

The Changing Healthcare Landscape of Lumbar Spinal Fusion: Two-Year Claims Database Analysis

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BACKGROUND

- Spinal lumbar fusion has been associated with high reoperation/revision rates.
 - Studies using older real-world data have reported two-year rates of about 4% to 7% and four to five year rates of about 8% to 13%.^{1,2,3}

OBJECTIVES

- To evaluate the two-year healthcare utilization associated with lumbar fusion surgery using comprehensive, contemporary data.

METHODS

Study Design: Retrospective, noncomparative cohort study of patients that had lumbar only fusion procedure.

Data Source: Merative MarketScan Commercial Claims database, covering >100 million lives, October 1, 2015 to October 31, 2020.

Study Population:

- Inclusion:** Adult (18 to 64 years) that had lumbar only fusion (identified with ICD-10 codes), ≥ two years continuous enrollment post-surgery, 180 days of healthcare enrollment prior to fusion.
- Exclusion:** Patients with fusions of other anatomies.

Outcomes:

- Reoperations in the lumbar spine
- Infection, defined as presence of deep infection or spinal infection
- Pseudarthrosis

Statistical Analysis:

- Descriptive analytics were conducted for all reoperations, infection and pseudarthrosis.
- Costs were inflation adjusted to 2022.
- Generalized linear models (GLM) with log link and gamma distribution and marginal analysis was used for costs.

References:

- Deyo RA, et al. Revision surgery following operations for lumbar stenosis. J Bone Joint Surg Am 2011;93(21):1979-86.
- Huang KT, et al. Differences in the outcomes of anterior versus posterior interbody fusion surgery of the lumbar spine: a propensity score-controlled cohort analysis of 10,941 patients. J Clin Neurosci 2015;22(5):848-53
- Cummings D, et al. Reoperation and Mortality Rates Following Elective 1 to 2 Level Lumbar Fusion: A Large State Database Analysis. Global Spine J 2022; 12(8): 1708-1714.

RESULTS

- The patient, provider and procedure characteristics of the cohort are presented in **Table 1**
 - 14,527 patients with average age 52, including 56% females, were included in the analysis.
 - The majority were treated in the inpatient setting 88%.
 - The average Elixhauser index patient comorbidity score was 1.8 (standard deviation (SD): 1.6) and ~30% patients had ≥ 3 comorbidities.
 - Degenerative disc disease and deformity were diagnosed in 88.3% and 16.6% cases, respectively.
 - One-level fusion was performed in 67% cases.

Table 1. Baseline/index characteristics of the study cohort

Variable	Lumbar Only
n	14,527
Age (mean (SD))	52.8 (8.3)
Gender = male n (%)	6,319 (43.5)
Discharge year n (%)	
2015	1,342 (9.2)
2016	3,874 (26.7)
2017	2,778 (19.1)
2018	2,561 (17.6)
2019	2,306 (15.9)
2020	1,666 (11.5)
Place of service code description n (%)	
ASC	689 (4.7)
ED	3 (0.0)
HOPD	976 (6.7)
Inpatient	12,847 (88.4)
OTHER	12 (0.1)
Elixhauser Index (mean (SD))	1.85 (1.62)
Elixhauser Index Categorical n (%)	
0	3,181 (21.9)
1-2	7,112 (49.0)
3-4	3,237 (22.3)
5+	997 (6.9)
Diabetes n (%)	2,483 (17.1)
Tobacco use n (%)	2,250 (15.5)
Osteoporosis/Osteopenia n (%)	318 (2.2)
Stenosis diagnosis n (%)	8,618 (59.3)
Degenerative diagnosis n (%)	12,822 (88.3)
Spinal cancer diagnosis n (%)	106 (0.7)
Deformity diagnosis n (%)	2,405 (16.6)
Adolescent idiopathic scoliosis n (%)	85 (0.6)
Pseudarthrosis diagnosis n (%)	527 (3.6)
Spine trauma diagnosis n (%)	428 (2.9)
Index spine infection diagnosis n (%)	95 (0.7)
Index surgical site infection diagnosis n (%)	47 (0.3)
Index radiculopathy diagnosis n (%)	5,846 (40.2)
Anterior approach n (%)	3,174 (21.8)
Posterolateral approach n (%)	4,834 (33.3)
Posterior interbody approach n (%)	5,428 (37.4)
Interbody cage use n (%)	11,155 (76.8)
Corpectomy at index n (%)	188 (1.3)
Posterior instrumentation used n (%)	4,162 (28.7)
Lumbar Fusion level n (%)	
1	9,751 (67.1)
2plus	4,776 (32.9)
Physician specialty code-Neurosurgeon n (%)	5,648 (38.9)
Physician specialty code-Orthopaedic n (%)	7,048 (48.5)
Physician specialty code-Other n (%)	2,264 (15.6)
Length of Stay (mean (SD))	3.57 (3.21)

