of 10,988 Patients

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INTRODUCTION:

Approximately 25% of patients undergoing total joint arthroplasty suffer with depression. Given the relatively high prevalence of psychiatric disorders in this group, there is growing interest in examining the outcomes of total knee arthroplasty (TKA) in patients with psychiatric diagnoses. Psychiatric disorders preoperatively have been linked with higher length of stay and increased readmissions, however, there is a paucity of literature on how these conditions affect patient-reported outcome measures (PROMs). Therefore, this study aims to evaluate (1) clinically relevant improvements in PROMs and (2) self-reported satisfaction one year after TKA in patients with and without a preoperative psychiatric diagnosis.

METHODS:

A cohort of 10,988 patients undergoing a primary elective unilateral TKA at a large tertiary academic center in the United States between 2016-2022 were included. Electronic medical records were reviewed to identify preoperative (within two years prior to surgery date) psychiatric diagnoses using ICD-9 codes. Psychiatric diagnoses included were anxiety, depression, post-traumatic stress disorder (PTSD), psychosis, bipolar, and substance abuse. If patients had more than one of these diagnoses, they were put into a 'multiple diagnosis' category. The PROMs evaluated included the Knee Disability and Osteoarthritis Outcome Score (KOOS) Pain, Physical Function Shortform (PS), Joint Replacement (JR), and Veteran RAND-12 mental component score (VR-12 MCS). Clinically relevant improvements were determined by the minimal clinically important difference (MCID) and Patient Acceptable Symptom State (PASS) thresholds. Multivariable logistic regression models were used to compare achievement of PASS (satisfaction), MCID, and PASS thresholds between those with and without psychiatric diagnosis. The models were adjusted for pre-specified demographic and surgical variables. All statistical tests were two-sided with a Type I error rate of 0.05. Cohort characteristics are detailed in **Table 1.**

RESULTS:

Overall, 26% (2,872/10,988) had a preoperative psychiatric diagnosis before their TKA. Psychiatric subgroups included anxiety (n=384), bipolar disorder (n=72), depression (n=1443), PTSD (n=20), substance use (n=143), psychosis (n=12), and multiple diagnosis (n=798). Multivariable logistic regression modelling indicates that psychiatric diagnosis was independently associated with failure to reach MCID improvement in KOOS PS (odds ratio [OR] 1.18; 95% confidence interval [CI]: 1.03,1.35; p=0.016), and VR12-MCS (OR 1.52; 1.36, 1.69; p<0.001) **(Table 2)**. Psychiatric diagnosis was also independently associated with failure to reach PASS threshold in KOOS pain (OR 1.13; 1.02, 1.25; p=0.016), PS (OR 1.13; 1.03, 1.25; p=0.014) and JR (OR 1.17; 1.06, 1.3; p=0.002) **(Table 3)**. Subgroup analysis showed that only those with multiple diagnoses have a significantly higher likelihood of failing to attain PASS threshold in KOOS JR (OR: 1.33; 1.12,1.57; p=0.001) **(Table 4)**. Psychiatric diagnoses patients are 19% more likely to be dissatisfied at 1-year post-TKA (OR 1.19; 1.05, 1.34; p=0.005) **(Table 5).**

DISCUSSION AND CONCLUSION:

Over a quarter of patients undergoing primary TKA have a preoperative psychiatric diagnosis. Psychiatric diagnosis was an independent predictor of failure to achieve clinically significant improvements in knee pain, function, mental health, and overall satisfaction one year post-surgery. Patients with multiple psychiatric disorders are especially prone to poorer knee-specific functional outcomes. This highlights the importance of a multidisciplinary approach in preoperative patient optimization, as addressing mental health may be key to improving outcomes of TKA.

