Stroke Care in Maine

All-Payer Claims Data Report
2003-2008

October 2014

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For more information on stroke care and/or cardiovascular health in Maine, visit:

http://www.mainecardiohealth.org/
http://www.mainehearthealth.org/
http://www.maine.gov/dhhs/mecdc/population-health/hmp/mcvhp/index.html
http://www.mcdph.org

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Executive Summary

The first all-payer claims data report was published in 2010 and represented claims data from 2003-2006. However, it was later discovered that the data did not include Medicaid information. As a result, this report is inclusive of all payers including Medicaid and represents claims data from 2003-2008. Further, it includes secondary diagnoses such as prior stroke, TIA, atrial fibrillation and hypertension.

Key Findings

- Over the 6 years (2003-2008), there was a decrease in the length of hospital stay but there was no consistent evidence in the data of an overall decline in death rates
- Among ischemic stroke patients, there was evidence of a trend toward increasing utilization of tPA
- Patients admitted to the designated stroke centers were more likely to receive tPA for ischemic stroke than non-recognized stroke centers
- Death rates were lower for subarachnoid hemorrhage cases treated in stroke centers (no significant difference noted with other types of stroke)

Ischemic stroke

- 83% of all hospital stays for stroke are ischemic strokes and 80% of them occur among those 65 years and older (Table 2)
- Increased tPA utilization, with rates going from less than half a percent in 2003-04 to more than 2.5% in 2007-2008 (Table 8)
- Analysis of differences among the three types of hospitals indicates that a significantly higher percentage of ischemic stroke patients admitted to stroke centers received tPA treatment than those admitted to other hospitals (Table 12)

Hemorrhagic Strokes

- Intracerebral hemorrhage accounts for about 13% of all strokes and subarachnoid hemorrhage for about 4%
- Patients with subarachnoid hemorrhage were more likely to be female and under age 65 (Tables 1-2)
- Patients with hemorrhagic stroke were more likely than those with ischemic stroke to be treated in the stroke center hospitals (Table 4)
- The overall 30-day death rates were significantly higher for hemorrhagic strokes, 39% for intracerebral hemorrhage and 24% for subarachnoid hemorrhage compared with 12% for ischemic stroke (Tables 24 & 36)
- Cost per stay was significantly lower for both types of hemorrhagic stroke at the smaller hospitals than at the stroke centers (Tables 29 & 41)

Project Purpose

The purpose of this report is to provide a follow-up and expand upon the previous Stroke Care in Maine report from 2010. This report includes claims data from 2003-2008 and includes MaineCare claims data as opposed to the previous report, which was limited to three years of data from 2003-2006 and did not contain MaineCare claims data.

Project Goal

To raise awareness of stroke care in Maine, decrease healthcare costs associated with stroke while improving mortality rates and quality of care in the state.

Background

Each year approximately 795,000 people in the United States experience a new or recurrent stroke[1]. Of these, 87% are ischemic (the most common type of stroke), 10% are intracerebral hemorrhages and 3% are subarachnoid hemorrhages. Stroke is the fourth leading cause of death in the nation, accounting for 1 out of every 19 deaths. Stroke rates have declined nationally from 2000-2010. Additionally, from 2000-2010, the stroke mortality rate decreased by 35.8%[1]. The most common risk factors for stroke are hypertension, diabetes mellitus, high blood cholesterol, physical inactivity, poor nutrition and smoking[1].

In 2010 in Maine approximately 29,000 adult Mainers, or 2.8% of the adult population, reported a history of stroke[2]. Stroke accounts for 5% of deaths in Maine making it the fourth leading cause of death in the state[3]. Furthermore, Maine has the highest stroke death rate out of any New England state[2]. When considering the risk factors of stroke, 22.8% of adults in Maine are current smokers, which is slightly higher than the national average and 65% of adults in Maine are considered overweight or obese[3].

Maine is one of the most rural states, as 61.3% of Maine's population is considered rural. This amounts to 814,819 people living in rural areas within the state and 98.8% of the land distribution is designated as rural[4]. This also presents specific difficulties in terms of

stroke care as tPA administration is based on a timing window where it must be given within 3 hours of the onset of symptoms. Furthermore, administration of tPA must be done with approval by a neurologist and Maine has a shortage of neurologists in the state. With a majority of the population living in rural areas, it may be difficult for a number of that population to access large hospitals and be evaluated by a neurologist within an appropriate timeframe, potentially leading to worse patient outcomes.

