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## Risk Factors of Not Reaching MCID after Elective Lumbar Spine Surgery: A Case Control Study

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## **Risk Factors of Not Reaching MCID after Elective Lumbar Spine Surgery: A Case Control Study**

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### **Background**

The therapeutic effect of spine surgery has been traditionally evaluated by physical examination, radiographic findings, and general perception of patient's health status. However, these assessments are often insufficient to represent surgical outcomes. Patient-reported outcomes (PROs) are tools developed to measure quality outcomes following spinal surgery. Examples include the Patient-Reported Outcomes Measurement Information System Function 4-item Short Form (PROMIS-PF), Visual Analogue Scale (VAS), ODI (Oswestry Disability Index), SF-36 (Short Form Health Survey), and EQ-5D (EuroQuol-5D). The minimum clinically important difference (MCID) is an assessment tool to note the smallest clinical difference in PROs and provides the threshold where patients experience clinical benefit that justifies treatment plans or procedures despite the cost and side effects. MCID results reflect patient-perceived functional improvement, which can be a core metric in lumbar surgery for degenerative disease. Clinical and sociodemographic risk factors may serve to identify high-risk patients via MCID assessment. This study aims to identify risk factors associated with failure of reaching MCID based on PROMIS PF after elective lumbar spine surgery and the data registry from Michigan Spine Surgery Spine Surgery Improvement Collaborative (MSSIC). The results of this study can provide opportunities to optimize medical conditions of patients in prior to any elective lumbar surgery.

### **METHODS**

MSSIC is a state-wide quality-improvement initiative database including 29 hospitals and 200 orthopedic and neurosurgeons from various settings. Member hospitals are required to perform an annual minimum of 200 spine surgeries. MSSIC reviews elective spine surgeries for degenerative disease but excludes non-degenerative and/or complex pathology (i.e., spinal cord injury, traumatic fractures, pre-existing infection, grade 3 or 4 spondylolisthesis, scoliosis greater than 25°, congenital anomalies, or ≥ 4-level fusion). Utilizing MSSIC, 10,922 patients who had undergone elective lumbar spine surgery were selected with 90 day follow up, and 7,200 patients with 1-year follow up. Patients with missing data were excluded from the study. Patient demographics, clinical presentation, medical history, surgical procedure, details of hospital stay, postsurgical adverse events within 90 days of surgery, and patient-reported outcome after surgery were reviewed. A patient was considered to have achieved MCID if there was an increase in ≥4.5 points.

### **RESULTS**

Of 10,922 patients with 90-day follow-up, 4,453 patients (40.8%) did not reach MCID. Of 7,200 patients with 1-year follow up, 2,361 patients (23.8%) did not achieve MCID. There were significant baseline differences in demographic profiles and operative characteristics for those who had follow-up at 90 days

and 1 year after their surgery. At 90 days after surgery, significant factors of not reaching MCID and their relative risk included symptom duration more than 1 year (1.34), previous spine surgery (1.25), African American descent (1.25), chronic opiate use (1.23), less than high school education (1.20), morbid obesity (1.15), ASA class >2 (1.15), current smoking (1.14), chronic obstructive pulmonary disease (COPD) (1.13), depression (1.09), history of DVT (1.08), scoliosis (1.06), anxiety (1.06), baseline PROMIS (1.06), and surgery invasiveness (1.02). At 1 year after surgery, significant factors of not reaching MCID and their relative risk included symptom duration more than 1 year (1.41), less than high school education (1.34), previous spine surgery (1.30), morbid obesity (1.30), chronic opiate use (1.25), age (1.21), current smoking (1.21), African American descent (1.20), ASA class >2 (1.18), history of DVT (1.12), depression (1.10), chronic obstructive pulmonary disease (COPD) (1.09), and baseline PROMIS (1.06). Independent ambulatory status (0.83 and 0.88 for 90-day and 1-year follow-up, respectively) and private insurance (0.83 and 0.85 for 90-day and 1-year follow-up, respectively) were associated with higher likelihood of reaching MCID.

## **CONCLUSION**

This case control study identifies relevant risk factors of not reaching MCID after elective lumbar spine surgery. The results may assist clinicians in identifying high risk patients and optimizing patients' medical conditions prior to spinal surgery.