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Reoperations Following Spine Surgery in Washington State

- We examined the cumulative incidence of second lumbar spine operation (“reoperation”) following an initial lumbar operation for degenerative conditions using a hospital discharge registry.
- The 11-year cumulative incidence of reoperation following lumbar spine surgery was 19%.
- Patients with spondylolisthesis had a lower cumulative incidence of reoperation after fusion surgery than after decompression alone (17.1% vs. 28.0%; $P= 0.002$).
- For diagnoses other than spondylolisthesis, the cumulative incidence of reoperation was higher following fusion than following decompression alone (21.5% vs. 18.8%; $p = 0.008$).
- Among patients who underwent surgery for lumbar degenerative disease, more than twice as many had a fusion procedure in the 1997 to 2000 cohort (19.1%) compared with the 1990 to 1993 cohort (9.4%).
- The 4-year cumulative incidence of reoperation was higher in the 1997 to 2000 cohort compared with the 1990 to 1993 cohort (14.0% vs. 12.4%, $p < 0.001$).
- Among fusion patients, those in the 1997 to 2000 cohort were approximately 40% more likely to undergo a reoperation within the first year when compared with fusion patients the 1990 to 1993 cohort.
- A higher proportion of fusion procedures and the introduction of new spinal implants between 1993 and 1997 were not associated with reduced reoperation rates.

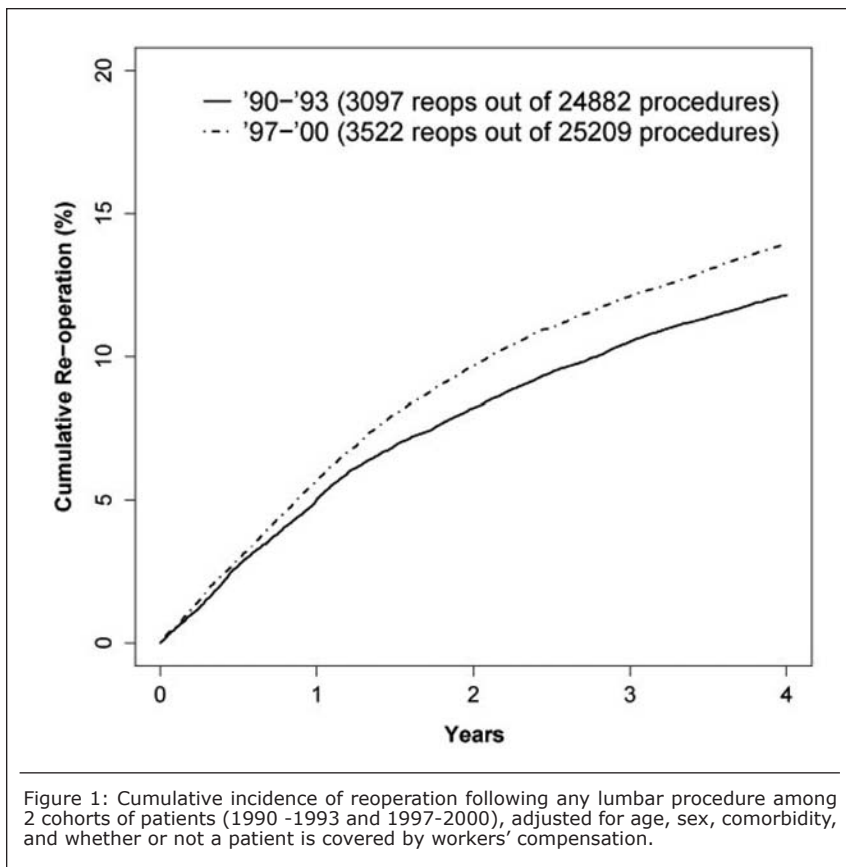
Lumbar decompression procedures such as laminectomy and discectomy are typically performed to relieve symptoms of leg pain, numbness, or weakness associated with compression of lumbar nerve roots. Lumbar spine surgery rates have increased over the past 2 decades. Rates of lumbar fusion surgery, in particular, increased 220% from 1990 to 2001, particularly accelerating after the 1996 Food and Drug Administration (FDA) approval of interbody fusion cage implants.

