

SUPPLEMENTAL MATERIAL

Method Supplements

Study Data

The data provided to the Agency for Healthcare Research and Quality as part of the Healthcare Cost and Utilization Project are comprised of de-identified discharge data from all patient visits at non-federal acute care emergency departments and hospitals. These data are electronically reported to the respective state health agencies and are checked for inconsistent or invalid elements and codes. Anonymous patient identifiers allow for longitudinal tracking across visits and readmissions. These data were available from 2005-2011 for California, 2005-2012 for Florida, and 2006-2011 for New York.

Patient Population/ICD-9 code

By excluding patients with any concomitant codes for traumatic brain injury, admissions for rehabilitation care, and late complications of cerebrovascular disease, the *ICD-9-CM* codes used in this study have been established as sensitive and specific for identifying patients with acute IS (sensitivity 86%, specificity: 95%), ICH (sensitivity 82%, specificity 93%), and SAH (sensitivity 98%, specificity: 92%). The *ICD-9-CM* code has been validated as 86% sensitive and 98% specific for identifying mechanical ventilation and 100% sensitive and 96% for identifying tracheostomy.

List of Potentially Confounding Variables

The following variables were adjusted for in our analysis:

Demographic characteristics such as age, sex, race, insurance status, and income quartile; vascular comorbidities including coronary heart disease, hypertension, diabetes mellitus, heart failure, peripheral vascular disease, chronic kidney disease, chronic obstructive pulmonary disease, and atrial fibrillation; stroke subtype; complications of the initial stroke including sepsis, cerebral edema, hypoxemia, seizures, and pneumonia; the length of index hospital stay and discharge disposition; and the Elixhauser comorbid conditions.

Data Supplements

Subgroup analyses

In subgroup analyses, tracheostomy was not associated with readmission rates in patients with IS (IRR, 0.96; 95% CI, 0.91-1.02), while it was associated with higher rates of readmission in patients with ICH (IRR, 1.13; 95% CI, 1.05-1.22) or SAH (IRR, 1.34; 95% CI, 1.22-1.47). In sensitivity analyses, these differences among stroke subtypes were attenuated and tracheostomy was associated with a similar and slight increase in readmission rates after IS (IRR, 1.20; 95% CI, 1.14-1.25), ICH (IRR, 1.13; 95% CI, 1.06-1.21), and SAH (IRR, 1.17; 95% CI, 1.08-1.28).

Supplemental Table I. Baseline Characteristics of Mechanically Ventilated Patients with Stroke, Stratified by Tracheostomy Placement

Characteristic ^a	Tracheostomy (N = 10,690)	No Tracheostomy (N = 29,191)	P value
Age, mean (SD), y	64.1 (14.8)	66.4 (15.5)	<0.001
Female	5,039 (47.1)	14,448 (49.5)	<0.001
Race ^b			<0.001
White	5,189 (48.5)	17,665 (60.5)	
Black	2,307 (21.6)	4,257 (14.6)	
Hispanic	1,682 (15.7)	4,015 (13.8)	
Asian	708 (6.6)	1,498 (5.1)	
Other	516 (4.8)	1,012 (3.5)	
Payment source ^c			<0.001
Medicare	5,580 (52.2)	17,025 (58.3)	
Medicaid	2,109 (19.7)	4,099 (14.0)	
Private	2,385 (22.3)	5,921 (20.3)	
Self-pay	334 (3.1)	1,137 (3.9)	
Other	281 (2.7)	1007 (3.4)	
Income quartile			<0.001
1	3,388 (32.7)	8,327 (29.2)	
2	2,613 (25.2)	7,459 (26.2)	
3	2,415 (23.3)	6,835 (24.0)	
4	1,944 (18.8)	5,859 (20.6)	
Stroke type			<0.001
Ischemic stroke	5,392 (50.4)	17,549 (60.1)	
SAH	1,858 (17.4)	4,195 (14.4)	
ICH	3,440 (32.2)	7,447 (25.5)	
Elixhauser comorbidities, mean (SD), no.	4.4 (2.0)	3.7 (2.0)	<0.001
Vascular risk factors			
Hypertension	7,225 (67.6)	20,754 (71.1)	<0.001
Diabetes	3,853 (36.0)	10,141 (34.7)	0.02
Coronary heart disease	2,883 (27.0)	9,760 (33.4)	<0.001
Congestive heart failure	2,617 (24.5)	7,819 (26.8)	<0.001
Peripheral vascular disease	960 (9.0)	2,833 (9.7)	0.03
Chronic kidney disease	1,505 (14.1)	4,361 (14.9)	0.03
Chronic obstructive pulmonary disease	1,826 (17.1)	5,385 (18.5)	0.002
Atrial fibrillation	2,500 (23.4)	7,751 (26.6)	<0.001
Complications			
Sepsis	4,108 (38.4)	6,311 (21.6)	<0.001
Cerebral edema	2,270 (21.2)	5,772 (19.8)	0.001
Hypoxemia	208 (2.0)	734 (2.5)	0.001
Seizures	626 (5.9)	1,847 (6.3)	0.08
Pneumonia	2,804 (26.2)	2,959 (10.1)	<0.001
Length of stay, median (IQR), d	33 (23-49)	15 (9-24)	<0.001
Discharge disposition			<0.001
Home	441 (4.1)	4,281 (14.7)	
Nursing facility	9,698 (90.7)	21,402 (73.3)	
Home care	391 (3.7)	2,989 (10.2)	
Against medical advice	<10 (0.1)	144 (0.5)	

Abbreviations: SD, standard deviation; SDH, subdural hematoma.

^aData are presented as number (%) unless otherwise specified.

^bSelf-reported by patients or their surrogates. Numbers do not sum to group totals because of missing race/ethnicity data in 2.7% of patients.

^cNumbers do not sum to group totals because of missing payment-source data in <0.01% of patients.