Generalizability and Validation of PROMIS Scores to Predict Surgical Success in Foot and Ankle Patients: A Tale of Two Academic Centers

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Disclosure

• No Conflict of Interest relative to this Research
Introduction

- Patient Reported Outcomes (PROs)
  - Expanded beyond Research to Clinical Care
  - Process of obtaining the PRO has been replicated in many institutions
    - Efficient mechanism for collecting, visualizing, and sharing PROs with Patients
  - Widespread adoption has been challenging
    - Translating the PRO (PROMIS) data into a clinically meaningful interpretation that can be used to improve the quality of care provided to our patients
Introduction

In 2016, our UR group determined pre-operative threshold for PROMIS Scores that could be used to determine the success or failure (MCID) of foot/ankle surgery with 83-94% probability

Ho et al. FAI 2016

Purpose: Determine the generalizability and validity of previously published PROMIS threshold scores applied to an independent orthopaedic foot and ankle practice (University of Utah)
Methods

• Prospective data from consecutive F/A patients
  • Univ. of Utah Multi-surgeon Foot/Ankle Elective Practice
  • Jan 2014-Nov 2016
  • PROMIS PF and PI
    • Preoperative and minimum 6 month surgical follow up scores
• Exclusions
  • Non-operative patients
  • Follow up patients
  • Patients without complete data sets
  • Non-Elective Surgery (Trauma, Infection, Amputations etc.)
Methods

• Statistical Analysis
  • ANOVA assessed pre/post surgery differences in PROMIS PF and PI
    • Covariates of age and gender
  • The distributive method (1/2 SD) to estimate min. clinical important difference (MCID)
  • Receiver operator curve (ROC) analysis and AUC was used to determine threshold values for achieving and failing to achieve MCID
  • Chi-square analysis
    • Compared the Utah threshold values with the previously published values
    • Assessed the % of patients achieving and failing to achieve MCID based on previous Threshold Values
Results

- 61 patients met inclusion
  - Similar age, gender to published demographics
- ANOVA Sig. Improvement over time
  - PF (6.0+/SD 11.6)
  - PI (7.0 +/- SD 8.4)
- ROC Analysis and AUC
  - Significant PF - .77
  - Not significant for PI
Applying Threshold Scores of Present and Previous Data to Determine Achieving MCID

Correctly Identified as > MCID

Minimal Clinically Important Difference (MCID)

Incorrectly Identified as < MCID

Threshold for achieving

Threshold to achieve MCID from Previous Study

Improvement

28 vs 29.7

41.6 vs 42
## Results

<table>
<thead>
<tr>
<th>Achieving an MCID</th>
<th>Likelihood Ratio (95% CI)</th>
<th>Pre-test Probability (%)</th>
<th>Post-test Probability (%)</th>
<th>Change from pre-test probability (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>8.8 (2.2 to 35.5)</td>
<td>44.3</td>
<td>87.5</td>
<td>43.2</td>
</tr>
<tr>
<td>NOT Achieving an MCID</td>
<td>7.2 (1.0 to 53.0)</td>
<td>55.7</td>
<td>90.0</td>
<td>34.3</td>
</tr>
</tbody>
</table>
Chi square analysis of proportions using thresholds from Ho et al, 2017.

<table>
<thead>
<tr>
<th></th>
<th>Failed to Achieve MCID</th>
<th>Achieved MCID</th>
<th>Chi-Square</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Baseline</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Physical Function</strong></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Failed to Achieve MCID</td>
<td>&gt;42.0</td>
<td>16 (26.2%)</td>
<td>3 (4.9%)</td>
<td></td>
</tr>
<tr>
<td>Ambiguous Range</td>
<td>29.7 to 42</td>
<td>10 (16.4%)</td>
<td>23 (37.7%)</td>
<td></td>
</tr>
<tr>
<td>Achieved MCID</td>
<td>&lt;29.7</td>
<td>1 (1.6%)</td>
<td>8 (13.1%)</td>
<td>18.9</td>
</tr>
</tbody>
</table>

31.1 %
1,375 patients 2016
Limitations

• Improvements in accuracy and precision could be made with:
  • Repeating methods with individual diagnoses
  • Increased sample size
  • Longer follow up (current study mean 7 months)
  • Greater capture of follow up of all patients (potential bias on those needing treatment)
Conclusions

• Previously published preop PROMIS PF threshold scores were found to be generalizable:
  • Different geographic area, wide array of F/A diagnoses and surgeries
• Previously published preop PROMIS PF threshold scores were found to be valid:
  • Nearly identical for patients failing to meet MCID (t-score 41-42)
    • If a patient’s goal is to improve function and has a score above 41 preop, rethink if surgery will benefit this patient (probability 89-90%)
  • Similar for patients meeting MCID (t-score 28-30)
    • If a patient’s goal is to improve function and has a score below 28 (or 30) the probability that the patient will benefit from the surgery is 84-88%
Questions