Reoperations following a decompression surgery are considered to be an indicator of a poor outcome of an initial surgery because they

generally imply persistent symptoms, progression of disease, treatment complication, or failure of patients to comply with postoperative care. Preventing repeat spinal surgery therefore, is an important goal for surgeons and their patients. Previous research have provided some evidence of an association between poor outcomes and increased readmissions, and are commonly used for quality assurance purposes by the National Committee on Quality Assurance (1995), as part of the Health Plan and Employer Data and Information Set (HEDIS), for the VA's NISQIP program, and by the Leapfrog group.

Health service researchers affiliated

with the UW Department of Orthopaedics and Sports Medicine performed a retrospective data analysis using the Washington State Comprehensive Hospital Abstract Reporting System (CHARS) to document the trends in reoperation rates from 1990 to 2001. The purpose of the CHARS system is to provide public health personnel, consumers, purchasers, payers, providers, and researchers with useful information by which to make informed decisions on health care. The CHARS system provides those concerned with the development of public policy with information necessary to analyze many significant health care issues. Specifically, the department uses



the CHARS data system to identify and analyze health trends related to patients' hospitalizations; establish statewide diagnosis related groups (DRG) weights; create hospital specific case mix indices; and identify and quantify issues related to health care access, quality, and cost containment.

Using a Cox-proportional Hazard regression model, we determined the cumulative incidence of reoperation following lumbar surgery and compared the frequency of reoperation following fusion surgery with that following decompression alone within four diagnoses (herniated disc, degenerative disc, spinal stenosis, and spondylolisthesis). Adults who underwent inpatient lumbar spine surgery for degenerative spine disorders in 1990-93 (n=24,882) were included in the study. We grouped patients as having either a spinal decompression surgery or spinal fusion surgery (with or without decompression). Our primary outcome measure was time until a second lumbar spine surgery (reoperation) of any type. Thus, reoperations did not necessarily occur at the same vertebral level as the initial surgery, but were always

lumbar procedures. We found that the cumulative incidence of reoperation at eleven years was 19.0%. For patients with spondylolisthesis, the cumulative incidence of reoperation was lower after fusion surgery than after decompression alone (17.1% versus 28%, p<0.001). However, for other diagnoses, the cumulative incidence of reoperation was significantly higher following fusion surgery than following decompression alone (21.5% vs. 18.8%, p=0.001). Following fusion surgery, 61.4% of reoperations were associated with a diagnosis code indicating device complication or pseudarthrosis.

In a separate analysis we also examined whether there was a trend in reoperation over time. For this study, we compared the 4-year cumulative incidence of a reoperation rate in two cohorts- a 1990-93 (n=24,882) cohort and a 1997-00 cohort (n=25,209). We used a Cox-proportional Hazard regression analysis, controlling for age, sex, insurance, and comorbidity to determine that the four-year cumulative incidence of reoperation was higher in the 1997-2000 cohort compared with the 1990-93 cohort (14.0% versus 12.4%, hazard ratio 1.16, p<0.001) despite increasing fusion surgery and

the availability of new implants.