Another challenge is recognition of stroke symptoms. When asked about the symptoms of a stroke, only 23.1% of Maine adults were able to identify them correctly[2]. This again presents challenges with timely treatment as some stroke symptoms are likely going unnoticed within the state.

Methodology

Description Of Data

Claims data was provided by the Maine Health Data Organization (MHDO) to Maine CDC- Cardiovascular Health Program

The data includes medical and drug claims from 2003-2008 for patients who were diagnosed with a cerebrovascular disease. The medical claims data includes patient gender, age, residential zip code, medical diagnoses, services received and provider of said services. In-hospital claims data also included admission dates, admission type and discharge destination (including death). Encrypted patient identifiers were used in all cases to protect patient confidentiality while linking multiple data sets concerning the same patient together.

Limitations of Data

While claims data does provide a variety of valuable information, there are some limitations with such a data source. Claims data is used by the provider to obtain reimbursement from insurance companies. With this in mind, a portion of the data may not be completely accurate as providers and billing offices attempt to maximize reimbursements. In addition, the data is less detailed than a medical record as it only

contains information regarding reimbursement, which may leave out valuable information about the specifics regarding each individual patient.

As discussed in the previous Maine CDC- Cardiovascular Health Program Stroke Report from 2010, when claims data was compared with "Get With The Guidelines-Stroke" from Penobscot Bay Medical Center and Eastern Maine Medical Center stroke diagnoses, gender and age distributions were all consistent as well as rates of ambulance use, tPA administration and length of stay[5]. There was significant variation in the rates of anticoagulation therapy, suggesting such a measure should not be analyzed from claims data, as it may be under-reported. In addition, individual hospitals may have variations in billing and procedural codes and some metrics while similar in nature were not a precise match. The 2010 report concluded that the All-Claims database is a reasonable and relevant source in guiding stroke care systems, allowing this report to shift focus to analyzing the state of stroke care in Maine and making recommendations based off the claims data.

Claims File

The claims file was used to create a file of inpatient stays at the 38 Maine acute care hospitals with either a primary or admitting diagnosis of cerebrovascular disease (stays at out-of-state hospitals were excluded). In this file, individual stays were identified by member ID, hospital ID, and admission date. Since admission and discharge dates in the inpatient claims were not reliable, stays were identified by combining overlapping and sequential claims at the same hospital (where the admission date on the later claim was within one day of the discharge date on the earlier claim) to determine the admission and discharge dates for the entire stay. Transfers between different hospitals were identified where a person's discharge from one hospital occurred within two days of their admission to another hospital, although the numbers of transfers identified in this way were low and may not be complete.

Finally, the inpatient stay file was used to create an analytic file containing data pulled from all claims for each individual during the period from one day before admission to the date of discharge. This analytic file had various demographic, diagnostic, and

treatment variables for the stay, including length of stay and total cost paid by the health insurer. In this file, stays were assigned to one of six diagnostic groups based on the primary diagnosis on the earliest inpatient institutional claim (type of bill = 11). The ICD-9 diagnostic codes used to identify the groups, along with the number and percent of stays, were the following:

Diagnosis	ICD-9 Codes	Stays	Percent
Ischemic Stroke	433.**, 434.** 436	8,830	43.8
Subarachnoid hemorrhage	430	434	2.2
Intracerebral hemorrhage	431	1,356	6.7
Other intracranial hemorrhage	432.*	546	2.7
TIA	435.*	2,800	13.9
Other CVD diagnosis	437..**, 438.**	6,203	30.8
Total		**20,169**	**100**

In this analysis, the first three types were considered as strokes and each of the three types was analyzed separately.

Analysis Variables

Outcome Variables

Administration tissue plasminogen activator or tPA (ICD-9 procedure code 99.10) was identified only where it occurred on the date of admission. Protocols call for its administration within 3 hours, but the claims data did not allow that to be determined. Length of stay was calculated as the difference between the initial hospital admission date and the final discharge date in the hospital stay file. Insurance cost was calculated as the sum of health insurance payments for all claims for services received by the patient during the period of the hospital stay. Death within 30 days was determined where a claim indicated a discharge due to death within 30 days of the admission on the hospital stay. This might occur during the inpatient hospital stay, but also might occur later if the patient was subsequently admitted to another hospital or nursing facility or received

home health services. This variable is not completely reliable since it misses deaths where the patient went home after the hospital stay and did not receive home health services.

