

Preoperative Expectations are not Predictive of Postoperative Hand Surgery Outcomes

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INTRODUCTION

- As orthopaedic surgery becomes increasingly prevalent, surgical outcome evaluations have transitioned to the use of Patient Reported Outcomes (PROs) measurements and surgical satisfaction.
- Studies across several areas of orthopaedic research have documented that better preoperative expectations scores are independently predictive of postoperative outcomes.
- While this relationship has been shown to be exceedingly strong in shoulder surgery patients, limited previous research has not been able to document this association in hand surgery populations.
- Prior research focusing on carpal tunnel surgery and rheumatoid hand surgery found that there was no statistically significant association between preoperative expectations and surgical outcomes.
- However, previous research has been limited by small sample size, limited surgical diversity, lack of validated PRO instruments, and limited follow up time.

OBJECTIVE

The purpose of this study was to use validated instruments to identify if there is a relationship between expectations and patient-reported outcomes.

HYPOTHESIS

We hypothesized that higher preoperative expectations would be predictive of superior two-year patient reported outcomes of hand surgery.

METHODS

- The Maryland Orthopaedic Registry (MOR) is an IRB approved registry containing patient information such as demographics and PRO scores from a variety of orthopaedic procedures.
 - Inclusion criteria were patients undergoing hand surgery and those who had completed two year follow up surveys. Exclusion criteria included patients who are not English-speaking, incarcerated, below 12 years of age, or lack of active email address.
 - 253 eligible patients that completed two year follow up surveys were enrolled between 2015 and 2018.
 - The MOR was retrospectively queried for Musculoskeletal Outcomes Data Evaluation and Management System (MODEMS) preoperative expectation scores and various PRO measurements before surgery and two years post operation.
 - These include all six PROMIS domains, Tegner Activity Scale, NPS operative site and whole body, MARS Upper, and BMHQ.
 - Satisfaction and Met Expectations were measured via SSQ-8 and MODEMS, respectively.
- ## STATISTICAL ANALYSES
- Bivariate analysis was accomplished via Wilcoxon rank-sum and/or Kruskal-Wallis test for categorical variables, or Spearman correlation coefficient for continuous variables.
 - Post-hoc Wilcoxon analysis was performed when necessary.
 - Backwards stepwise maximum-validation multivariable linear regression models were performed for each outcome parameter.
 - Variables associated with higher preoperative expectations ($p < 0.10$) along with MODEMS preoperative expectations were incorporated into each model.

What results do you expect from your treatment?	No. (%) of patients reporting level of expectation					Mean score*(±SD)
	Not at all likely (1)	Slightly likely (2)	Somewhat likely (3)	Very likely (4)	Extremely likely (5)	
1. Relief from symptoms (pain, stiffness, swelling, numbness, weakness, instability)	2 (0.9%)	6 (2.6%)	17 (7.3%)	67 (28.6%)	142 (60.7%)	86.4 (±20.2)
2. To do more everyday household or yard activities	2 (0.9%)	10 (4.4%)	19 (8.3%)	65 (28.4%)	133 (58.1%)	84.6 (±22.0)
3. To sleep more comfortably	6 (2.8%)	8 (3.7%)	22 (10.3%)	51 (23.8%)	127 (59.3%)	83.3 (±24.9)
4. To go back to my usual job	6 (3.0%)	3 (1.5%)	15 (7.4%)	45 (22.3%)	133 (65.8%)	86.6 (±23.0)
5. To exercise and do recreational activities	2 (0.9%)	5 (2.2%)	19 (8.3%)	56 (24.5%)	147 (64.2%)	87.2 (±20.2)
6. To prevent future disability	4 (1.8%)	6 (2.8%)	22 (10.1%)	53 (24.3%)	133 (61.0%)	85.0 (±22.8)
Overall mean expectations						85.5 (±18.3)

*The mean expectations score was converted to 0-100 continuous scale.

