

Racial Disparities in Outcomes of Surgery for Lumbar Spinal Stenosis

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Introduction

Racial inequalities have been described in the outcomes of cardiovascular and orthopedic procedures. Lumbar stenosis is among the most common indications for spine surgery, but there has been minimal investigation of racial disparities in complications and costs of lumbar laminectomies and fusions.

Methods

Patient selection: The Medicaid dataset of Thomson Reuter's MarketScan database was used. We retained all African American or non-Hispanic white patients who were hospitalized for a primary procedure of laminectomy or fusion for a primary diagnosis of LSS between the years 2000 and 2009. We excluded those under age 18 and those who had less than two years of continuous post-operative enrollment.

Outcome variables: The primary outcome variable was reoperation at one and two years. Secondary outcome variables were the number of postoperative complications and various measures of healthcare resource utilization. The charges for healthcare use were inflated to 2009 dollars using the medical care component of the consumer price index (Bureau of Labor Statistics).

Input variables: Demographic variables included sex and age at the time of index procedure. Comorbidity was calculated for each patient using the Charlson index.



		1	Race	Adjusted p-value
		White (n= 1052)	Black (n= 336)	
1 year Re-operation N (%)	All-type	50 (4.75)	17 (5.06)	0.9042
	Laminectomy	31 (2.95)	14 (4.17)	0.3864
	Fusion	14 (1.33)	5 (1.49)	0.8877
	Revision fusion	19 (1.81)	5 (1.49)	0.7967
2 year Re-operation	All-type	83 (7.89)	24 (7.14)	0.7895
N (%)	Laminectomy	55 (5.23)	18 (5.36)	0.9883
	Fusion	23 (2.19)	7 (2.08)	0.9871
	Revision fusion	33 (3.14)	9 (2.68)	0.7895
Time to re-operation [mean	(SE)]	2924 (38)	2522 (47)	1.0000
Post-operative all-type complications	Immediate	84 (7.98)	49 (14.58)	0.0019*
		REF	1.819 (1.230,2.689)	0.0123*
[N (%)	30-day	96 (9.13)	54 (16.07)	0.0023*
aOR (95% CI)]		REF	1.746 (1.204,2.532)	0.0141*
	90-day	103 (9.79)	54 (16.07)	0.0085*
		REF	1.611 (1.116,2.326)	0.0410*
Post-operative renal	Immediate	11 (1.05)	7 (2.08)	0.2640
complications	30-day	11 (1.05)	7 (2.08)	0.2640
N (%)	90-day	15 (1.43)	7 (2.08)	0.5351
Post-operative cardiac	Immediate	4 (0.38)	5 (1.49)	0.1304
complications		REF	4.050(0.976,16.813)	0.1385
[N (%)	30-day	4 (0.38)	5 (1.49)	0.1304
aOK (95% CI)]		REF	4.050(0.976,16.813)	0.1385
	90-day	4 (0.38)	5 (1.19)	0.1304
		REF	4.050(0.976,16.813)	0.1385
Post-operative neural	Immediate	5 (0.48)	2 (0.60)	0.7895
N (%)	30-day	5 (0.48)	3 (0.89)	0.5351
	90-day	5 (0.48)	3 (0.89)	0.5351
Post-operative DVT PE	Immediate	3 (0.29)	1 (0.30)	1.0000
N (62)	30-day	4 (0.38)	1 (0.30)	1.0000
N(w)	90-day	6 (0.57)	2 (0.60)	1.0000
Post-operative pulmonary	Immediate	16 (1.52)	11 (3.27)	0.1304
complications		REF	1.823 (0.808, 4.113)	0.2636
N (W)	30-day	18 (1.71)	11 (3.27)	0.1792
	90-day	18 (1.71)	11 (3.27)	0.1792
Post-operative infection	Immediate	1 (0.10)	1 (0.30)	0.5449
N (%)	30-day	2 (0.89)	3 (0.89)	0.1930
14 (26)	90-day	4 (0.38)	3 (0.89)	0.5146
Post-operative wound	Immediate	49 (4.66)	24 (7.14)	0.1792
IN (%)	30-day	59 (5.61)	29 (8.63)	0.1385
aOR (95% CI)]		REF	1.496 (0.923, 2.410)	0.1930
	90-day	63 (5.99)	29 (8.63)	0.1922

Odds ratios were adjusted for age, sex, Charlson index, year of index procedure, and follow-up length.

