PROMIS Better Reflects the Impact of Length of Stay and the Occurrence of Complications within 90 Days than Legacy Outcome Measures for Lumbar Degenerative Surgery

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Disclosures

Dr. Peter G. Passias reports: consulting from Aesculap, Globus Medical, Medicrea, SpineWave and Zimmer Biomet; scientific advisory board membership from Allosource and Terumo BCT; publishing copyright from Jaypee Brothers Publishers, all outside the submitted work.

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Background

- The Oswestry Disability Index (ODI) is limited:
  - Floor effect
  - Cross-contamination score bias
  - Weighting of unimportant items

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- Patient Reported Outcome Measurement Information System (PROMIS)
  - Efficient means of capturing patient-reported outcomes
  - Computer adaptive testing = shorter outcomes assessment

- ODI vs PROMIS
  - PROMIS has outperformed ODI in coverage and reliability
  - Unclear how PROMIS & ODI compare in ability to reflect impact of perioperative complications and length of stay (LOS)

Patrick et al, 1995; Muller et al, 2004

Brodke et al, 2017; Hays et al. 2015
Purpose

Assess differences between PROMIS and ODI as they relate to length of stay (LOS) and complication outcomes of surgical thoracolumbar patients.
Materials & Methods

• **Design:** Retrospective cohort study of consecutive, patient-reported outcomes at a single center.

• **Inclusion Criteria:**
  • Surgical patients >18 y/o
  • Thoracolumbar spine diagnosis
  • Available ODI and PROMIS scores at baseline and 3-month postoperative intervals

• **Statistical Analysis:**
  • **Pearson bivariate correlation:** assessed linear relationship between clinical outcomes (LOS, perioperative complications) and scores for both PROMIS (Physical Function, Pain Intensity, Pain Interference) and ODI.
  • **Linear regression:** predicted the relationship between clinical outcomes and 3-month postoperative scores for ODI and PROMIS.

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## Results: Overall Outcomes

**Included:** 182 patients

### Clinical Outcomes

- **Length of stay:** 2.7±2.8 days
- **Overall perioperative complication rate:** 16.5%
- **Common perioperative complications:**
  - Cardiac (2.2%)
  - Neurologic (2.2%)
  - Urinary (2.2%)
  - Infection (2.2%)
  - Pulmonary (1.1%)

### Patient-reported Outcomes

- **Significant pre- to postop improvement**
  - **ODI:**
    - 50.2±16.1 → 39.0±19.2, *p*<0.001
  - **PROMIS Physical Function:**
    - 10.9±11.6 → 21.4±21.3, *p*<0.001
  - **PROMIS Pain Intensity**
    - 92.4±9.1 → 78.3±22.3, *p*<0.001
  - **PROMIS Pain Interference**
    - 58.4±5.8 → 49.8±8.6, *p*=0.001
Results: PROMIS and ODI Correlations with Outcomes

Correlation with postoperative HRQL outcomes

<table>
<thead>
<tr>
<th>Clinical Outcome</th>
<th>Health-related quality of life assessment</th>
<th>R</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length of stay</td>
<td>ODI</td>
<td>0.314</td>
<td>&lt;0.001*</td>
</tr>
<tr>
<td></td>
<td>PROMIS Pain Intensity</td>
<td>0.237</td>
<td>0.001*</td>
</tr>
<tr>
<td></td>
<td>PROMIS Pain Interference</td>
<td>0.174</td>
<td>0.019*</td>
</tr>
<tr>
<td></td>
<td>PROMIS Physical Function</td>
<td>-0.296</td>
<td>&lt;0.001*</td>
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<tr>
<td>Complication Incidence</td>
<td>ODI</td>
<td>0.143</td>
<td>0.055</td>
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<tr>
<td></td>
<td>PROMIS Pain Intensity</td>
<td>0.137</td>
<td>0.065</td>
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<tr>
<td></td>
<td>PROMIS Pain Interference</td>
<td>0.182</td>
<td>0.014*</td>
</tr>
<tr>
<td></td>
<td>PROMIS Physical Function</td>
<td>-0.206</td>
<td>0.005*</td>
</tr>
</tbody>
</table>

- All postop HRQL instruments correlated with LOS
- PROMIS showed stronger correlations with complication incidence than ODI
Results: PROMIS and ODI Correlations with Outcomes

Correlation with pre- to postoperative changes in HRQL outcomes

<table>
<thead>
<tr>
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<th>R</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
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<td>ODI</td>
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<td>0.179</td>
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<tr>
<td></td>
<td>PROMIS Pain Intensity</td>
<td>0.167</td>
<td>0.024*</td>
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<td>PROMIS Pain Interference</td>
<td>0.078</td>
<td>0.294</td>
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<tr>
<td></td>
<td>PROMIS Physical Function</td>
<td>-0.169</td>
<td>0.023*</td>
</tr>
<tr>
<td>Complication Incidence</td>
<td>ODI</td>
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<td>0.781</td>
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<tr>
<td></td>
<td>PROMIS Pain Intensity</td>
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<td>0.258</td>
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<tr>
<td></td>
<td>PROMIS Pain Interference</td>
<td>0.127</td>
<td>0.087</td>
</tr>
<tr>
<td></td>
<td>PROMIS Physical Function</td>
<td>-0.104</td>
<td>0.161</td>
</tr>
</tbody>
</table>

- Changes in PROMIS score correlated with LOS; changes in ODI did not
- Complication incidence did not correlate with PROMIS or ODI
Results: Regression Analysis

- No association between ODI and complication occurrence:
  - \( R^2 = 0.015, p = 0.055 \)

- PROMIS Physical Function and Pain Interference were significantly associated with complication occurrence
  - Physical Function: \( R^2 = 0.037, p = 0.005 \)
  - Pain Interference: \( R^2 = 0.028, p = 0.014 \)

- Only pre- to postoperative changes in PROMIS were associated with LOS; changes in ODI were not.
  - ODI: \( R^2 = 0.005, p = 0.179 \)
  - PROMIS Pain Intensity: \( R^2 = 0.023, p = 0.024 \)
  - PROMIS Physical Function: \( R^2 = 0.023, p = 0.023 \)
Conclusions

- For patients undergoing thoracolumbar spine surgery, PROMIS better reflects the impact of perioperative complication occurrence and length of stay than ODI.

- Given previous reports demonstrating the lower administrative burden of PROMIS, this study suggests PROMIS may offer greater clinical utility in tracking outcomes.  

  *Fries et al, 2018*

Limitations

- Heterogeneity of the included patient population (any thoracolumbar diagnosis)
- Generalizability is limited; patients come from a single institution
- Short follow-up (3-months)