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“Impact of Preoperative Depression on the Association Between Revision Status and Inpatient Outcomes Following Elective Posterior Lumbar Fusion”

Background: Posterior lumbar fusion is among the most commonly performed spinal procedures in the United States. Revision lumbar fusion carries substantially higher risk of perioperative morbidity compared to primary surgery. Preoperative depression is prevalent in this population and has been independently associated with worse surgical outcomes; however, whether depression modifies the relationship between revision status and inpatient outcomes remains unknown. Identifying high-risk patient subgroups, particularly those with both preoperative depression and revision surgery, could have implications for preoperative optimization and surgical decision-making.

Methods: We conducted a retrospective cohort study using the National Inpatient Sample (NIS), 2016–2022. Adults (≥ 18 years) undergoing elective posterior lumbar fusion (ICD-10-PCS codes: 0SG0/0SG1 family) were identified and stratified by revision status (primary vs. revision) and preoperative depression diagnosis (ICD-10-CM F32/F33). Primary outcomes included any inpatient complication, major complication, and non-routine discharge. Secondary outcomes were prolonged length of stay (≥ 75 th percentile), total hospital charges, and in-hospital mortality. Survey-weighted multivariable regression (PROC SURVEYLOGISTIC/SURVEYREG in SAS) was performed incorporating an a priori depression $\times$ revision interaction term, adjusting for age, sex, Elixhauser Comorbidity Index, hospital characteristics, and year. Survey weights, stratification, and clustering variables were applied per HCUP analytic guidelines.

Results: The final cohort included approximately 206,000 admissions: 172,956 primary/no depression, 31,763 primary/depression, 1,392 revision/no depression, and 294 revision/depression. Patients with concurrent revision surgery and preoperative depression were more likely to be female, older, and to carry a higher comorbidity burden. On unadjusted analysis, this subgroup demonstrated the highest rates of any complication and non-routine discharge across all four groups. On multivariable analysis, however, the depression $\times$ revision interaction term did not reach statistical significance for any prespecified outcome (all $p > 0.05$). Post-hoc power analysis estimated 56% power to detect the hypothesized interaction, reflecting the relatively low prevalence of revision surgery in the NIS over the study period.

Conclusions: This large administrative database study did not identify a statistically significant interaction between preoperative depression and revision status on inpatient outcomes following elective posterior lumbar fusion. The study was limited by insufficient power to detect a meaningful interaction effect at the prevalence observed. Nonetheless, the concurrent burden of depression and revision surgery in this subgroup underscores a clinically important high-risk population. Larger prospective studies capturing patient-reported and functional outcomes are needed to fully characterize the role of depression in modifying surgical risk in this population.