Physical Function after Primary Total Knee Arthroplasties Stratified by Preoperative Patient-Reported Mental Health Score

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Introduction

- In the US, estimates for lifetime prevalence of mental health disorders are ~50% and estimates for the prevalence of mental health disorders within the past year are ~25%[1,2]
- Evidence shows that pre-operative psychological factors including mental health can negatively affect the outcome of total knee arthroplasty (TKA)
- The Patient-Reported Outcomes Information System is a validated system used to measure the patient-centered domains of physical function and mental health
    - Consists of both PROMIS Scale v1.2 – Global Health and PROMIS Short Form v2.0 – Physical Function 10a (PROMIS PF10a)
    - Global Health divided into Global Physical (PROMIS Physical) and Global Mental (PROMIS Mental)

Study Aims

1. To investigate the association of preoperative PROMIS mental health scores to both preoperative and postoperative physical function following TKA
2. To determine whether the change in physical function following TKA was similar between patients with differing pre-operative PROMIS mental health scores

Methods

- Large northeastern healthcare network was queried from 2015-2018 for TKA patients with preoperative and postoperative PROMIS questionnaires
- Demographic and clinical data consisting of ASA score, mental health diagnoses, opioid prescriptions, BMI, race, gender, and age obtained
- Patients grouped into 5 categories according to their PROMIS Mental score: "Poor" (≤ 29), "Fair" (29-40), "Good" (40-48), "Very Good" (48-56), "Excellent" (> 56)

Table 1: Mental Health Diagnoses Across Patient Population

	All Patients ($n = 1392$)
Mental Health Diagnosis (%):	
Yes	534 (38)
No	858 (62)
Mental Health Diagnosis Type (%):	
Anxiety/Stress-related	160 (11)
Mood Disorders	136 (10)
Multiple	218 (16)
Other	12 (1)
Schizo/Delusion/Non-mood Psychotic Disorders	3 (0)
Substance Use	5 (0)
No Diagnosis	858 (62)

Table 2: Patient Demographic and Clinical Information

	All Patients ($n = 1392$)	Patients With Mental Health Diagnosis ($n = 534$)	Patients Without Mental Health Diagnosis ($n = 858$)	P-value
ASA (%):				0.001
1	29 (2)	3 (1)	26 (3)	
2	937 (69)	346 (67)	591 (71)	
3	381 (28)	165 (32)	216 (26)	
4	2 (0)	0 (0)	2 (0)	
Unknown	43	20	23	
Opioid Prescription in 6 Months Prior to Surgery (%):				0.007
Yes	280 (20)	127 (24)	153 (18)	
No	1112 (80)	407 (76)	705 (82)	
Opioid MME (mean ± std):	56.03 ± 45.70	59.25 ± 50.12	53.42 ± 41.78	0.429
BMI (%):				0.008
Underweight	2 (0)	1 (0)	1 (0)	
Normal	206 (15)	81 (15)	125 (15)	
Overweight	414 (30)	131 (25)	283 (33)	
Obese	758 (55)	317 (60)	441 (52)	
Unknown	12	4	8	
Race (%):				0.006
American Indian or Alaska Native	1(0)	0 (0)	1 (0)	
Asian	13 (1)	0 (0)	13 (2)	
Black or African American	45 (3)	20 (4)	25 (3)	
White or Caucasian	1292 (93)	505 (95)	787 (92)	
Other	41 (3)	9 (2)	32 (4)	
Gender (%):				<0.001
Male	565 (41)	151 (28)	414 (48)	
Female	826 (59)	383 (72)	443 (52)	
Unknown	1	0	1	
Age (mean ± std):	66.02 ± 8.65	65.25 ± 8.48	66.50 ± 8.72	0.016

Results

- Physical function scores increase shortly after surgery until reaching a plateau
- Patients with better preoperative mental health tend to have better preoperative and postoperative physical function
- Patients with poor preoperative mental health experience a sharp decline in physical function ~200 days after surgery
- The change between preoperative and postoperative physical function was consistent among groups
- Patients with poor preoperative mental health experience larger fluctuations
- Potentially due to a small sample size and a large confidence interval

Figure 1: LOESS fit plot of PROMIS PF10a scores, measure of physical function, over time