Health Care Utilization after Stenosis Surgery

		White (n = 1052)	Black (n = 336)	Adjusted p-value
Hospital days	Index procedure	3 (2)	5 (9)	<.0007 *
[mean (SD)]		REF	128% (118%, 139%)	<.0007 *
[est. ratio between black	Total over 1 year	3 (13)	3 (9)	0.2234
and white (95% CI)]	Total over 2 years	6 (17)	4 (10)	0.2640
# all outpatient services	Total over 1 year	86 (82)	83 (86)	0.3734
[mean (SD)]	Total over 2 years	169 (161)	162 (163)	0.2640
ED outpatient services [mean (SD)]	Total over 1 year	9 (20)	10 (24)	0.1792
	Total over 2 years	17 (38)	20 (38)	0.2980
# all medications	Total over 1 year	71 (63)	47 (48)	<.0007 *
[mean (SD)] [est. ratio between black		REF	203% (182%, 231%)	<.0007 *
	Total over 2 years	138 (121)	91 (94)	<.0007*
and white (95% CI)]		REF	200% (197%, 228%)	<.0007*
Hospital costs	Index procedure	16148 (22593)	24267 (25917)	<.0001 *
[mean (SD)]		REF	153% (131%, 179%)	<.0007 *
[est. ratio between black	Total over 1 year	7448 (23476)	8082 (25328)	0.1930
and white (95% CI)]	Total over 2 years	15284 (35697)	16048 (38377)	0.3734
All outpatient costs	Total over 1 year	5646 (7618)	5721 (8979)	0.6956
[mean (SD)]	Total over 2 years	10961 (14629)	10899 (15672)	0.7067
ED outpatient costs	Total over 1 year	423 (1094)	647 (1793)	0.2492
[mean (SD)]	Total over 2 years	824 (1961)	1232 (3487)	0.3864
Medication costs	Total over 1 year	4286 (5268)	2620 (3246)	<.0007 *
[mean (SD)]		REF	59% (41%, 84%)	0.0148 *
[est. ratio between black	Total over 2 years	8450 (9878)	5297 (7167)	<.0007 *
and white (95% CI)]		REF	56% (39%, 81%)	0.0094 *

Results

African American patients in the Medicaid database were at **no higher** risk for re-operation in the two years following an operation for lumbar stenosis than white patients (7.14% vs 7.89%. p = 0.65). However, we did find that African American patients were more likely to experience post-operative complications of **any kind**, even after adjusting for length of hospital stay, comorbidities, sex and age (aOR = 1.6, p = 0.01). White patients had a significantly shorter length of stay (3 vs. 5 days, p < 0.0001) and accrued fewer hospitalrelated charges (\$16,148 vs. \$24,267, p < 0.0001). African American patients, despite having more comorbidities in our sample, were prescribed significantly fewer medications in the two years following index procedures (47 vs. 71 prescriptions, p < 0.0001), and had fewer medication charges during the two years after surgery (\$5,297 vs. \$8450, p = 0.002).

Conclusions

At the national level, there are a number of racial disparities in the rate of complications, length of stay and charges after surgery for lumbar spinal stenosis. Despite having more comorbidities in our sample, African American patients were given fewer prescriptions during the 1- and 2-year postoperative period.

Cohort Demographics

	A 11	R			
	(n= 1388)	White (n= 1052)	African American (n= 336)	1 Adjusted p-value	
Age [mean (SD)]	60 (13)	60 (13)	60 (12)	0.8022	
Post-operative follow-up days [mean (SD)]	1630 (683)	1591 (652)	1751 (760)	0.0135*	
Gender: females [n (%)]	987 (71.11)	734 (69.71)	253 (75.30)	0.0862	
Charlson index [n (%)]					
0	855 (61.60)	666 (63.31)	189 (56.25)		
1	353 (25.43)	264 (25.10)	89 (26.49)	0.0413*	
2	140 (10.09)	98 (9.32)	42 (12.50)		
≥ 3	40 (2.88)	24 (2.28)	16 (4.76)		
Year of initial procedure					
[n (%)]					
2000	105 (7.56)	88 (8.37)	17 (5.06)		
2001	140 (10.09)	100 (9.51)	40 (11.90)		
2002	206 (14.84)	159 (15.11)	47 (13.99)	0.1726	
2003	212 (15.27)	162 (15.40)	50 (14.88)		
2004	212 (15.27)	170 (16.16)	42 (12.50)		
2005	119 (8.57)	90 (8.56)	29 (8.63)		
2006	155 (11.17)	111 (10.55)	44 (13.10)		
2007	239 (17.22)	182 (16.35)	67 (19.94)		