Racial Disparities in Medicaid Patients after Brain Tumor Surgery

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Introduction

Healthcare disparities remain a widespread societal and health policy issue. We investigated racial disparities among an otherwise homogenous cohort of post-operative Medicaid patients with meningioma or malignant/benign/metastatic brain tumors.

Methods

We used the Medicaid component of the MarketScan database (2000-2009) to primarily compare Caucasians and African-Americans undergoing craniotomy for primary or metastatic brain tumors. Univariate and multivariate analyses assessed death, 30-day post-operative complications, adverse discharge disposition, length of stay (LOS), and adjust total charges.

Table 1: Baseline Characteristics of Brain Tumor Patients Undergoing Resection Within the Medicaid Database, 2000-2009

Variable	All (n=2321) N (%)	White (n=1710) N (%)	Black (n=611) N (%)	p value
Age, mean (SD)	49 (14)	49 (14)	50 (14)	.1858
Female gender	1343 (57.86)	950 (55.56)	393 (64.32)	.0002*
Charlson index score				.1936
0	594 (25.59)	429 (25.09)	165 (27.00)	
1	194 (8.36)	133 (7.78)	61 (9.98)	
2	516 (22.23)	382 (22.34)	134 (21.93)	
>=3	1017 (43.82)	766 (44.80)	251 (41.08)	
High hospital volume	618 (26.63)	416 (24.33)	202 (33.06)	<.0001*
Metastases	792 (34.12)	587 (34.33)	205 (33.55)	
Meningioma	515 (22.19)	313 (18.30)	202 (33.06)	
Malignant tumor	872 (37.57)	708 (41.40)	164 (26.84)	
Benign brain tumor	142 (6.12)	102 (5.96)	40 (6.55)	

* designates statistically significant.

Results

Our study identified 2,321 patients. A majority were Caucasian (73.7%) and female (57.9%) with Charlson comorbidity scores <3 (56.2%) and treated at low-volume centers (73.4%). Approximately 26.3% were African-American; 22.1% had meningiomas. Inpatient mortality was 2.0%, mean LOS was 9 days, mean adjusted total charges were $42,422, adverse discharge disposition occurred in 22.5%, and the 30-day complication rate was 23.35%.

Table 2: Outcomes of All Brain Tumor Patients Undergoing Resection Within the Medicaid Database, 2000-2009

Outcome	White (n = 1710)	AA (n = 611)	p value
Index hosp. in-hospital death, n (%)	31 (1.81)	16 (2.62)	.2248
30-day re-operation, n (%)	12 (0.70)	0 (0.00)	.0441*
In-hospital complications, n (%)	243 (14.21)	111 (18.17)	.0196*
30-day complications, n (%)	297 (17.37)	129 (21.11)	.0401*
Index hosp. discharge home, n (%)	1336 (78.13)	464 (75.94)	.266
Index hosp. length of stay, mean (SD)	8 (9)	11 (12)	<.0001*
Index hosp. charges, mean (SD)	$37,853 ($50,769)	$55,209 ($70,636)	<.0001*

* designates statistically significant.

Table 3A: Multivariate Analysis of Factors Associated with Increased Length of Stay within the Medicaid Database, 2000-2009

Factor	Combined Estimate	Combined p-value	Mengioma Estimate	Mengioma p-value
Race (ref: White)				
African American	1.31	<0.0001*	1.32	<0.0001*
Charlson index (ref: 0)				
1	1.39	<0.0001*	1.46	<0.0001*
2	1.22	<0.0001*	1.3	0.0054*
3+	1.56	<0.0001*	1.54	<0.0001*
Age (per year increment)	1.005	<0.0001*	1.003	.1188
Gender (ref: Male)				
Female	0.96	.2722	0.91	.2422
Hospital volume (ref: Low)				
High	0.98	.5318	1.07	.3751

* designates statistically significant.

In bivariate analysis of all tumor types, African-Americans had significantly longer LOS (3 additional days, p<0.001), higher charges ($17,356, p<0.001), and complication rates 3.7% higher (p=0.04) than Caucasian counterparts. While similar trends were noted across tumor types, meningioma patients showed the widest racial disparities.

Table 3B: Multivariate Analysis of Factors Associated with Increased Total Hospital Charges within the Medicaid Database, 2000-2009

Factor	Combined Estimate	Combined p-value	Meningioma Estimate	Meningioma p-value
Race (ref: White)				
African American	1.68	<.0001*	1.85	<.0001*
Charlson index (ref: 0)				
1	1.38	.0014*	1.58	.0038*
2	1.39	<.0001*	1.54	.0055*
3+	1.46	<.0001*	1.4	.0565
Age (per year increment)	.99	.06	.99	.56
Gender (ref: Male)				
Female	.90	.0332*	0.94	.6615
Hospital volume (ref: Low)				
High	1.1768	.0042*	1.4	.0093*

* designates statistically significant.

In multivariate analysis, African-Americans with meningiomas had higher odds of developing a complication (p=0.05), having greater LOS (p<0.001), and incurring higher charges (p<0.001) than Caucasians. The presence of one complication doubled both LOS and total charges, while two complications tripled both LOS and total charges.

Table 3C: Multivariate Analysis of Factors Associated with Increased 30-day Complication Rate within the Medicaid Database, 2000-2009

Factor	Combined OR	Combined 95% CI	Combined p value	Meningioma OR	Meningioma 95% CI	Meningioma p value
Race (ref: White)						
African American	1.27	1.00-1.61	.0463*	1.56	1.01-2.40	.0453*
Charlson index (ref: 0)						
1	2.38	1.61-3.5	<.0001*	2.52	1.42-4.45	.0015*
2	1.1	0.79-1.54	.5619	2.01	1.12-3.60	.0186*
3+	1.45	1.09-1.93	.0115*	2.31	1.22-4.38	.0104*
Age (per year increment)	1.01	0.99-1.01	.2108	1.00	0.99-1.02	.5738
Gender (ref: Male)						
Female	1.85	0.69-1.06	.1421	0.56	0.35-0.90	.0168*
Hospital volume (ref: Low)						
High	0.92	0.73-1.17	.497	0.89	0.55-1.43	.6194

* designates statistically significant.

Table 4: Bivariate Analyses Assessing the Impact of Inpatient Complications Upon Inpatient Mortality, Length of Stay and Total Charges for Brain Tumor Patients Undergoing Craniotomy Within the Medicaid Database, 2000-2009

Outcome	Number of Complications	All
% Mortality		
	0	0.82
	1	6
	2	15.49
	3+	15.15
Average length of stay in days		
	0	7
	1	14
	2	21
	3+	41
Average total charges in 2009 US $		
	0	34,952
	1	61,826
	2	104,649
	3+	206,763

Conclusions

African-Americans had significantly higher post-operative complications than Caucasians within a homogenous Medicaid population. These higher complications drove greater healthcare utilization, among African-Americans. Interventions aimed at reducing complications among African-American brain tumor patients may help reduce post-operative disparities and improve cost-effectiveness.