Effects of SMART Goal Quality on Patient Activation and Patient Reported Outcome Measures following Total Hip Arthroplasty and Total Knee Arthroplasty

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INTRODUCTION:

Musculoskeletal procedures are prevalent in the United States; however, patients report high levels of dissatisfaction attributable to physical dysfunction, persistent pain, and unrealistic expectations, among other reasons. Traditional care models have not addressed patient values and preferences, prompting a shift toward goal-directed care. While many studies identify patient-generated goals and their impact on patient satisfaction, few have considered goal quality. Patient-generated goals may be poorly defined and thus unhelpful in improving patient care and satisfaction. One framework for generating well defined goals is the SMART criteria, which defines Specific, Measurable, Achievable, Relevant, and Time-bound attributes. Higher quality goals meeting the SMART criteria may improve patient outcomes and satisfaction more so than vague, lower quality goals. This study investigates pre-operative orthopedic patient goal quality, and the relationships between goal quality and patient activation and between goal quality and patient reported outcome measure scores.

METHODS:

In this retrospective observational study, randomly selected surgical patient goals (n=600) across several orthopaedic subspecialties were evaluated using applicable SMaRT criteria (i.e., Specific, Measurable, Relevant, and Time-bound). Achievability was not assessed as that attribute was evaluated through patient-provider interaction. Two coders utilized a content analysis methodology to evaluate presence of SMaRT criteria in each goal. Inter-rater reliability was analyzed using Cohen's Kappa for two raters. Ordinal logistic regression was employed to evaluate the relationship between patient activation as measured by the PAM-13 and the number of SMaRT criteria met on patient-generated goals. Mixed effects linear modeling was employed to evaluate the relationship between number of SMaRT criteria met and scores on either the PROMIS-10 GPH for all patients and the HOOS-PS or the KOOS-PS for patients that received a Total Hip Arthroplasty or Total Knee Arthroplasty, respectively.

RESULTS:

Of the 600 patient goals assessed, 57.7% were specific (n=346), 84.0% were measurable (n=504), 9.5% were relevant (n=57) and 4.7% were time-bound (n=28). Overall, 12% of goals met 3-4 of the SMaRT criteria (n=73). Patient activation was not a significant predictor of the presence of any of the applicable SMaRT criteria. For patients who received a Total Hip Arthroplasty (n=184), meeting three or four of the SMaRT goal criteria was a significant predictor of PROMIS-GPH score. This relationship did not hold for HOOS-PS, nor did it hold for either of the patient reported measures for patients who received a Total Knee Arthroplasty (n=146).

DISCUSSION AND CONCLUSION:

Patient-generated goals rarely meet most of the SMaRT criteria and are often not relevant or time-bound. Patient skill, knowledge, motivation, and confidence as encompassed in activation was not predictive of goal quality. However, while goal quality did not appear to impact self-reported recovery measures for Total Knee Arthroplasty patients, it did predict subsequent recovery measure scores for Total Hip Arthroplasty patients. This suggests that developing higher quality goals may be an important focus for improving patient outcomes in a subset of orthopedic patients.

Table 1. *Binary Logistic Regression with SMART Criteria as Outcome*

	Intercept	PAM[1] Level	SE	95% CI	*p*
Specific	1.49	1.00	0.01	0.98 – 1.01	.78
Measurable	11.40	.99	0.01	0.97 – 1.01	.33
Relevant	0.15	1.00	0.01	0.97 – 1.02	.77
Time-bound	0.07	.99	0.02	0.96 – 1.03	.74

[1]Patient Activation Measure

Table 2. *Random Intercepts and Slopes Mixed Effects Model Predicting PROMIS-GPH Outcomes Overtime for Total Hip Arthroplasty*

Predictors	Estimates[1]	CI[2]	*p*[2]
(Intercept)	33.06	30.54 – 37.59	
Time[3]	5.09	3.49 – 6.70	**<0.001**
Age	0.06	-0.02 – 0.14	0.173
BMI[4]	-0.19	-0.33 – -0.06	**0.006**
CCI[5] [1]	-1.26	-4.63 – 2.10	0.462
CCI [2+]	-3.31	-5.18 – -1.43	**0.001**
Gender[6] [Male]	1.32	-0.44 – 3.08	0.140
Goal Criteria[7] [1]	2.30	-1.69 – 6.30	0.258
Goal Criteria [2]	2.00	-1.89 – 5.90	0.313
Goal Criteria [3]	4.90	0.06 – 9.74	**0.047**
Time * Goal Criteria [1]	-0.79	-2.61 – 1.03	0.395
Time * Goal Criteria [2]	-0.82	-2.40 – 1.17	0.497
Time * Goal Criteria [3]	-1.55	-3.75 – 0.64	0.165
Sample Information			
ICC[8]		0.57	
N_{person}		184	
Number of Observations		502	

Note: [1]Unstandardized *B* coefficients. [2]95% confidence intervals. [3]Alpha threshold = 0.05. [4]Pre-op, 6-week, 3-month, and 6-month post-operative windows. [5]Body mass index. [6]Charlson comorbidity index referent = 0. [7]Binary gender referent = Female. [8]Number of goal criteria met referent = 0. [9]Intraclass correlation coefficient.

