Effect of Pre-Operative Physical Therapy on Healthcare Utilization and Costs for Patients Undergoing Lumbar Decompression Surgery

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INTRODUCTION: As lumbar spine surgery costs rise, pre-operative physical therapy (PT) is increasingly utilized. Therefore, we assessed the effect of pre-operative PT on outcomes and expenditures for patients undergoing lumbar decompression surgery and evaluated Centers for Medicare & Medicaid Services (CMS) policy changes regarding PT requirements.

METHODS: We conducted a retrospective analysis of claims data from 2007–2021 using Merative Marketscan. Adults undergoing lumbar decompression were included. Exposure was receipt of PT between initial diagnosis and surgery. Outcomes included surgical length of stay (LOS), 90-day emergency/inpatient readmissions, prescribed morphine milligram equivalents (MMEs) within one year post-surgery, hospitalization expenditure, and total inpatient/outpatient costs within one year post-discharge. Propensity score matching (PSM) with caliper matching (0.0001) was based on patient characteristics including age, sex, year, region, plan type, surgical approach (anterior vs. posterior, single vs. multilevel), prior opioid use, and Elixhauser comorbidity index (ECI). A difference-in-differences analysis examined the effects of CMS policies introduced in 2015 and 2018 that expanded pre-operative PT requirements.

RESULTS: Pre-operative PT utilization increased significantly from 26.2% in 2007 to 68.8% in 2021 in the unmatched sample (N=131,136), representing an annual increase of 3.2% (P<0.001). After PSM (50,388 matched pairs), the overall cohort had a mean age of 51.1 years (SD 9.9), 51.9% were female, 69.4% had prior opioid use, mean ECI was 1.4 (SD 5.1), 97.7% underwent posterior approach, and 48.4% had multilevel decompression. The PSM reduced mean bias from 12.4% to 0.9%, median bias from 7.1% to 1.0%, and standardized bias from 54.2% to 3.1%. Pre-operative PT showed mixed associations with outcomes. PT was associated with reduced MME prescribing within one year (4,837 vs. 5,095 MMEs, P<0.001) and a modest increase in readmission rates (20.5% vs. 19.9%, P=0.013). No significant difference was observed in LOS (2.78 vs. 2.81 days, P=0.142). However, PT was associated with increased hospitalization expenditure ($63,036 vs. $60,628, P<0.001) and total one-year costs ($92,296 vs. $86,318, P<0.001). The difference-in-differences analysis revealed that the 2015 CMS policy was associated with increased MME prescribing (442.2 MMEs, P=0.012), while neither the 2015 nor 2018 policies significantly affected LOS, readmissions, or healthcare costs.

DISCUSSION AND CONCLUSION: Pre-operative PT for lumbar decompression showed a complex pattern of associations, with reduced individual-level opioid prescribing but increased healthcare costs and readmissions. Lumbar decompression patients do not derive clear benefit from PT if they eventually require surgery, possibly due to treatment delays that allow for progressive neurological deterioration, the mechanical nature of lumbar stenosis or disc herniation requiring surgical decompression that PT cannot provide, or selection bias where surgical candidates represent more severe, treatment-resistant pathology. Unexpectedly, CMS policy changes were associated with increased opioid prescribing at the population level. Policy interventions may have unintended consequences, suggesting that conservative management strategies should be tailored to specific spinal pathologies and surgical procedures.