Demographic Variables

Age, gender, and patient zip code of residence were taken from the earliest claim found for each patient within each year, which might not be a claim for the inpatient stay and thus may not give the exact age or the residence of the patient at the time of admission. Zip codes were used to identify the hospital service area within which the patient lived. For purposes of the analysis, the hospital service areas were grouped into the following regions:

Region	**Hospital Service Areas**
Central Maine	Lewiston, Augusta, Waterville
Bangor/Penobscot Bay	Bangor, Belfast, Rockland
Midcoast/Downeast	Brunswick, Damariscotta, Boothbay Harbor, Blue Hill, Ellsworth, Bar Harbor, Machias, Calais,
Northern Maine	Dover-Foxcroft, Greenville, Millinocket, Lincoln, Houlton, Presque Isle, Caribou, Fort Kent
Western Maine	Bridgton, Norway, Rumford, Farmington, Skowhegan, Pittsfield
Southern Maine	Portland, Biddeford, Sanford, York

Insurance and Treatment Variables

These variables included the type of hospital for the inpatient stay, the patient's health insurance coverage, and several variables indicating specific treatment or diagnostic services received during the stay. It proved impossible to reliably identify individual Maine hospitals in the Medicare claims earlier than 2007, and analyses requiring the identification of specific hospitals were therefore limited to the two years 2007-2008. The individual hospitals were grouped into three types: stroke center hospitals, large hospitals, and smaller hospitals as follows:

Type of Hospital	Hospitals
Stroke Centers	Maine Medical Center; Eastern Maine Medical Center; Penobscot Bay Medical Center
Large Hospitals	Southern Maine Medical Center; Mercy Hospital; Mid Coast Hospital; Central Maine Medical Center; St. Mary's Regional Medical Center; Maine General Medical Center; Northern Maine Medical Center; St. Joseph's Hospital
Smaller Hospitals	Aroostook Medical Center; Blue Hill Memorial Hospital; Charles A Dean Memorial Hospital; Calais Regional Hospital; Cary Medical Center; Down East Community Hospital; Franklin Memorial Hospital; Henrietta D Goodall Hospital; Houlton Regional Hospital; Maine Coast Memorial Hospital; Mayo Regional Hospital; Miles Memorial Hospital; Millinocket Regional Hospital; Mount Desert Island Hospital; Bridgton Hospital; Parkview Adventist Medical Center; Penobscot Valley Hospital; Redington Fairview Hospital; Rumford Hospital; Sebasticook Valley Hospital; St Andrews Hospital; Stephens Memorial Hospital; Waldo County General Hospital; Inland Hospital; York Hospital

The stroke centers are the hospitals within the state specifically designated for stroke care. Large hospitals are other hospitals and medical centers in the state's urban areas, and the smaller hospitals are located in the more rural parts of the state and many of them are designated as critical access hospitals.

Individual insurance payers included MaineCare, Medicare, and private insurers, and patients were often covered by more than one. Variables indicating coverage by each of the individual payers were included and a variable to account for the different combinations was defined with the following categories:

- Dual eligible (MaineCare and Medicare), consisting mainly of the younger disabled and the elderly in nursing facilities;
- MaineCare only, mostly younger adults and children;

- Medicare and private, mostly those elderly on Medicare with supplemental private plans, including "Advantage" plans;
- Medicare only;
- Private insurance only.

Variables indicating specific services received by patients included:

- Critical/intensive care: whether care was received in a critical care or intensive care unit of the hospital (revenue codes 200-219). In the absence of other indicators of the severity of the stroke in the claim, this variable may serve to flag the most severe cases.
- Neurology: whether a professional claim was received for services provided by a physician identified as a neurologist in the MHDO provider file
- CT scan: whether the patient received a CT scan at the time of admission (revenue code 351 or ICD-9 procedure code 87.03)
- MRI: whether the patient received an MRI at the time of admission (revenue code 611 or ICD-9 procedure code 88.91)

Diagnosis Variables

Several variables were defined indicating that the patient had a prior history of certain specific conditions relevant to the treatment of stroke, including hypertension, atrial fibrillation, TIA, and earlier stroke. All claims preceding the admission in the original claims file were searched to identify these conditions, not just those during the period of the inpatient stay.

