Insurance Status Predicts Survival Outcomes in Patients with GBM

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Introduction

Patients without any insurance and insurance with limited coverage are reported to be at increased risk for impaired access to healthcare, delayed medical treatment and receipt of substandard care. The aim of this study was to determine the survival outcome in patients undergoing surgery for newly diagnosed primary GBM with public health insurance as compared to privately insured patients, while controlling for well-characterized prognostic factors.

Methods

A retrospective review of 339 patients between the age of 21 and 88 years treated with surgical resection for primary GBM was performed using medical records, imaging and Insurance information obtained at the University of California San Francisco from 2005 to 2009. Clinical presentations and surgical outcomes were compared between the public and privately insured patients with pearson. Briefly, differences in categorical variables between the treatment groups were analyzed using the Pearson's Chi-squared test and ordinal variables (KPS score) were compared using Mann-Whitney U test. Analysis of variance (ANOVA) was used to evaluate the means of multiple continuous variables. Progression free survival (PFS) and overall survival (OS) were analyzed by building Kaplan-Meier curves with differences assessed by log-rank test. To evaluate the independent prognostic value of insurance status, a multivariate cox regression model was constructed.

Results

1.1 *Clinical characteristics at the time of presentation for the GBM patients with public (n=125) and Private (n=214):* The median age for patients was 64 years for public insurance group in contrast to 54 for privately insured. The median pre-op KPS was 90 for both groups (P<0.05). Both groups were similar in presenting symptoms, gender distribution,tumor size and tumor locations.

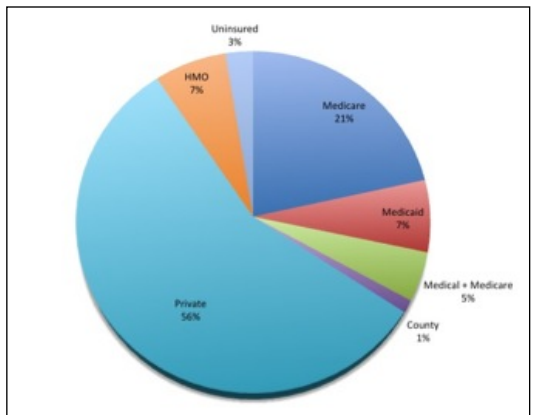

TABLE 1. Clinical characteristics of GBM patients with public and private insurance at presentation (KPS = Karnofsky Performance Score; SE = Standard Error)

Characteristic	No. of patients (%) Public Group (n = 125)	Private Group (n = 214)	p value
Age			<0.0001
Median	64	54	
Range	28-88	21-76	
Sex			
Male	70 (56)	131 (61)	0.36
Female	83 (44)	55 (39)	
Tumor Location			0.474
Frontal	33 (26.4)	68 (32)	
Temporal	41 (32.8)	64 (30)	
Parietal	29 (23)	33 (15.4)	
Occipital	5 (4)	11 (5)	
Frontotemporal	4 (3)	8 (3.7)	
Frontoparietal	1 (0.8)	8 (3.7)	
Parietooccipital	6 (5)	9 (4.2)	
Other	6 (5)	13 (6)	
Eloquent Cortex	42 (34)	81 (38)	0.48
Mean Tumor Size (cm) ± SE	4.7± 0.2	4.7 ± 0.1	0.96
Presenting Symptom			
Headache	21 (16.8)	42 (19.6)	
Seizure	13 (10.4)	55 (25.7)	
Cognitive deficit	18 (14.4)	25 (11.7)	
Speech deficit	24 (19.2)	31 (14.5)	
Motor deficit	30 (24)	36 (16.8)	
Sensory deficit	0 (0)	3 (1.4)	
Other	19 (15.2)	22 (10.3)	
Pre-op KPS			
Median	90	90	0.016
Range	20-90	20-100	

1.2a *Surgical resection and adjuvant therapy:* Gross-total surgical resection was achieved in 43% of publically insured patients and 48% of privately insured patients of patients with GBM. The fraction of patients who received primary treatment did not differ significantly, but secondary treatment and repeat resection were significantly different between two groups (P<0.0001).

