



Racial Disparity in Total Hospital Length of Stay for Adults Undergoing Elective ACDF

Parth Kothari BS; Samuel K Cho MD; Javier Z Guzman BS; Nathan John Lee BS; John I Shin BS; Jeremy Steinberger MD;

Branko Skovrlj MD; Dante Leven DO
Icahn School of Medicine at Mount Sinai



Introduction

Racial disparities are an important component of healthcare cost inequalities. It is important to become more familiar with racial differences in patients undergoing spine surgery.

Methods

Patients were identified by CPT (Current Procedural Terminology) code in the American College of Surgeon's National Surgical Quality Improvement Program (ACS-NSQIP) database. A univariate analysis was performed to compare demographics, comorbidities, operative and postoperative complications across Hispanics, Blacks and Whites. Multivariate step-wise logistic regression was performed on each complication that demonstrated significant association to race in the univariate comparison. Race and any perioperative variables with P<0.2 were included in the multivariate analyses. White race was set as the reference for the race category. Level of significance was set at p=0.05.

Conclusions

Black race when using White race as reference is an independent predictor of prolonged LOS in patients undergoing ACDF. Further research may be warranted in this area.

Results

Hispanics were more likely to be = 65 years of age than Whites or Blacks (23.08% vs. 16.41% vs. 12.01%)(p=0.002). Smoking status was least amongst Hispanic patients (23.56% vs. 33.7 Blacks vs. 33.55% Whites)(p=0.002). With regards to comorbidities, Hispanics were observed to have a greater rate of neuromuscular injury (p<0.0001) and previous stroke (p=0.0001) than White or Black patients undergoing ACDF. Length of stay (LOS) > 5 days was more often to be experienced by Black or Hispanic patients than White patients, respectively (11.235 vs. 7.69% vs. 4.96%)(p<0.0001). Postoperative blood transfusion was observed at a greater rate in Hispanics (1.44%) than in Blacks (1.04%) or Whites (0.35%) (p=0.027). Multivariate for LOS > 5 days shows that Black race [Adjusted Odds Ratio (OR)=2.36, p=0.002] but not Hispanic race is an independent predictor of prolonged LOS.

Learning Objectives

By the conclusion of this session, participants should be able to understand the impact of race on length of stay in patients undergoing ACDF.

Table 1

Demographics and Clinical Characteristics of Adults undergoing Posterior Lumbar Fusion Stratified by Race									
Feature	N	White		Blacks		Hispanic		P value	
		Rate	%	Rate	%	Rate	%		
Female	50,51%	3420	50.32%	300	52.23%	97	46.63%	0.451	
Male	49,49%	3402	49.68%	183	47.78%	111	53.37%		
Age <65	83,68%	2359	83.59%	337	87.99%	160	76.92%	0.002	
Age ≥65	16,32%	463	16.41%	46	12.01%	48	23.08%		
ASA 1/2	62,38%	3779	63.04%	208	54.31%	142	68.27%	0.0008	
ASA 3/4/5	37,62%	3243	36.96%	173	45.69%	66	31.73%		
Inpatient vs. Outpatient									
Inpatient	79,90%	2240	79.38%	311	81.20%	176	84.62%	0.152	
Outpatient	20,10%	582	20.62%	72	18.80%	32	15.38%		
BMI Class									
Non-Obese (18.5-29.9)	54,23%	3554	55.07%	182	47.52%	115	55.29%	0.023	
Obese I (30-34.9)	26,11%	1733	25.32%	107	27.96%	58	27.88%		
Obese II (35-39.9)	11,57%	737	11.59%	48	12.53%	20	9.62%		
Obese III (≥40)	7,88%	508	7.37%	46	12.01%	15	7.21%		
Diseases									
No Diabetes	84,73%	2429	86.07%	308	79.50%	157	75.48%	<0.0001	
Diabetes	15,27%	1071	13.93%	82	21.50%	50	24.52%		
Insulin Dependent	4,69%	323	4.38%	22	5.74%	15	7.21%		
Insulin Independent	7,58%	548	8.55%	60	15.76%	35	16.81%		
Smoke									
Smoker	33,55%	222	33.78%	144	37.60%	49	23.56%	0.002	
Non-smoker	66,45%	458	66.22%	94	24.40%	71	34.44%		
Opinions									
At Rest	0,44%	33	0.46%	1	0.26%	1	0.48%	0.887	
Moderate Exertion	6,74%	485	6.91%	22	5.74%	13	6.25%		
No Opinions	92,82%	2644	92.63%	360	93.99%	184	93.27%		
Functional Status Prior to Surgery									
Independent	97,19%	3754	97.50%	366	95.56%	197	94.71%	0.005	
Partially Dependent	2,46%	177	2.02%	17	4.44%	10	4.81%		
Totally Dependent	0,35%	25	0.35%	0	0.00%	1	0.48%		