Table 2 Relationship between categorical variables and overall expectation score

	n	Overall preoperative expectations		P-value
		Mean	SD	
Gender				
Female	127	85.5	±19.4	0.51
Male	108	85.5	±17.1	
Race				
Asian	10	77.9	±29.5	0.73
Black	79	84.0	±19.7	
Other	8	91.7	±12.4	
White	133	86.4	±16.9	
Ethnicity				
Not Hispanic or Latino	223	85.4	±18.5	0.99
Hispanic or Latino	12	87.2	±13.9	
Education Level				
College graduate	101	87.8	±17.6	0.09
Completed high school	117	82.9	±19.0	
Some high school or below	14	87.7	±16.1	
Employment Status				
Currently employed	150	86.7	±17.4	0.36
Not currently employed	57	82.1	±20.8	
Student	25	86.0	±16.4	
Income				
<\$70,000	110	85.7	±16.4	0.25
>\$70,000	95	86.9	±19.8	
Marital Status				
Single	120	85.3	±18.8	0.91
Married or Domestic partnership	111	85.9	±17.8	
Smoking				
Currently smokes	34	76.4	±23.2	0.022*
Never smoked	141	86.6	±17.2	
Quit Smoking	57	88.3	±15.9	
Alcohol				
Greater than four times a month	46	87.7	±16.2	0.09
Four times a month or fewer	116	87.0	±18.1	
Never	69	81.3	±19.4	
Recreational drug use				
No	219	86.4	±17.6	0.12
Yes	12	75.0	±24.7	
Preoperative Narcotic use				
No	160	86.4	±17.8	0.14
Yes	72	83.1	±19.7	
ASA Score				
I	65	87.0	±14.2	0.86
II	129	83.6	±20.4	
III	22	84.5	±19.8	
Depression or anxiety				
No	202	85.9	±17.2	0.86
Yes	33	82.7	±24.3	
Prior Surgery on hand				
No	191	86.2	±18.2	0.06
Yes	42	82.1	±19.0	
Injury prior to surgery				
No	105	85.8	±20.1	0.56
Yes	119	86.2	±16.4	
Workers Compensation				
No	221	83.3	±18.0	0.025*
Yes	7	75.4	±11.9	
Legal claim				
No	212	87.0	±17.7	<0.001
Yes	16	73.1	±16.5	*

*Statistically significant correlation ($p < 0.05$). Never and quit smoking, no workers compensation, and no legal claim were associated with higher mean preoperative expectation scores. Abbreviations: ASA, American Society of Anesthesiologists

RESULTS

- Overall, hand surgery patients scored high on the MODEMS preoperative expectation scale (top left, Table 1).
- Higher expectations were observed in patients that were nonsmokers. Additionally, no worker's compensation claim or legal claim was associated with higher preoperative expectations. (bottom left, Table 2).
- Bivariate analysis of continuous variables (Table 3) revealed that fewer previous hand surgeries and fewer prior orthopaedic surgeries were both associated with higher preoperative expectations. Analysis also found that better preoperative PROMIS physical function, worse preoperative PROMIS fatigue, and PROMIS anxiety were also associated with higher preoperative expectation scores. (Table 3).
- Expectations did not differ by procedure type.
- Bivariate analysis (Table 4) of two-year outcome scores revealed that higher preoperative expectations were associated with better scores on PROMIS physical function, PROMIS pain interference, PROMIS fatigue, PROMIS depression, NPS op site, NPS whole body, SSQ8, MODEMS Met Expectations, and BMHQ.
- Multivariable analysis to control for confounding variables revealed that higher preoperative expectations were not independently associated with any of the two-year patient reported outcome scores.

Table 3 Association between continuous variables and expectation scores

	Mean (±SD)	Median	Spearman's (r) Correlation Coefficient	P-value
Age (years)	50.4 (±16.2)	52.0	0.03	0.64
BMI (kg/m ²)	30.2 (±7.9)	28.8	-0.02	0.82
CCI	1.7 (±1.8)	1	0.09	0.17
No. of all prior surgeries	3.7 (±4.8)	3.0	-0.11	0.09
No. of prior hand surgeries	0.3 (±0.9)	0	-0.13	0.043*
No. of prior orthopaedic surgeries	1.5 (±2.0)	1.0	-0.13	0.048*
PROMIS Physical Function	46.1 (±9.4)	46.6	0.14	0.038*
PROMIS Social satisfaction	44.5 (±9.8)	43.4	0.10	0.11
PROMIS Pain interference	59.1 (±7.3)	58.7	-0.09	0.18
PROMIS fatigue	50.7 (±9.6)	50.7	-0.13	0.047*
PROMIS anxiety	53.0 (±9.0)	52.9	-0.13	0.048*
PROMIS depression	47.9 (±9.1)	48.1	-0.11	0.10
TAS (preop)	2.6 (±2.1)	2.0	0.06	0.37
Numeric pain (Op site)	4.7 (±2.9)	5.0	-0.03	0.71
Numeric pain (Whole body)	1.5 (±2.3)	0	-0.13	0.05
MARS Upper	48.8 (±28.8)	50.0	0.10	0.16
BMHQ	49.4 (±19.9)	50.0	0.10	0.15