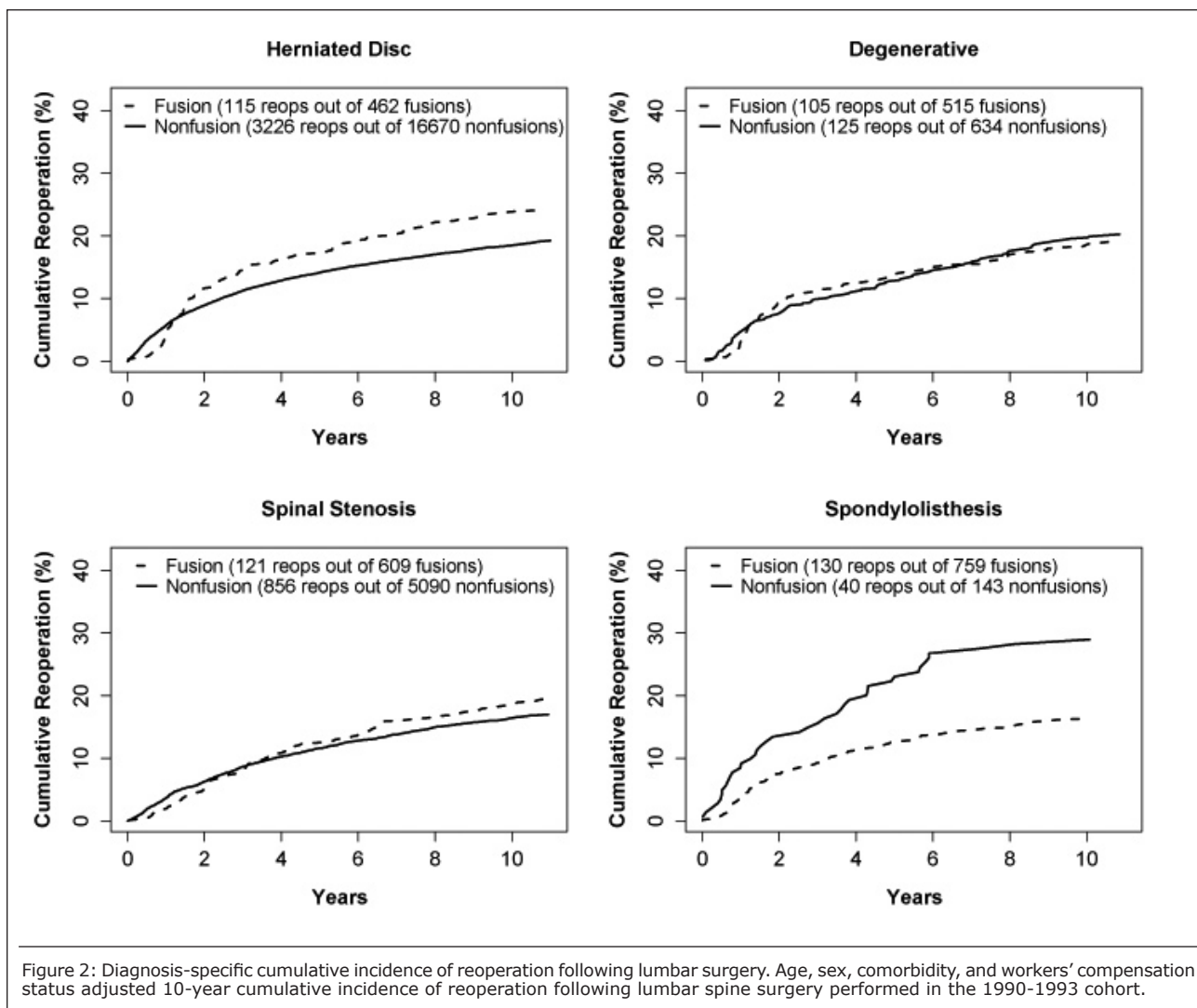
Conclusions

Based on these findings we concluded that for spondylolisthesis, fusion surgery was associated with fewer reoperations than decompression alone. However, for other degenerative spine conditions, the cumulative incidence of reoperation is higher after a fusion procedure than after decompression alone. Furthermore, the study suggests that the introduction of new spinal implants, and increasing use of fusion surgery, did not reduce the incidence of reoperations during the 1990's.

Ongoing research will examine factors that influence the safety outcomes for spinal surgery. Specifically, we will examine the variation in the rates of reoperations as an indicator of surgical safety across providers, examining the association between procedure volume and reoperation rates, and providing a useful analysis of the influence that risk-adjustment measures of comorbidity have on spine surgery outcomes. Variation in rates of procedures is a commonly reported metric of professional uncertainty and has been reported across hospital referral regions for many procedures including those of spine surgery. However, variation of outcomes has not been substantially explored. High variation in reoperation rates may reflect uncertainty regarding patient selection, varying complication rates, progression of disease, or treatment failures. Examining the variation in reoperation rates following spine surgery may allow comparisons of safety outcomes across providers. This is an attractive target for reporting programs because large variation may reflect overuse of services, variation in the amount and quality of care, and variations in outcomes. Future research may also suggest a direction to improve indications for initial and repeat spine surgery; to involve patients in informed decision-making; and to determine the safest and most effective surgical techniques.

Acknowledgements

Salary support received for this project from the University of Washington Surgical Dynamics Endowed Chair for Spine Outcomes Research. This study was supported



in part by grant number P60AR48093 and K23AR48979 from the National Institute of Arthritis, Musculoskeletal, and Skin Diseases (NIAMS).

Recommended Reading

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