- At 2-year follow-up, new lumbar operations were performed in 11% cases, of which 57% had a diagnosis of spinal fusion complication at the time of the new lumbar procedure (Figure 1).
- Pseudarthrosis and infection were reported in 5.6% and 4.3% of all cases, respectively (Figure 1).
- The incremental healthcare costs associated with pseudoarthrosis and infection, without reoperation costs, averaged \$32,302 (95% confidence interval (CI): \$20,773-\$43,831) and \$80,539 (95%CI: \$61,270-\$99,807), respectively (Figure 2).
- When reoperations were performed, costs increased by \$73,603 (95%CI: \$57,519-\$89,688) (Figure 2).

Figure 1. Two-year incidence proportion with 95% confidence interval of reoperation, pseudarthrosis and infection after lumbar fusion procedures

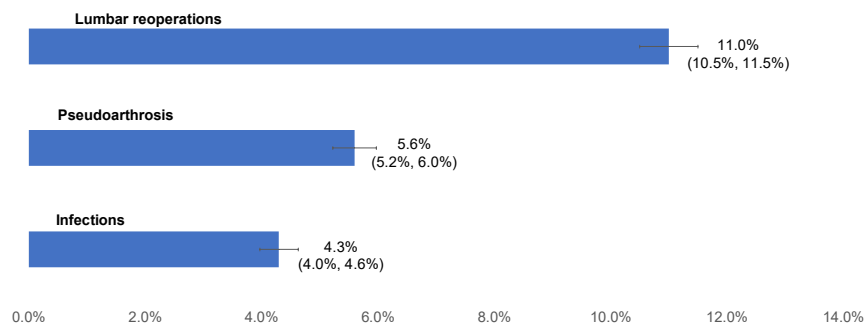
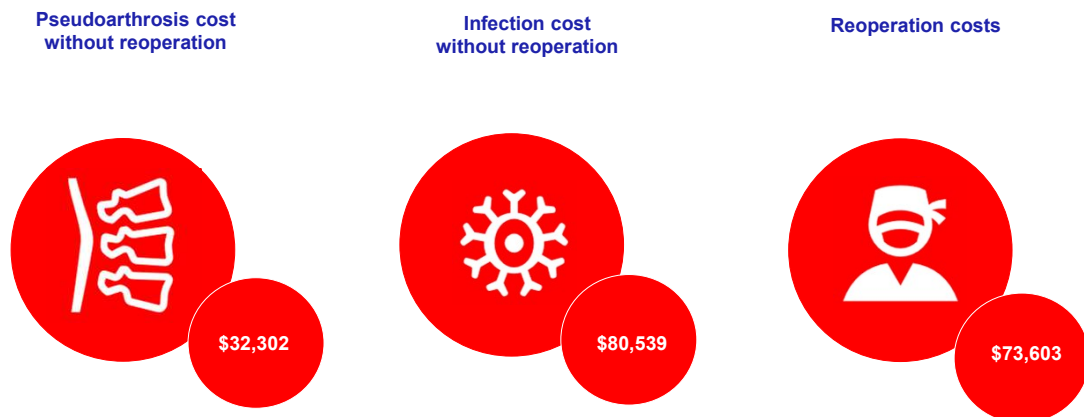


Figure 2. Incremental healthcare costs associated with pseudarthrosis, infection and reoperation



CONCLUSIONS

- For > 10% of patients, lumbar spinal surgery is associated with additional lumbar surgical interventions and high overall healthcare costs.
- Reoperation costs exceeded \$70K.