The ICD-9 codes used to identify these conditions are shown in the following table:

Diagnosis	ICD-9 codes
Hypertension	401.1-401.9, 642.00-642.04
Atrial fibrillation	427.31,427.32
Prior TIA	435.**
Prior Stroke	430,431,432.0,432.1,432.9,433.01,433.10,433.11,433.21,433.31,433.81,433.91, 434.00,434.01,434.11,434.91,436

Analytic Methods

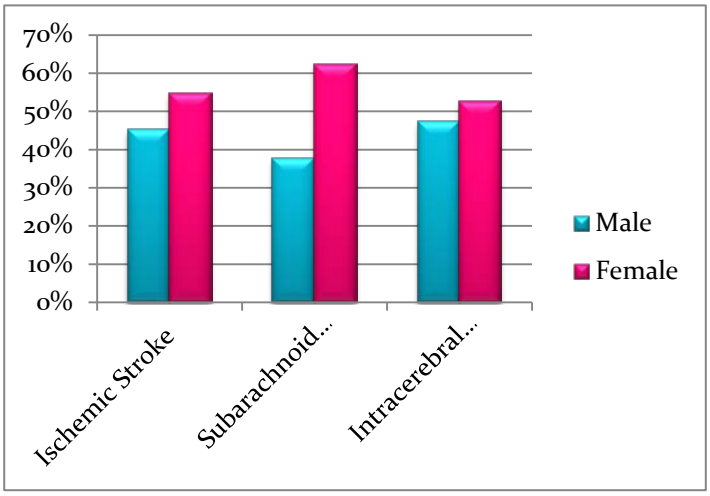
For each of the three types of stroke we calculated descriptive statistics (means or percentages with 95% confidence intervals) for the outcome variables by year to see if there was any evidence of trends over time. We then looked at differences in the same descriptive statistics for the three types of hospitals. Finally, we used multivariate (regression) models to estimate the effects on the outcome variables of other variables used in the analysis. Logistic regression models were used for the categorical variables (tPA utilization and death) and linear regression models for the continuous variables (length of stay and insurance cost) while controlling for the effects of the other variables included in the model. In the logistic regression models, an estimate of the odds ratio that is significantly less than 1 indicates that the independent variable decreases the likelihood of the outcome involved, while an estimated odds ratio significantly greater than 1 increases its likelihood. In the linear regression models, the parameter estimate indicates the amount of the positive or negative effect of the independent variable on the outcome variable with the probability value indicating whether this effect is statistically significant.

Results

Independent Variables

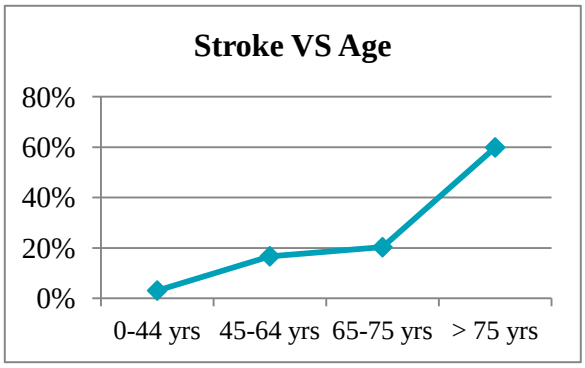
Stroke VS Gender

Females in Maine had a higher percentage of strokes when compared to Males across all three stroke types. Females accounted for 54.7% of ischemic strokes, 62.3% of subarachnoid hemorrhages, 52.7% of intracerebral hemorrhages and 54.7% of total strokes.



Stroke VS Age

Data was as expected, with increasing rates of stroke within older populations. 3.1% of strokes occurred within the 0-44 age population, 16.7% of strokes occurred within the 45-64 age population, 20.3% of strokes occurred within the 65-75 age population and 59.9% of strokes occurred within the >75 age population.



Stroke VS Health Insurance

When looking at the relationship between stroke and health insurance, it is interesting to note that 40.3% of the population treated had access to Medicare only. This relationship

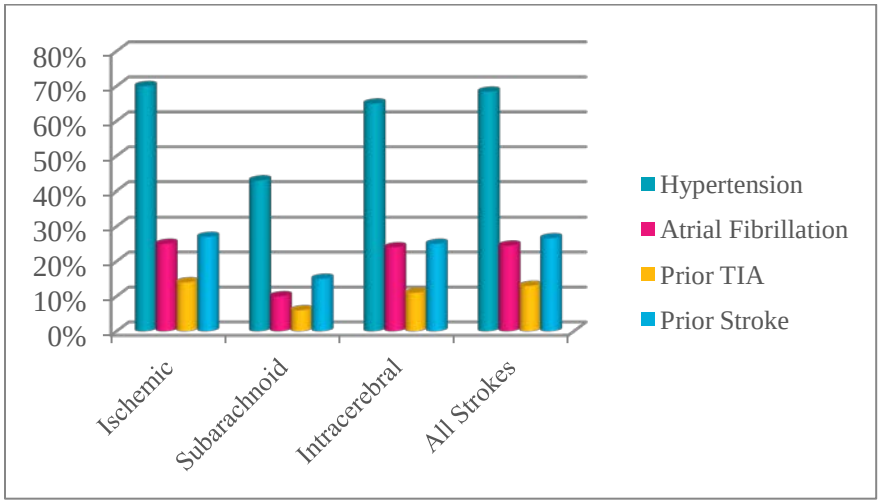
is expected however, as the primary population, dealing with stroke is the elderly, the same population that has access to Medicare.