Table 1 - Cohort demographics comparing psychiatric diagnosis versus non- psychiatric diagnosis patients undergoing THA

Variable	Level	Total (N=10988)	No Psychiatric Diagnosis (N=8116)	Psychiatric Diagnosis (N=2872)	P-value
Age		67.0 [61.0;73.0]	68.0 [62.0;74.0]	66.0 [60.0;72.0]	<0.001
Sex	Male	4373 (39.8%)	3607 (44.4%)	766 (26.7%)	<0.001
	Female	6615 (60.2%)	4509 (55.6%)	2106 (73.3%)	
BMI		31.0 [27.2;35.5]	30.7 [27.0;35.2]	31.9 [28.0;36.6]	<0.001
Race	White	9245 (86.1%)	6800 (85.9%)	2445 (86.7%)	0.488
	Black	242 (2.25%)	185 (2.34%)	57 (2.02%)	
	Other	1250 (11.6%)	931 (11.8%)	319 (11.3%)	
Education		14.0 [12.0;16.0]	14.0 [12.0;16.0]	14.0 [12.0;16.0]	<0.001
Smoking	Never	6281 (57.2%)	4829 (59.5%)	1452 (50.6%)	<0.001
	Quit 6m+	3767 (34.3%)	2701 (33.3%)	1066 (37.1%)	
	Quit <6m	329 (2.99%)	210 (2.59%)	119 (4.14%)	
	Current	611 (5.56%)	376 (4.63%)	235 (8.18%)	
ADI		54.0 [34.0;74.0]	53.0 [33.0;72.0]	59.0 [38.0;77.0]	<0.001
CCI		1.00 [0.00;2.00]	0.00 [0.00;2.00]	1.00 [0.00;2.00]	<0.001
Insurance	Private	3461 (35.3%)	2604 (36.2%)	857 (32.7%)	<0.001
	Medicaid	365 (3.72%)	181 (2.52%)	184 (7.02%)	
	Medicare	5861 (59.7%)	4300 (59.8%)	1561 (59.6%)	
	Other	125 (1.27%)	107 (1.49%)	18 (0.69%)	
Baseline KOOS Pain		41.7 [30.6;52.8]	41.7 [33.3;52.8]	38.9 [27.8;50.0]	<0.001
Baseline KOOS PS		51.5 [42.1;59.7]	51.5 [42.1;59.7]	48.8 [38.0;58.0]	<0.001
Baseline KOOS JR		44.9 [36.9;52.5]	47.5 [39.6;54.8]	42.3 [34.2;52.5]	<0.001
Baseline MCS		52.8 [43.2;61.0]	54.9 [45.8;62.1]	46.5 [37.5;55.4]	<0.001
PROM Phenotype	Pain+ PS+ MCS+	2690 (24.5%)	2280 (28.1%)	410 (14.3%)	<0.001
	Pain+ PS+ MCS-	1581 (14.4%)	1087 (13.4%)	494 (17.2%)	
	Pain+ PS- MCS+	369 (3.36%)	311 (3.83%)	58 (2.02%)	
	Pain+ PS- MCS-	384 (3.50%)	257 (3.17%)	127 (4.43%)	
	Pain- PS+ MCS+	910 (8.29%)	756 (9.32%)	154 (5.37%)	
	Pain- PS+ MCS-	890 (8.10%)	593 (7.31%)	297 (10.3%)	
	Pain- PS- MCS+	1530 (13.9%)	1225 (15.1%)	305 (10.6%)	
	Pain- PS- MCS-	2628 (23.9%)	1603 (19.8%)	1025 (35.7%)	
Diagnosis	OA	10676 (97.2%)	7899 (97.3%)	2777 (96.7%)	0.09
	non-OA	312 (2.84%)	217 (2.67%)	95 (3.31%)	
Anesthesia	General	2534 (23.3%)	1943 (24.2%)	591 (20.7%)	0.001
	Spinal	8026 (73.7%)	5844 (72.8%)	2182 (76.3%)	
	Other	329 (3.02%)	241 (3.00%)	88 (3.08%)	
Narx		110 [0.00;190]	0.00 [0.00;190]	130 [0.00;240]	<0.001

Data reported as median [IQR], or n (%)

