

Association Between Insurance Status and Survival in Patients that Underwent Surgical Removal of Glioblastoma Between 2007 and 2015: A Cohort Study

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Abstract

Context: Glioblastoma is the most common primary malignant neoplasm of the brain affecting adults; with an incidence rate of 3.19 per 100,000 persons in the United States in 2015. Furthermore, the median survival rate is less than 2 years, and the 5-year survival rate is less than 5%. A number of researchers have suggested that socioeconomic and insurance status may be related to shorter glioblastoma survival. However, current scientific information is scant. Understanding and removing barriers to optimal therapy is imperative.

Objectives: To evaluate the association between insurance status (uninsured, Medicaid, or private insurance) and survival in glioblastoma patients after surgery at a population level.

Methods: Using the Surveillance, Epidemiology, and End Results (SEER) database, this historical cohort evaluated patients 18-65 years old who underwent surgical removal of glioblastoma between 2007 and 2015. Patients with missing information on insurance status and survival were excluded from the study. The independent variable, insurance status, was subdivided into uninsured, Medicaid, and private insurance at the time of diagnosis. The main outcome was survival time (measured in months) after surgery. The covariates included were age, sex, marital-status, comorbidities, and grade, size and location of the tumor, race, ethnicity, sex, and extent of surgery, and post-surgery treatment. Unadjusted and adjusted Cox regression analysis were used to assess the association between insurance status and survival. Hazard ratios (HR) and 95% confidence intervals (CI) were calculated.

Results: Out of 2734 glioblastoma patients that underwent surgery, 1616 died in the first two years. The 2-year survival among those with Medicaid was increased by 36% compared with those with a private insurance (HR) 1.36; 95% CI 1.15-1.61). No statistically significant associations were found between being uninsured and survival (HR 1.23; 95% CI 0.96-1.59).

Conclusions: Compared with insured patients, those with any Medicaid have a decreased survival after surgery. Interventions are needed to improve access to healthcare and guarantee

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insurance coverage in patients with brain malignancies. Future studies may address the outcome disparity between any Medicaid and private insurance, as well as quality of life and its effect on survival.



Association of insurance status and survival in patients that underwent surgical removal of glioblastoma

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Background

Glioblastoma is the most common primary malignant neoplasm of the brain affecting adults. Surgical resection is the gold standard therapy for patients affected with this aggressive cancer. Furthermore, the median survival rate is less than 2 years, and the 5-year survival rate is less than 5%. Statistical heterogeneity continues to be significant among survivors, in spite of a growing understanding of glioblastoma biology. A number of researchers have suggested that socioeconomic and insurance status are related to shorter glioblastoma survival. In glioblastoma, post-op treatment should start immediately. Understanding and removing barriers to optimal therapy is imperative.

Objective

To evaluate the association between insurance status (uninsured, Medicaid, or private insurance) and survival in glioblastoma patients after surgery at a population level.

Methods

Study design and population: Using the Surveillance, Epidemiology, and End Results (SEER) database, this historical cohort will evaluate patients 18-85 years old who underwent surgical removal of glioblastoma between 2007 and 2015. The SEER Program of the National Cancer Institute keeps population-based cancer databases covering about 28% of the US population and publishes data on cancer incidence and survival. So far, it is the only program of its kind including stage of cancer upon diagnosis and survival data on patients. **Analysis variables:** The independent variables, insurance status, will be subdivided into uninsured, Medicaid, and private insurance at the time of diagnosis. **Outcome variable:** The main outcome will be survival time, in months, after surgery. Patients missing insurance and survival information will be excluded from the study. **Covariates:** Baseline characteristics, such as age, sex, marital status, comorbidities, and grade/site/location of the tumor will be assessed on the population. **Statistical analysis:** Other demographic (race, ethnicity, gender) and clinical features (extent of surgery, and post-surgery treatment) will also be evaluated to control for confounding variables using Chi-squared. Unadjusted and adjusted Cox regression analysis will be used to assess the association between insurance status and survival.

Results

Table 1. Baseline characteristics of glioblastoma patients that underwent surgery in the US, SEER from 2007 to 2015 according to insurance status.

Characteristics	Insurance status						p-value
	Uninsured (n=140)		Any Medicaid (n=251)		Insured (n=2332)		
	n	%	n	%	n	%	
Age at diagnosis-Mean (SD)	53.8 (9.5)		53.3 (9.4)		54.3 (8.8)		<.001
Gender							0.135
Male	76	59	139	56	1447	62	
Female	34	31	98	34	886	38	
Race							<.001
White	88	60	236	78	2085	90	
Black	12	11	35	12	126	5	
Other	10	9	28	10	117	5	
Ethnicity							<.001
Non-Hispanic	52	44	258	89	2217	95	
Hispanic	18	16	33	11	116	5	
Marital status							<.001
Partnered	55	50	132	39	1642	73	
Unpartnered	46	42	169	58	599	26	
Unknown	9	8	30	3	52	2	
Tumor site							0.131
<4.5cm	40	36	131	38	1030	44	
>4.5cm	52	47	144	50	1017	44	
Not reported	18	16	36	12	285	12	
Extent of surgery							0.495
No total resection	62	56	176	61	1327	57	
Total resection	48	44	135	40	1006	43	
Primary Site							0.311
Frontal	50	46	130	45	821	40	
Temporal	39	38	89	31	325	15	
Parietal	17	16	55	19	458	21	
Occipital	4	4	12	4	329	15	

Table 2. Unadjusted and adjusted hazard ratios between insurance status and 2-year survival in glioblastoma patients that underwent surgery in the US, SEER from 2017-2015.

Characteristics	Unadjusted HR (95% CI) ^a	Adjusted ^b HR (95% CI)
Insurance status		
Insured	Ref ^c	Ref
Uninsured	1.15 (0.89-1.47)	1.23 (0.96-1.59)
Any Medicaid	1.25 (1.06-1.47)	1.36 (1.15-1.61)

^aAdjusted for age at diagnosis, gender, race, ethnicity, marital status, tumor size, extent of surgery and primary site. ^bHazard ratio. ^cConfidence interval. ^dReference group.

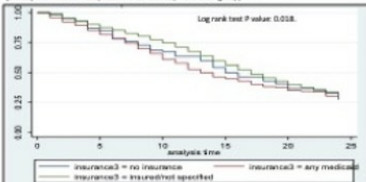




Fig. 1. Unadjusted Kaplan Meier estimates of 2-year overall survival of glioblastoma patients that underwent surgery by insurance status.

Conclusion

- Glioblastoma patients that undergo surgery and have any Medicaid had lower survival than those with private insurance when controlled for age at diagnosis, gender, race, ethnicity, marital status, tumor size, extent of surgery and primary site.
- This study takes us a step closer to overcoming barriers to access to healthcare and addresses how healthcare disparities greatly affects overall survival in GBM patients.
- We propose that further studies may focus on the improvement of not only quantity of life but also quality of life, which could ultimately lead to a further increase in overall survival of GBM patients.

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