



Effect of Insurance and Racial Disparities on Outcomes in Traumatic Brain Injury Patients

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Introduction

We aimed to describe disparities between commercially insured, Medicaid, and Medicare patients. We further study racial disparities within a relatively homogenous Medicaid population.

Learning Objectives

By the conclusion of this session participants should be able to describe the effect of insurance and racial disparities on the outcomes of patients with with traumatic brain injuries.

Methods

We reviewed MarketScan database (2000-2009) for adult TBI patients. Univariate and multivariate analysis were performed for mortality, length of stay (LOS), payments, and use of post-hospitalization rehabilitation or emergency department (ED) services.

Table 1

Table 1: Baseline characteristics of traumatic brain Injury patients within the Medicaid database, 2000-2009.					
Characteristics	Insurance Type				p value
	All patients (N=92,159)	Commercial (N=44,108)	Medicaid (N=19,743)	Medicare (N=28,308)	
Age, mean (SD)	54 (23)	42 (15)	46 (20)	80 (8)	<.0001
Female, N (%)	37766 (41.0)	14830 (33.6)	8123 (41.1)	14813 (52.3)	<.0001
Post-operative follow-up in days mean (SD)	664 (692)	654 (662)	804 (794)	582 (644)	<.0001
Charlson index, N (%)					<.0001
0	50777 (55.1)	30083 (68.2)	11964 (60.6)	8730 (30.8)	
1	21615 (23.5)	8752 (19.8)	4035 (20.4)	8828 (31.2)	
2	10611 (11.5)	3148 (7.1)	1899 (9.6)	5564 (19.7)	
3+	9156 (9.9)	2125 (4.8)	1845 (9.4)	5186 (18.3)	
ICISS, mean (SD)	0.82 (0.2)	0.81 (0.2)	0.79 (0.3)	0.86 (0.2)	<.0001

Abbreviations: SD= standard deviation, ICISS=Classification of Disease Injury Severity Score

Results

Our study included 92,159 patients; commercial insurance, Medicaid, and Medicare were utilized by 44,108, 19,743 and 28,308 individuals, respectively. In-hospital death was lowest for commercially insured (5.0%) vs. 7.6% and 8.5% for Medicaid and Medicare patients, respectively (p<0.0001). Multivariate analysis showed that Medicaid patients were almost twice as likely to have a complication than the commercially insured (OR=1.8). Medicaid patients had longer hospitalizations than commercially insured (12 days vs. 6 days, p<0.0001). Mean inpatient charges were least for Medicare (\$17,374) and greatest for Medicaid patients (\$42,438); charges for commercially insured averaged \$35,280 (p=<0.0001). Rehabilitation was utilized by 13.4% commercially insured vs. 9.1% Medicaid patients; 16.6% of Medicare patients utilized rehabilitation (p=<0.0001). Mean ED visits totaled 4 for both commercially insured and Medicare patients; Medicaid patients averaged 26 ED services (p=<0.0001). A subset of 17,627 Medicaid patients was used to examine racial disparities; 12,847 patients were Caucasian and 4,780 were African American (AA). In-hospital mortality (7.6% vs. 7.9%, p=0.50) and LOS (12 vs. 13 days, p=0.45) were similar between Caucasians and AAs, respectively. Mean hospital payments were higher (\$51,837 vs. \$39,615, p=<0.0001), rehabilitation services were used less frequently (8.2% vs. 9.7%, p=0.0018), and ED services were used more frequently (31 vs. 26 visits, p=<0.0001) by AAs relative to Caucasians.

Table 2

Table 2: Outcomes of traumatic brain Injury patients within the Medicaid database, 2000-2009.				
Outcomes	Insurance Type			p value
	Commercial (N=44,108)	Medicaid (N=19,743)	Medicare (N=28,308)	
In-hospital death, N (%)	2198 (5.0)	1494 (7.6)	2395 (8.5)	<.0001
Index hospitalization, mean (SD) days	6 (11)	12 (21)	6 (8)	<.0001
charges in 2009 dollars	\$35,280 (69857)	\$42,438 (103555)	\$17,374 (34236)	<.0001
payments, median	\$13,148	\$10,522	\$8,624	
Discharge to home during index hospitalization, N (%)	32214 (73.0)	11856 (60.1)	15057 (53.2)	<.0001
Post-operative outpatient rehabilitation use, N (%)	5912 (13.4)	1792 (9.1)	4697 (16.6)	<.0001
no. of services	3 (17)	2 (14)	2 (8)	<.0001
charges in 2009 dollars	558 (5377)	298 (4112)	221 (1711)	<.0001
payments, median	\$0	\$0	\$0	
Post-operative outpatient ED no. of services	4 (13)	26 (72)	4 (9)	<.0001
charges in 2009 dollars	700 (3041)	1349 (4179)	514 (1533)	<.0001
payments, median	\$0	\$148	\$0	
All post-operative outpatient no. of services*	94 (149)	177 (339)	112 (148)	<.0001
charges in 2009 dollars	\$15,888 (35944)	\$14,808 (43107)	\$18,216 (34643)	<.0001

*outpatient services includes services order by doctor's office, hospital outpatient facility, ER, and other outpatient facilities. The average follow up period was 664 days.

