

# Incidence and Risk Factors of Perioperative Inpatient Falls Following Multi-level Posterior Spinal Fusion for Adult Idiopathic Scoliosis

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**INTRODUCTION:** Adult spinal deformity (ASD) patients may be considered for multi-level posterior spinal fusion (PSF). Such interventions are typically followed by inpatient stays during which patients are gradually mobilized. During this course, patients may be at risk for inpatient falls (IPFs), which are serious, preventable, and non-reimbursable “never events” that can severely injure or delay discharge of patients. However, the incidence of this inpatient complication and potentially modifiable factors associated with its occurrence remain poorly characterized at a national level for the study population. This study thus aimed to investigate and clarify these characteristics.

**METHODS:** This study was exempt from Institutional Review Board approval. From the national M170Ortho PearlDiver Mariner Patient Claims Database, patients of both sexes undergoing PSF for ASD were extracted. From this sample of 13,708 patients, those with versus without an IPF during their inpatient stay were identified based on administrative coding. Various factors were analyzed for association with IPFs using multivariate logistic regression. These included: clinical (age, sex, history of prior falls, obesity, underweight, alcohol use disorder, opioid use disorder, prior dementia diagnosis, hospital acquired delirium or psychosis), non-clinical (social determinants of health, insurance plan, geographic region), and surgical (number of levels fused, pelvis fixation, 3-column posterior osteotomy, anterior lumbar interbody fusion [ALIF], posterior lumbar interbody fusion [PLIF]) factors. Hospital stay characteristics between patients with and without IPFs were also compared by two-tailed student t-test.

**RESULTS SECTION:** Of 13,708 ASD patients undergoing multi-level PSF, an IPF was experienced by 392 (2.86%). The mean length of stay for patients who experienced an IPF was 25.1% longer and the mean cost was 47.4% higher (p<0.001 for both). Independent factors associated with increased IPF risk are shown in Figure 1. In order of decreasing odds ratio (OR), these included: history of prior falls (OR 3.62, p<0.001), Medicaid insurance (OR 1.82, p=0.009), disadvantaged social determinants of health (OR 1.48, p=0.023), pelvis fixation (OR 1.45, p=0.011), and older age (OR 1.35, p<0.001). Conversely, most surgical factors such as the use of ALIF, PLIF, or greater number of levels fused were not associated with greater odds of an IPF. Additionally, geographic region was not associated with IPF incidence.

**DISCUSSION:** Among a robust, national cohort of ASD patients undergoing multi-level PSF, the overall rate of IPFs was 2.86%. IPFs significantly increased the burden of hospital stays which underscores the importance of preventing them. Various factors were found to be associated with IPF occurrence, many of which are potentially modifiable through refinement of current fall-prevention programs. The factor associated with the greatest increased odds of an IPF was history of prior falls. This highlights a defined sub-cohort of patients for which fall prevention measures should be emphasized.

**SIGNIFICANCE/CLINICAL RELEVANCE:** The findings of this study have important implications for designing pathways to prevent the major harm from inpatient falls after PSF surgery. The risk factors found to be significant in this study should be checked in risk assessment before surgery and prevention measures tailored to address them.

IMAGES AND TABLES:

Figure 1. Risk Factors Associated with an IPF for ASD Patients Undergoing Multi-Level PSF

