Validity Of Patient Health Questionnaire-9 In Minimally Invasive Lumbar Interbody Fusion

Nathaniel W. Jenkins, MS¹; James M. Parrish, MPH¹; Nadia Hrynewycz, BS¹; Thomas Brundage, BS¹; Joon Yoo, BA¹; Kern Singh¹,²

¹Department of Orthopaedic Surgery, Rush University Medical Center
²Professor, Co-Director of the Minimally Invasive Spine Institute at Rush University Medical Center; Founder and President, Minimally Invasive Spine Study Group
Disclosures

Nathaniel W. Jenkins, MS; James M. Parrish, MPH; Nadia Hrynewycz, BS; Thomas Brundage, BS; Joon Yoo, BA
Nothing to disclose

Kern Singh, MD

- **Stock Ownership** - TDi, LLC and Vital 5, LLC.
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- **Grants** - Cervical Spine Research Society
Introduction

• Preoperative depression & anxiety predict postop pain and physical impairments
• Better identify and accommodate patients before surgery
Aims and Objectives

This study aims to ...

Examine relationship of depression in patients undergoing MIS lumbar fusions, as measured by:

- PHQ-9
- SF-12 Mental Component Summary scores (MCS)
- VR-12 MCS
Methodology

- Prospectively-maintained registry, retrospective review

- 215 patients that underwent a primary, 1 or 2 level MIS TLIF for degenerative spondylolisthesis were identified
Methodology

• Variables Analyzed
  • Patient demographics
  • Perioperative and operative variables
  • Patient-Reported Outcomes (PROs)
    ■ PHQ-9,
    ■ SF-12 MCS
    ■ VR-12 MCS

• Statistical Analyses
  • Student’s t-test
  • Chi-Squared analysis
  • Pearson correlation coefficient
  • Strengths of correlation were
Patients demonstrated significant improvement in ODI and VAS Back and Leg pain at 6-months follow-up

Table 1. Baseline characteristics of study population

<table>
<thead>
<tr>
<th></th>
<th>(N=215)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (Mean ± SD, years)</td>
<td>53.8 ± 11.4</td>
</tr>
<tr>
<td>Gender (n)</td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>41.9% (94)</td>
</tr>
<tr>
<td>Male</td>
<td>58.1% (125)</td>
</tr>
<tr>
<td>Smoking status (n)</td>
<td></td>
</tr>
<tr>
<td>Non-smoker</td>
<td>87.4% (187)</td>
</tr>
<tr>
<td>Smoker</td>
<td>12.6% (27)</td>
</tr>
<tr>
<td>Body Mass Index (n)</td>
<td></td>
</tr>
<tr>
<td>&lt;30 kg/m² – Non-obese</td>
<td>50.2% (108)</td>
</tr>
<tr>
<td>&gt;30 kg/m² – Obese</td>
<td>49.8% (107)</td>
</tr>
<tr>
<td>CCI (Mean ± SD)</td>
<td>2.0 ± 1.9 (214)</td>
</tr>
<tr>
<td>Operative time (Mean ± SD, min)</td>
<td>149.2 ± 69.2 (211)</td>
</tr>
<tr>
<td>Estimated blood loss (Mean ± SD, mL)</td>
<td>52.4 ± 44.3 (213)</td>
</tr>
<tr>
<td>Length of stay (Mean ± SD, hours)</td>
<td>33.4 ± 25.7 (211)</td>
</tr>
</tbody>
</table>

SD = Standard Deviation; CCI = Charlson Comorbidity Index
Statistically significant improvements in:

- PHQ-9
- SF-12 MCS
- VR-12 MCS

### Table 2. Postoperative changes in survey scores

<table>
<thead>
<tr>
<th></th>
<th>Score (Mean ± SD)</th>
<th>Change (Mean ± SD)</th>
<th>p-value*</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PHQ-9</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Preoperative</td>
<td>6.73 ± 6.62</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>6-week</td>
<td>5.26 ± 5.81</td>
<td>-1.51 ± 5.46</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>12-week</td>
<td>3.84 ± 4.59</td>
<td>-2.11 ± 4.90</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>6-month</td>
<td>3.70 ± 4.70</td>
<td>-2.83 ± 5.47</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>1-year</td>
<td>4.55 ± 5.90</td>
<td>-2.17 ± 6.53</td>
<td>0.004</td>
</tr>
<tr>
<td><strong>SF-12 MCS</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Preoperative</td>
<td>49.73 ± 11.33</td>
<td>--</td>
<td>0.006</td>
</tr>
<tr>
<td>6-week</td>
<td>51.81 ± 11.12</td>
<td>2.26 ± 10.42</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>12-week</td>
<td>54.23 ± 10.73</td>
<td>2.99 ± 8.83</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>6-month</td>
<td>53.80 ± 9.93</td>
<td>2.91 ± 8.76</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>1-year</td>
<td>52.35 ± 10.99</td>
<td>3.31 ± 10.26</td>
<td>0.006</td>
</tr>
<tr>
<td><strong>VR-12 MCS</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Preoperative</td>
<td>50.60 ± 11.43</td>
<td>--</td>
<td>0.001</td>
</tr>
<tr>
<td>6-week</td>
<td>53.03 ± 11.23</td>
<td>2.63 ± 10.23</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>12-week</td>
<td>55.91 ± 10.58</td>
<td>4.04 ± 9.06</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>6-month</td>
<td>56.64 ± 9.67</td>
<td>4.74 ± 8.77</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>1-year</td>
<td>55.02 ± 10.84</td>
<td>5.56 ± 10.19</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

*Boldface indicates statistical significance

†p-value calculated using paired t-test comparing scores at each timepoint to preoperative values
## Results

**Table 3. Association of PHQ-9 with SF-12 MCS and VR-12 MCS**

<table>
<thead>
<tr>
<th></th>
<th>PHQ-9 vs. SF-12 MCS</th>
<th>PHQ-9 vs. VR-12 MCS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>r*</td>
<td>p-value</td>
</tr>
<tr>
<td>Preoperative</td>
<td>-0.741</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>6-week</td>
<td>-0.693</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>12-week</td>
<td>-0.688</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>6-month</td>
<td>-0.787</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>1-year</td>
<td>-0.725</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

*Boldface indicates strong correlation with PHQ-9 score at the corresponding timepoint, as identified by Pearson correlation coefficient (*r* ≥ 0.5, p<0.05)

**Strong Correlations for all, |r| ≥ 0.5 p < 0.05**
Results
VR-12 vs PHQ-9 Correlations

Preop 6 weeks 12 weeks
6 months 12 months
Results
SF-12 vs PHQ-9 Correlations

Preop

6 weeks

12 weeks

6 months

12 months
Discussion

- Mental health significantly improves as measured by:
  - PHQ-9
  - SF-12 MCS
  - VR-12 MCS

- PHQ-9 strongly correlates with:
  - SF-12
  - VR-12
Limitations

- Due to loss to follow up, sample size differed for various patient-reported outcome measures
- Limited sample size (n=215)
- Retrospective nature of the study can impart selection bias
Conclusions

• PHQ-9 can be used as valid screening even in absence of SF-12 & VR-12

• May effectively screen patients in less time

• Limiting number of questionnaires could reduce survey burden
REFERENCES


17. Iqbal SU, Rogers W, Selim A, et al. The Veterans RAND 12 Item Health Survey (VR-12): what it is and how it is used. Boston University School of ….


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