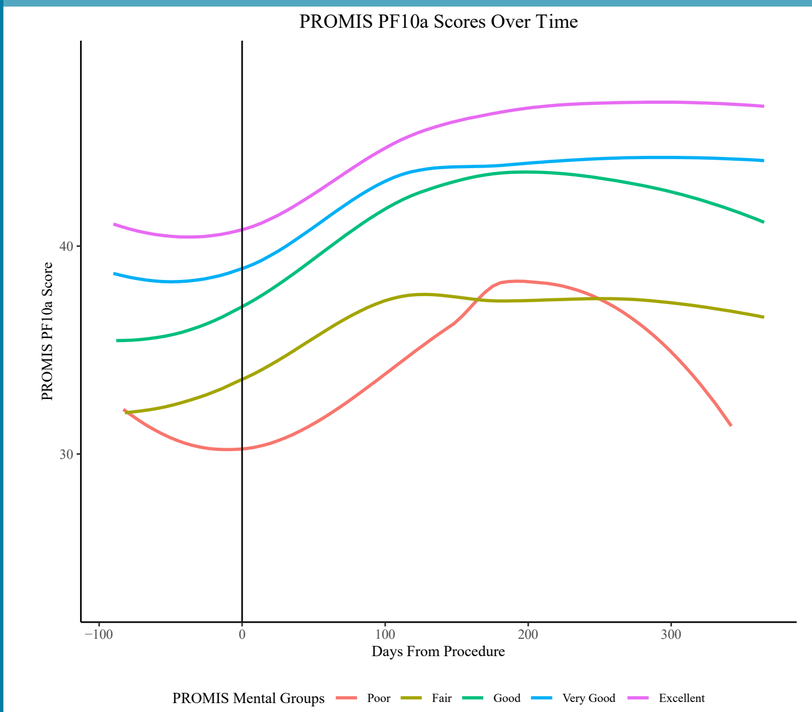

Figure 1. LOESS fit plot of PROMIS PF10a scores, a measure of physical function, over time. The figure tracks the progression of the entire study cohort. Data include a PROMIS PF10a score for each patient before and after sur gery. The shaded interval represents the 95% confidence interval. Mental health groups are as defined in the Methods section.

Figure 2 :Change in PROMIS PF10a scores over time

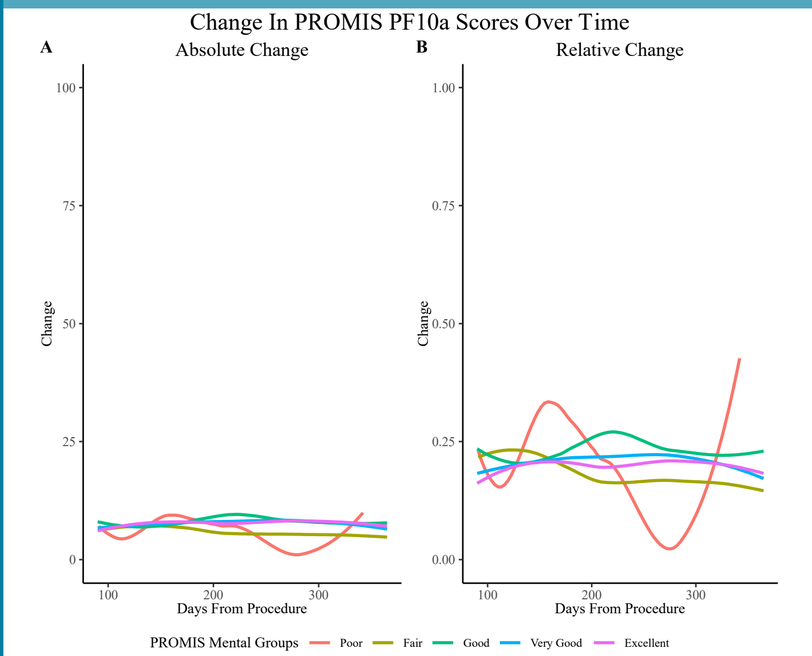

Figure 2. LOESS fit plot of the change in PROMIS PF10a scores before and after sur gery over time. The figure tracks the progression of the entire study cohort. Data include a PROMIS PF10a score for each patient before and after sur gery. The absolute change is calculated by subtracting each patient' s score before and after sur gery. Relative change is calculated by dividing the absolute score of each patient by the pre−operative PROMIS PF10a score of each patient. The x−axis represents the time at which the post−operative score was surveyed. Mental health score groups as defined in the Methods section.

Conclusion

- TKA led to an increase in physical function among all patients
- Yet, absolute physical function scores were different based on patient-reported mental health
- Poor mental health should not be a contraindication for performing TKA
- Rather, with physicians should be conscientious of the fact that a patient's physical function score may decrease after one year
- Tighter follow-up guidelines, more frequent physical therapy visits, and interventions to address mental health issues may offer solutions
- Raising the mental health of a patient may ensure more consistent and beneficial results long term

References

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