Table 3

Variable	Length of Stay		Total Charges		Mortality		Discharge Home		Complications	
	Estimate	p value	Estimate	p value	OR	p value	OR	p value	OR	p value
Insurance (ref: Commercial)										
Medicaid	0.44	<.0001	-0.29	<.0001	1.29	<.0001	0.64	<.0001	1.78	<.0001
Medicare	0.07	<.0001	-0.36	<.0001	1.18	.4456	0.88	<.0001	1.13	<.0001
Age (year increment)	0.00	.0995	-0.01	<.0001	1.02	<.0001	0.98	<.0001	0.99	<.0001
Female gender	-0.12	<.0001	-0.17	<.0001	0.80	<.0001	1.07	<.0001	0.67	<.0001
Charlson index (ref: 0)										
1	0.25	<.0001	0.22	<.0001	1.27	<.0001	0.83	<.0001	1.48	<.0001
2	0.42	<.0001	0.38	<.0001	1.55	.5244	0.67	<.0001	1.98	<.0001
3+	0.61	<.0001	0.56	<.0001	2.71	<.0001	0.48	<.0001	2.96	<.0001
ICISS (unit increase)	-0.76	<.0001	-1.51	<.0001	0.01	<.00001	22.7	<.0001	0.07	<.0001

ICISS score: 0=death, 1=complete recovery (ICISS≤0.96 corresponds to the threshold for serious/severe injury).

Table 4

Table 4: Multivariate analysis of factors associated with rehab and ED outpatient resource utilization within the Medicaid database, 2000-2009.							
Variable	Insurance				Race		
	Rehab OR	p value	No. of ED visits Estimate	p value	Rehab OR	No. of ED visits Estimate	p value
Insurance (ref: Commercial)							
Medicaid	0.634	<.0001	1.978	<.0001	-	-	-
Medicare	1.333	<.0001	0.0068	.7999	.832*	.0025*	0.1741* <.0001*
Age (year increment)	0.997	.0003	-0.0012	.0327	.987	<.0001	-0.0106 <.0001
Female gender	1.039	.0581	0.1603	<.0001	1.10	.0769	0.073 .0312
Charlson index (ref: 0)							
1	1.104	<.0001	0.0661	.0004	1.03	.695	0.0741 .0892
2	1.245	<.0001	0.0715	.0035	1.00	.982	-0.0038 .9479
3+	1.264	<.0001	0.1143	<.0001	.92	.4487	-0.0173 .7754
ICISS (unit increase)	0.758	<.0001	1.0417	<.0001	.77	.0079	1.6543 <.0001

* Estimates correspond to Black patients versus White (reference group).
ICISS score: 0=death, 1=complete recovery (ICISS≤0.96 corresponds to the threshold for serious/severe injury).

Table 5

Table 5: Baseline characteristics of 17,627 traumatic brain Injury patients by race within the Medicaid database, 2000-2009.			
Variables	Race		p value
	White (N=12,847)	Black (N=4,780)	
Age, mean (SD)	46 (12)	45 (19)	.36
Female, N (%)	792 (778)	881 (842)	<.0001
Post-operative follow-up days, mean (SD)	5577 (43.41)	1699 (35.54)	<.0001
ICISS, mean (SD)	0.78 (0.26)	0.80 (0.26)	<.0001
Outcomes			
In-hospital death, N (%)	972 (7.57)	376 (7.87)	.50
Index hospitalization in days, mean (SD)	12 (21)	13 (22)	.45
charges in 2009 dollars	\$39,615 (105375)	\$51,837 (105963)	<.0001
Discharge to home during index hospitalization, N (%)	7456 (58.04)	3009 (62.95)	<.0001
Hospital readmission			
30-day	7535 (58.67)	2748 (57.49)	.16
90-day	8180 (63.70)	2978 (62.30)	.0873
Post-operative outpatient rehabilitation use, N (%)	1248 (9.71)	391 (8.18)	.0018
# of services	2 (16)	1 (9)	.0018
charges in 2009 dollars	\$310 (3593)	\$230 (3105)	.0004
Post-operative outpatient ED # of services	26 (70)	31 (78)	<.0001
charges in 2009 dollars	1280 (3913)	1693 (5145)	<.0001
All post-operative outpatient # of services	185 (351)	170 (321)	<.0001
charges in 2009 dollars	\$15,365 (45706)	\$13,797 (33788)	<.0001

Abbreviations: SD= standard deviation, ICISS=Classification of Disease Injury Severity Score
ICISS score: 0=death, 1=complete recovery (ICISS≤0.96 corresponds to the threshold for serious/severe injury).

Table 6

Table 6: Multivariate analysis of factors associated with total charges, discharge disposition, and 30-day complications within the Medicaid database, 2000-2009.						
Variable	Total Charges		Discharge Home		Complications	
	Estimate	p value	OR	p value	OR	p value
Race (ref: White)						
Black	-.30	<.0001	1.23	<.0001	1.13	.0024
Age (year increment)	-.01	<.0001	0.97	<.0001	0.99	<.0001
Female gender	-.32	<.0001	1.22	<.0001	0.62	<.0001
Charlson index (ref: 0)						
1	0.22	<.0001	0.76	<.0001	1.35	<.0001
2	0.38	<.0001	0.65	<.0001	1.52	<.0001
3+	0.43	<.0001	0.50	<.0001	1.96	<.0001
ICISS (unit increase)	-1.62	<.0001	21.42	<.0001	0.09	<.0001

ICISS score: 0=death, 1=complete recovery (ICISS≤0.96 corresponds to the threshold for serious/severe injury).

Conclusions

Insurance and racial disparities continue to exist for TBI patients. Insurance status appears to impact short and long-term outcomes to a greater degree than patient race.

References

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