*Statistically significant correlation ($p < 0.05$). Number of prior hand surgeries, number of prior orthopaedic surgeries, PROMIS physical function, and PROMIS fatigue, and PROMIS anxiety were associated with higher preoperative mean expectations. Abbreviations: BMI, body mass index; CCI, Charlson Comorbidity Index; PROMIS, Patient-Reported Outcomes Measurement Information System; SD, standard deviation; TAS, Tegner Activity Scale; MARS, Marx activity rating scale upper extremity; BMHQ, Brief Michigan Hand Questionnaire.

Table 4 Association between patient reported outcomes and expectation scores

Outcome measurements (2 year Follow up)	Spearman's (r) Correlation Coefficient	P-value
PROMIS PF	0.18	0.006*
PROMIS PI	-0.22	<0.001*
PROMIS Fatigue	-0.17	0.013*
PROMIS SS	0.08	0.23
PROMIS Anxiety	-0.07	0.29
PROMIS Depression	-0.14	0.042*
TAS (preop)	0.03	0.64
TAS (postop)	0.13	0.07
NPS (Op Site)	-0.25	<0.001*
NPS (Whole Body)	-0.14	0.04*
SSQ8	0.22	0.002*
MODEMS Met expectations	0.25	<0.001*
MARS Upper	0.004	0.95
BMHQ	0.21	0.003*

*Statistically significant correlation ($p < 0.05$). Preoperative expectations were associated with PROMIS PF, PROMIS PI, PROMIS Fatigue, PROMIS depression, NPS (op site), NPS (Whole body), SSQ8, MODEMS, and BMHQ. Abbreviations: PROMIS, Patient-Reported Outcomes Measurement Information System; PF, Physical Function; PI, Pain Interference; SS, Social Satisfaction; TAS, Tegner Activity Scale; NPS, Numerical Pain Scale; SSQ8, Surgical Satisfaction Questionnaire 8; MARS, Marx activity rating scale upper extremity; BMHQ, Brief Michigan Hand Questionnaire.

DISCUSSION

- After controlling for confounding variables, the findings of this study do not support our hypothesis. In contrast to most other areas of orthopaedic research, preoperative expectations are not an independent predictor of surgical outcomes.
- We were able to identify several associations between preoperative expectations and several PRO measurements, however, variables such as smoking and having a legal claim most likely exhibited a confounding effect on the expectation-outcome relationship.
- While our findings do not align with research in most areas of surgery, they do agree with previous findings in research of the hand surgery population. For example, previous studies into carpal tunnel surgery could not find a relationship between expectations and outcomes in the hand surgery population.
- Our work expanded upon previous studies with a larger sample (253), verified PRO and expectations measurement scales, along with an expanded follow up period.

CONCLUSION

- Preoperative expectations of patients receiving hand surgery are associated with but not independently predictive of two-year patient reported outcomes.
- Better expectation scores were associated with but not independently predictive of PROMIS physical function, PROMIS pain interference, PROMIS fatigue, PROMIS depression, NPS op site, NPS whole body, SSQ8, MODEMS Met Expectations, and BMHQ scores.
- Further study may be warranted to identify why despite similar models and analysis, the data from previous studies in other orthopaedic populations were not generalizable to the hand patient population given our findings.
- These findings have implications for patient education and counseling prior to surgery to affect outcomes.

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ACKNOWLEDGEMENTS

This work was supported by The James Lawrence Kernan Hospital Endowment Fund, Incorporated.