Table 3. *Random Intercepts and Slopes Mixed Effects Model Predicting HOOS-PS Outcomes Overtime for Total Hip Arthroplasty*

Predictors	Estimates[1]	CI[2]	*p*[2]
(Intercept)	35.31	26.66 – 43.96	
Time[3]	15.77	11.11 – 19.42	**<0.001**
Age	0.17	0.02 – 0.31	**0.027**
BMI[4]	-0.13	-0.38 – 0.13	0.327
CCI[5] [1]	-3.24	-9.34 – 2.85	0.297
CCI [2+]	-3.64	-7.04 – -0.24	**0.036**
Gender[6] [Male]	2.38	-0.59 – 5.35	0.141
Goal Criteria[7] [1]	2.69	-7.06 – 12.41	0.589
Goal Criteria [2]	4.43	-5.00 – 13.86	0.357
Goal Criteria [3]	7.46	-4.32 – 19.24	0.214
Time * Goal Criteria [1]	-1.01	-5.77 – 3.74	0.676
Time * Goal Criteria [2]	-2.28	-6.89 – 2.34	0.334
Time * Goal Criteria [3]	-2.43	-8.20 – 3.35	0.410
Sample Information			
ICC[8]		0.31	
N_{person}		184	
Number of Observations		476	

Note: [1]Unstandardized *B* coefficients. [2]95% confidence intervals. [3]Alpha threshold = 0.05. [4]Pre-op, 6-week, 3-month, and 6-month post-operative windows. [5]Body mass index. [6]Charlson comorbidity index referent = 0. [7]Binary gender referent = Female. [8]Number of goal criteria met referent = 0. [9]Intraclass correlation coefficient.

Table 4. *Random Intercepts and Slopes Mixed Effects Model Predicting PROMIS-GPH Outcomes Overtime for Total Knee Arthroplasty*

Predictors	Estimates[1]	CI[2]	*p*[2]
(Intercept)	40.21	36.40 – 44.03	
Time[3]	2.55	1.05 – 4.05	**0.001**
Age	0.16	0.06 – 0.26	**0.001**
BMI[4]	-0.10	-0.24 – 0.03	0.120
CCI[5] [1]	-0.92	-4.29 – 2.45	0.592
CCI [2+]	-2.64	-4.59 – -0.68	**0.008**
Gender[6] [Male]	-0.87	-2.72 – 0.97	0.353
Goal Criteria[7] [1]	-2.20	-6.58 – 2.19	0.326
Goal Criteria [2]	-0.06	-4.18 – 4.05	0.976
Goal Criteria [3]	-3.61	-8.49 – 1.47	0.164
Time * Goal Criteria [1]	0.73	-1.06 – 2.51	0.425
Time * Goal Criteria [2]	0.12	-1.57 – 1.81	0.888
Time * Goal Criteria [3]	1.01	-1.03 – 3.05	0.333
Sample Information			
ICC[8]		0.37	
N_{person}		146	
Number of Observations		415	

Note: [1]Unstandardized *B* coefficients. [2]95% confidence intervals. [3]Alpha threshold = 0.05. [4]Pre-op, 6-week, 3-month, and 6-month post-operative windows. [5]Body mass index. [6]Charlson comorbidity index referent = 0. [7]Binary gender referent = Female. [8]Number of goal criteria met referent = 0. [9]Intraclass correlation coefficient.

Table 5. *Random Intercepts and Slopes Mixed Effects Model Predicting KOOS-PS Outcomes Overtime for Total Knee Arthroplasty*

Predictors	Estimates[1]	CI[2]	*p*[2]
(Intercept)	44.95	37.89 – 52.01	
Time[3]	8.19	4.96 – 11.42	**<0.001**
Age	0.29	0.14 – 0.44	**<0.001**
BMI[4]	0.01	-0.19 – 0.22	0.894
CCI[5] [1]	3.93	-1.36 – 9.21	0.145
CCI [2+]	-0.65	-3.66 – 2.36	0.672
Gender[6] [Male]	-2.30	-5.13 – 0.53	0.112
Goal Criteria[7] [1]	-2.73	-10.96 – 5.50	0.516
Goal Criteria [2]	-0.02	-7.74 – 7.71	0.997
Goal Criteria [3]	-1.96	-11.53 – 7.59	0.687
Time * Goal Criteria [1]	0.07	-3.76 – 3.90	0.971
Time * Goal Criteria [2]	-0.37	-4.02 – 3.28	0.842
Time * Goal Criteria [3]	-0.46	-4.90 – 3.98	0.841
Sample Information			
ICC[8]		0.27	
N_{person}		146	
Number of Observations		407	

Note: [1]Unstandardized *B* coefficients. [2]95% confidence intervals. [3]Alpha threshold = 0.05. [4]Pre-op, 6-week, 3-month, and 6-month post-operative windows. [5]Body mass index. [6]Charlson comorbidity index referent = 0. [7]Binary gender referent = Female. [8]Number of goal criteria met referent = 0. [9]Intraclass correlation coefficient.