TABLE 2. Surgical outcomes and adjuvant treatment of patients with Public and Private Insurance (KPS = Karnofsky Performance Score)

	No. of patients (%) Public Group (n = 125)	Private Group (n = 214)	p value
Tumor Resection			
Total	54 (43)	103 (48)	0.38
Subtotal	71 (57)	111 (52)	
Post-op KPS			
Median	80	90	<0.0001
Range	30-90	50-100	
Median change	0	0	0.009
Primary Chemotherapy			0.80
Temozolomide	113 (90.4)	189 (88.3)	
Temozolomide + Erlotinib	7 (5.6)	16 (7.0)	
Temozolomide + Enzastaurin	5 (4)	9 (4)	
Secondary Chemotherapy			<0.0001
None	69 (55.2)	82(38.3)	
Bevacizumab	9 (7.2)	37 (17.3)	
Bevacizumab + Irinotecan	6 (4.8)	25 (11.7)	
Lomustine	2 (1.6)	7 (3.3)	
Other Chemotherapy	6 (4.8)	27 (12.6)	
Unknown	33 (26.4)	36 (16.8)	
Repeat Resection	21 (16.8)	90 (42.1)	<0.0001

1.3 Overall survival: The median actuarial survival significantly different between two groups (10 months for public vs. 19 months for Private; P<0.0001).

Figure 1: Kaplan-Meier estimates of overall survival in GBM patients with public insurance compared to those with private insurance. The differences between the two groups are significant (p = <0.0001).

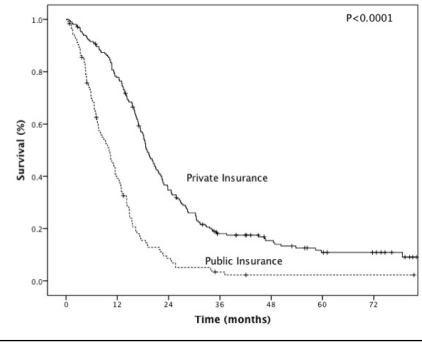

TABLE 3. Outcomes of GBM patients with Public and Private insurance (CI = Confidence Interval)

Outcome	Public insurance GBM Group	Private insurance GBM Group	p Value
Median follow-up, mos. (range)	9.7 (1 – 81)	18.6 (1 – 89)	<0.0001
Actuarial Overall Survival			
Median, mos. (95% CI)	10 (7.9-12.3)	19 (17.5 – 20.5)	<0.0001
6-mo survival (%)	70	91	
1-yr survival (%)	39	78	
2-yr survival (%)	8.6	35	

1.4 Insurance status as independent prognostic factor: Multivariate Cox regression model constructed to evaluate impact of health insurance as well as other characterized prognostic factors.

TABLE 4. Multivariate Cox regression model of overall survival (CI = Confidence Interval, TMZ = temozolomide)

Variable	Overall Survival Hazard ratio (95% CI)	p Value
Age (per 1-yr increment)	1.03 (1.01– 1.04)	<0.0001
Extent of resection (total vs. subtotal)	0.75 (0.60 – 0.95)	0.017
Eloquent location (no vs. yes)	0.92 (0.72– 1.17)	0.487
Insurance (Public vs. Private)	2.08 (1.60– 2.73)	<0.0001
Primary Treatment		
TMZ+Erlotinib vs. TMZ	1.25 (0.79 – 1.98)	0.345
TMZ+Enzastaurin vs. TMZ	0.69 (0.38 – 1.24)	0.215
Secondary Treatment		
Bevacizumab vs. None	0.82 (0.57 – 1.19)	0.296
Bevacizumab + Irinotecan vs. None	0.82 (0.54 – 1.3)	0.355
Lomustine vs. None	1.20 (0.58 – 2.49)	0.629
Other vs. None	0.83 (0.54– 1.02)	0.374
Repeat Resection (no vs. yes)	1.10 (0.85 – 1.42)	0.456

Conclusions

There are more frequent adverse outcomes including worse overall survival of GBM among patients without private health insurance (median survivial of 10 months for public vs. 19 months for private insurance) and this suggests that such patients would benefit from improved access to optimal therapy. Thus, insurance status is independent predictor of survival in patients with GBM.

Acknowledgements: Supported by Howard Hughes Medical Institute and UCSF CTR Fellowship.