BMI: body mass index, ADI: area deprivation index, CCI: charlson comorbidity index, NARX: narcotic opioid risk score

Table 2 - Multivariable logistic regression model, using **failure to reach MCID improvements in HOOS Pain, PS, JR, and MCS** as outcomes

		KOOS PAIN MCID			KOOS PS MCID			KOOS JR MCID			MCS MCID		
Factor	Level	OR (95%CI)	Pvalue	Overall Pvalue	OR (95%CI)	Pvalue	Overall Pvalue	OR (95%CI)	Pvalue	Overall Pvalue	OR (95%CI)	Pvalue	Overall Pvalue
Group	Psychiatric Diagnosis (v no Psychiatric Diagnosis)	1.17 (0.97, 1.41)	0.092	0.092	1.18 (1.03, 1.35)	0.016	0.016	1.15 (0.97, 1.37)	0.117	0.117	1.52 (1.36, 1.69)	<0.001	<0.001

This model was adjusted for Age, Sex, BMI, Race, Education, Smoking, ADI, CCI, Insurance, Diagnosis, Anesthesia, PROM Phenotype, Baseline JR, and Narx.

Table 3 - Multivariable logistic regression model results, using **failure to reach attainment of PASS thresholds in HOOS Pain, PS, and JR** as outcomes

		KOOS PAIN PASS			KOOS PS PASS			KOOS JR PASS		
Factor	Level	OR (95%CI)	Pvalue	Overall Pvalue	OR (95%CI)	Pvalue	Overall Pvalue	OR (95%CI)	Pvalue	Overall Pvalue
Group	Psychiatric Diagnosis (v no Psychiatric Diagnosis)	1.13 (1.02, 1.25)	0.016	0.016	1.13 (1.03, 1.25)	0.014	0.014	1.17 (1.06, 1.3)	0.002	0.002

This model was adjusted for Age, Sex, BMI, Race, Education, Smoking, ADI, CCI, Insurance, Diagnosis, Anesthesia, PROM Phenotype, Baseline JR, and Narx.

Table 4 - Subgroup Analysis - Multivariable logistic regression model using **failure to reach attainment of PASS thresholds in HOOS Pain, PS, and JR** as outcomes

		KOOS PAIN PASS			KOOS PS PASS			KOOS JR PASS		
Factor	Level	OR (95%CI)	Pvalue	Overall Pvalue	OR (95%CI)	Pvalue	Overall Pvalue	OR (95%CI)	Pvalue	Overall Pvalue
Subgroup	**Bipolar disorder** (v Anxiety)	1.14 (0.7, 1.88)	0.597	0.064	1.27 (0.78, 2.08)	0.341	0.078	1.26 (0.74, 2.15)	0.403	0.024
	Depression (v Anxiety)	1.05 (0.92, 1.2)	0.455		1.07 (0.94, 1.21)	0.296		1.07 (0.94, 1.22)	0.308	
	Post-traumatic Stress Disorder (v Anxiety)	1.13 (0.44, 2.91)	0.807		0.83 (0.3, 2.28)	0.717		0.77 (0.27, 2.22)	0.628	
	Substance use (v Anxiety)	1.59 (1.11, 2.28)	0.011		1.63 (1.13, 2.34)	0.009		1.47 (1, 2.15)	0.049	
	Psychosis (v Anxiety)	0.58 (0.17, 2)	0.39		1.8 (0.49, 6.59)	0.372		1.29 (0.37, 4.52)	0.689	
	Multiple Diagnosis (v Anxiety)	1.23 (1.05, 1.45)	0.012		1.1 (0.94, 1.3)	0.239		1.33 (1.12, 1.57)	0.001	

Table 5 - Multivariable logistic regression model results, using **failure to answer PASS (yes)** as outcome

Factor	Level	OR (95%CI)	Pvalue	Overall Pvalue
Group	Psychiatric Diagnosis (v no Psychiatric Diagnosis)	1.19 (1.05, 1.34)	0.005	0.005