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Perioperative Outcomes, Complications, and Costs Associated with Lumbar Spinal Fusion in Older Patients with Spinal Stenosis and Spondylolisthesis: Analysis of the United States Medicare Claims Database

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Introduction: Among elderly patients with spinal stenosis and spondylolisthesis, lumbar spinal fusion is commonly performed to facilitate spinal decompression and stabilization. However, recent reports of excessive perioperative morbidity and soaring healthcare costs with fusion have led to the search for methods to improve the safety profile and to lower costs for this important surgical treatment. The purpose of this study is to quantify the perioperative outcomes, complications, and costs associated with posterior spinal fusion among Medicare enrollees with spinal stenosis and spondylolisthesis using a national Medicare claims database.

Methods: The 5% systematic sample of Medicare claims data (2005-2009) was used to identify and track the outcomes of patients who received any form of posterior spine fusion (PSF) for lumbar spinal stenosis (LSS) or spondylolisthesis. Surgical patients were identified by standard PSF procedural coding, while diagnoses of LSS and spondylolisthesis were identified using specific ICD-9 coding. Enrollees further required a minimum of 2 years' follow-up, and claim history of at least 12 months prior to surgery. Patients' length of stay, discharge status, incidence and type of complications, and treatment costs following PSF were evaluated.

Results: A final cohort of 1,672 PSF patients was included. LSS and spondylolisthesis were the primary diagnoses for 58.7% and 18.9% of the patients, respectively, and were the secondary diagnoses for the remaining patients. Of the 1,672 PSF patients, 50.7% had LSS only; 10.2% had spondylolisthesis only; and 39.1% had both LSS and spondylolisthesis. For the overall cohort, the average age was 71.4 +/- 7.9, and the average length of stay was 4.6 +/- 3.2 days. While 42.2% of the patients had routine discharges, a majority of the patients (54.6%) were discharged to an outside facility or required home health services (18.0%, 19.4%, and 17.2% were discharged to skilled nursing facilities, home health services, and rehabilitation facilities, respectively). At 3 months, 1 year, and 2 years post-operative, the incidence of spine reoperation was 19.9%, 24.0%, and 28.0%, respectively, while readmission for complications was 34.5%, 41.4%, and 47.9%, respectively. The overall average payment for the PSF patients was \$36,230 +/- \$17,020, \$46,840 +/- \$31,350, and \$61,610 +/- \$46,580 at 3 months, 1 year, and 2 years, respectively, and corresponded to an overall cost to Medicare of \$60.6 million, \$78.3 million, and \$103.0 million for treating these patients.

Complication Rates - Overall

Complication	3 mo. f/u	1 year f/u	2 years f/u
Spine reoperation	19.9%	24.0%	28.0%
Infection	3.83%	4.90%	5.92%
Spinal cord injury	0.60%	0.66%	0.78%
Nerve root injury	0.06%	0.12%	0.12%
Dural tear/puncture	5.02%	5.50%	5.98%
Pneumonia	4.43%	7.78%	13.1%
PE	1.85%	2.51%	3.59%
Myocardial infarction	1.97%	2.81%	4.49%
Mechanical complications	3.47%	5.50%	8.49%
Hemorrhage/hematoma	2.81%	3.89%	4.84%
Lumbar spine fracture	2.45%	3.29%	4.19%
Postlaminectomy syndrome	11.8%	19.1%	25.4%
Wound infection	4.61%	6.10%	7.00%
UTI	17.9%	30.3%	40.9%
Non/mal-union	1.73%	3.05%	4.13%
Readmission (for above complications)	34.5%	41.4%	47.9%
Removal of hardware	1.56%	2.51%	4.25%

[Figure 1]

Conclusions: Over half of the PSF-treated patients in this study had LSS alone, suggesting that factors other than spondylolisthesis play a significant role in the decision to recommend spinal fusion in this elderly population. One in 4 elderly fusion patients being treated for LSS or spondylolisthesis was reoperated on the spine within 2 years, and nearly 1 in 2 readmitted for a surgery-related complication. This data highlights several areas where improvements can be made in the effective delivery and cost of surgical care for patients with spinal stenosis and spondylolisthesis.