Demographics

Table 2

Comorbidities and Operative Characteristics of Adults undergoing Posterior Lumbar Fusion Stratified by Race									
Comorbidity	N	White		Blacks		Hispanic		P value	
		Rate	%	Rate	%	Rate	%		
Pulmonary Comorbidity	5,40%	39	3.51%	11	2.83%	6	2.88%	0.743	
Cardiac Comorbidity	45,71%	3226	43.44%	241	62.92%	93	44.71%	<0.0001	
Peripheral Vascular Disease	0,91%	23	0.32%	7	1.83%	1	0.48%	0.117	
Diabetes	0,39%	3	0.13%	0	0.00%	1	0.48%	<0.0001	
Impaired Sensorium	0,15%	4	0.14%	0	0.00%	1	0.48%	0.721	
Neuromuscular Injury	4,69%	332	3.97%	26	6.79%	22	10.58%	<0.0001	
Stroke	2,20%	56	1.59%	7	1.83%	18	8.65%	0.001	
Steroid Use	2,99%	82	2.91%	12	3.13%	8	3.85%	0.733	
Recent Weight Loss	0,32%	10	0.13%	1	0.26%	0	0.00%	0.668	
Bleeding Disorder	1,05%	13	0.17%	0	0.00%	0	0.00%	0.241	
Preoperative Blood Transfusion	0,00%	0	0.00%	0	0.00%	0	0.00%	NA	
Operative Variables									
Operative Time > 4 hours	93,29%	2542	93.62%	349	91.12%	193	92.70%	0.178	
Multilevel	18,06%	450	15.95%	69	18.02%	29	13.94%	0.406	

Comorbidities and Operative Factors

Table 3

Postoperative Complications and Outcomes for Adults undergoing Posterior Lumbar Fusion Stratified by Race									
Postoperative Complication Rate	N	Total		White		Blacks		Hispanic	
		Rate	%	Rate	%	Rate	%	Rate	%
Any Complication	3,34%	90	3.19%	16	4.18%	8	3.85%	0.550	
Death	0,26%	7	0.25%	2	0.51%	0	0.00%	0.461	
Pulmonary Complication	1,49%	37	1.31%	8	2.09%	6	2.88%	0.117	
Wound Complication	0,76%	21	0.74%	3	0.78%	2	0.96%	0.940	
Renal Complication	0,06%	2	0.07%	0	0.00%	0	0.00%	0.811	
Cardiac Complication	0,23%	6	0.21%	2	0.51%	0	0.00%	0.386	
CNS Complication	0,18%	5	0.18%	1	0.26%	0	0.00%	0.769	
VTE	0,50%	13	0.46%	4	1.04%	0	0.00%	0.180	
Sepsis	0,15%	2	0.07%	2	0.51%	1	0.48%	0.841	
UTI	0,56%	14	0.50%	4	1.04%	1	0.48%	0.396	
Peripheral Nerve Injury	0,12%	3	0.11%	1	0.26%	0	0.00%	0.622	
Intra/postoperative Blood Transfusion	0,50%	10	0.35%	4	1.04%	3	1.44%	0.007	
Graft Failure	0,03%	1	0.04%	0	0.00%	0	0.00%	0.901	
Other Outcomes									
LOS > 5 Days	5,83%	140	4.96%	43	11.23%	16	7.69%	<0.0001	
Return to OR	1,90%	54	1.91%	9	2.31%	2	0.96%	0.467	
Unplanned Reoperations (2011-2012)	1,28%	16	1.28%	2	1.32%	1	0.93%	0.237	
Unplanned Readmissions (2011-2012)	5,13%	101	4.97%	10	6.10%	7	8.64%	0.999	

Postoperative Complications and Outcomes

Table 4

Multivariate Logistic Regression to Assess Race as an Independent Risk Factor for Intra/Postoperative Blood Transfusions				
Risk Factor	Adjusted Odds Ratio	95% Confidence Limits	P Value	
Black vs. White	2.477	0.701 - 8.747	0.301	
Hispanic vs. White	2.643	0.559 - 12.507	0.568	
Multilevel Fusion vs. Single	5.494	1.951 - 15.637	0.0014	
Age > 65	4.726	1.614 - 13.843	0.0046	
Functional Health Status: Partially Dependent vs Independent	5.677	1.465 - 21.999	0.0046	
Functional Health Status: Totally Dependent vs Independent	<0.001	<0.001 - >999.999	0.877	
Cardiac Comorbidity	11.775	1.499 - 92.52	0.019	
Recent Weight Loss	8.39	0.742 - 94.894	0.0857	
Operative Time > 4 Hours	12.43	4.336 - 35.632	<0.0001	
Multivariate Logistic Regression to Assess Race as an Independent Risk Factor for Prolonged LOS (>5 Days)				
Risk Factor	Adjusted Odds Ratio	95% Confidence Limits	P Value	
Black vs. White	2.357	1.582 - 3.511	0.0017	
Hispanic vs. White	1.249	0.682 - 2.287	0.5073	
Outpatient vs. Inpatient	0.074	0.002 - 0.247	<0.0001	
Age > 65	5.774	1.253 - 25.603	0.0012	
Obese II vs. Non-obese	0.454	0.293 - 0.704	0.0005	
Obese III vs. Non-obese	1.214	0.756 - 1.949	0.0081	
Obese III vs. Non-obese	0.861	0.469 - 1.604	0.0026	
ASA > 3	1.909	1.365 - 2.671	0.0002	
Functional Health Status: Partially Dependent vs Independent	3.268	1.853 - 5.762	0.4902	
Functional Health Status: Totally Dependent vs Independent	5.748	1.383 - 23.885	0.1136	
Pulmonary Comorbidity	2.822	1.602 - 4.971	0.0005	
Neuromuscular Injury	3.891	2.457 - 6.16	<0.0001	
Bleeding Disorder	3.346	1.294 - 8.649	0.0127	
Operative Time > 4 hours	4.444	2.988 - 6.615	<0.0001	

Multivariate analysis for Outcomes