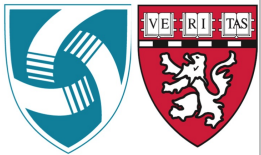


Effect of Insurance Status on Outcome of Intracranial Aneurysm Treatment

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Introduction

Medicare and Medicaid coverage have been associated with inferior outcomes for patients with varied medical and surgical conditions. This is the first nationwide study to analyze the impact of primary payer on the outcomes of patients with aneurysmal subarachnoid hemorrhage who underwent endovascular coiling or microsurgical clipping.

Methods

Patients were identified using the Nationwide Inpatient Sample (2001-2010) by ICD-9 codes for subarachnoid hemorrhage or intracerebral hemorrhage and a procedural code for aneurysm repair. Multivariate regression models were utilized to analyze the impact of primary payer on in-hospital mortality, non-routine discharge, and length of hospital stay. Models were adjusted for patient age, sex, race, comorbidities, socioeconomic status, hospital region and location, procedural volume, year of admission. Subsequent models were also adjusted for time to aneurysm repair and time to ventriculostomy.

Table 1. Multivariate analysis* evaluating the impact of primary payer status on the outcomes after aneurysmal subarachnoid hemorrhage, utilizing patients with private insurance as the reference.

Outcome	Medicare OR [95% CI]	Medicaid OR [95% CI]	Uninsured OR [95% CI]
In-hospital Mortality	1.26 [0.88, 1.78] <i>p</i> =0.202	1.33 [0.93, 1.90] <i>p</i> =0.120	1.43 [0.91, 2.25] <i>p</i> =0.123
Non-routine Discharge	1.44 [0.93, 2.21] <i>p</i> =0.098	0.72 [0.54, 0.95] <i>p</i> =0.023	0.45 [0.32, 0.64] <i>p</i> <0.001
Length of Stay	Coef. [95% CI] 0.15 [-1.62, 1.92] <i>p</i> =0.872	Coef. [95% CI] 9.29 [5.65, 12.9] <i>p</i> <0.001	Coef. [95% CI] 3.74 [0.83, 6.64] <i>p</i> =0.012

*The independent variables included as covariates in regression analyses were patient age, sex, race, comorbidities, median household income of the patient's zip code, hospital region, hospital location, teaching status, procedural volume, the presence of intracerebral hemorrhage, the performance of a ventriculostomy, year of admission, and aneurysm treatment modality (clipping or coiling).

Table 2: Subgroup multivariate analyses investigating the impact of primary payer on the outcomes after aneurysmal subarachnoid hemorrhage, evaluating patients who underwent microsurgical clipping (A) or endovascular coiling (B) separately.

	Private Insurance	Medicare		Medicaid		Uninsured	
	%	%	OR [95% CI]	%	OR [95% CI]	%	OR [95% CI]
In-hospital Mortality	10.5	19.3	1.66 [1.03, 2.67] <i>p</i> =0.037	12.3	1.26 [0.74, 2.13] <i>p</i> =0.398	13.4	1.40 [0.62, 3.15] <i>p</i> =0.414
Non-routine Discharge	59.2	84.4	1.34 [0.69, 2.60] <i>p</i> =0.384	57.8	0.55 [0.38, 0.81] <i>p</i> =0.002	42.5	0.32 [0.15, 0.69] <i>p</i> =0.003
	Days	Days	Coef. [95% CI]	Days	Coef. [95% CI]	Days	Coef. [95% CI]
Length of Stay	19±13	23±15	-0.67 [-3.04, 1.70] <i>p</i> =0.578	26±24	12.5 [7.21, 17.7] <i>p</i> <0.001	20±15	4.74 [-0.30, 9.78] <i>p</i> =0.065

B)	Private Insurance	Medicare		Medicaid		Uninsured	
	%	%	OR [95% CI]	%	OR [95% CI]	%	OR [95% CI]
In-hospital Mortality	11.5	21.6	0.17 [0.02, 1.23] <i>p</i> =0.077	12.5	5.26 [0.86, 32.2] <i>p</i> =0.072	13.8	2.13 [0.18, 25.1] <i>p</i> =0.534
Non-routine Discharge	54.0	80.9	1.95 [0.95, 3.99] <i>p</i> =0.068	60.5	0.92 [0.60, 1.40] <i>p</i> =0.688	43.8	0.61 [0.34, 1.09] <i>p</i> =0.096
	Days		Coef. [95% CI]	Days	Coef. [95% CI]	Days	Coef. [95% CI]
Length of Stay	18±13	20±13	-0.65 [-6.21, 4.91] <i>p</i> =0.814	24±20	13.4 [2.38, 24.5] <i>p</i> =0.019	18±14	22.5 [-5.19, 50.2] <i>p</i> =0.107

*The independent variables included as covariates in regression analyses were patient age, sex, race, comorbidities, median household income of the patient's zip code, hospital region, hospital location, teaching status, procedural volume, the presence of intracerebral hemorrhage, the performance of a ventriculostomy, year of admission, and aneurysm treatment modality (clipping or coiling).

Results

A total of 15,557 hospitalizations (4096 Medicare, 2578 Medicaid, 2002 uninsured, 8883 private insurance) were included in this study. In the initial model, in-hospital mortality was increased in Medicaid (OR 1.28, 95% CI 1.02-1.60), and uninsured patients (OR 1.36, 95% CI 1.08-1.72). Adjusting for intervention accounted for the mortality associations observed. Length of stay remained significantly longer for Medicaid patients (by 12.5 days for surgical clipping, 95% CI 7.21-17.7, and 13 days for coiling, 95% CI 2.4-24.5) with a reduced adjusted odds of non-routine discharge (clipping OR 0.55, 95% CI 0.38-0.81; coiling OR 0.92, 95% CI 0.60-1.40). Reduced non-routine discharge was also observed in uninsured patients (clipping OR 0.32, 95% CI 0.15-0.69; coiling OR 0.61, 95% CI 0.34-1.09).

Learning Objectives

- 1) Describe the impact of insurance status on outcome of intracranial aneurysm treatment.
- 2) Discuss the use and limitations of the Nationwide Inpatient Sample database

Conclusions

Differences by primary payer were more pronounced for patients who underwent microsurgical clipping. The observed differences by primary payer are likely multifactorial, attributable to varied socioeconomic factors and complexities of the American healthcare delivery system.

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