Stroke VS Type Of Hospital

The data shows an even distribution between the three main types of hospitals with 35.8% of the population treated at stroke centers, 32.1% at large hospitals and 31% at small hospitals.

Additional Variables

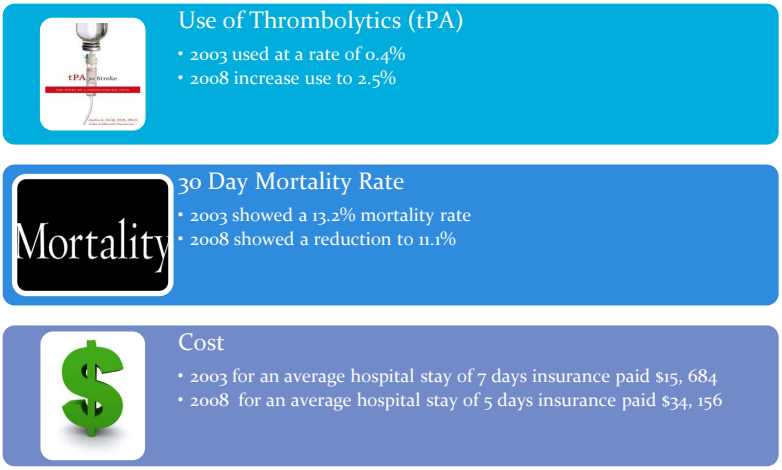
The distribution of strokes across the state according to residence was pretty balanced with the more populated Southern Maine having 28.7% of all strokes. 26.5% of stroke patients received critical care, 25.0% had access to a neurologist and 22.0% had a brain MRI while 51.1% received a CAT scan. Furthermore, we looked at secondary diagnoses and discovered 68.4% of the stroke population had a prior diagnosis of hypertension. See the chart below for secondary diagnoses related to a primary stroke diagnosis.



Ischemic Stroke

tPA Administration

tPA administration drastically increased between 2003 and 2008, going from 0.4% to 2.5% in that five year span. In 2007-2008, tPA administration at stroke centers in Maine was even higher at 5.7% with large hospitals at 0.8% and small hospitals at 1.3%. From 2003-2008, those who had MaineCare were less likely to receive tPA (0.41) while those who had a neurologist visit (2.32) or were in critical care (15.42) were drastically more likely to receive tPA.



Mortality

In 2003, the 30-day mortality rate was 13.2% and in 2008, it was 11.1%. This is consistent with national mortality rate trends. In 2007-2008, smaller hospitals had a higher mortality rate (14.5%) among stroke patients when compared to larger hospitals (10.8%) and stroke centers (10.7%). From 2003-2008, 30-day mortality rates were decreased when patients had a neurologist visit (0.79) or a prior TIA (0.78) and were increased when patients were female (1.16), had MaineCare (1.56), were age 65 or older (3.46), received critical care (2.56) or had prior atrial fibrillation (1.95).

Cost

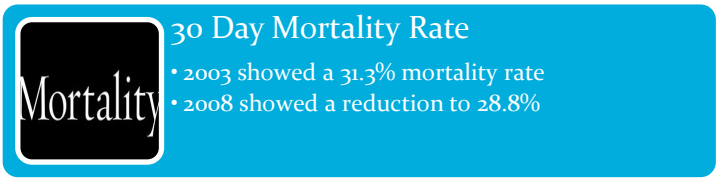
The mean length of stay in hospitals has decreased from 6.75 days in 2003 to 4.52 days in 2008. At the same time mean insurance payments have increased from $15,684 in 2003 to $34,156 in 2008. The mean length of stay was increased if the patient had been intercepted (3.39) or received critical care (1.53) and was decreased if the patient had a neurological visit (0.96). The greatest mean insurance payments resulted from patients

who were intercepted, were age 65 or older, had a neurologist visit or received critical care.

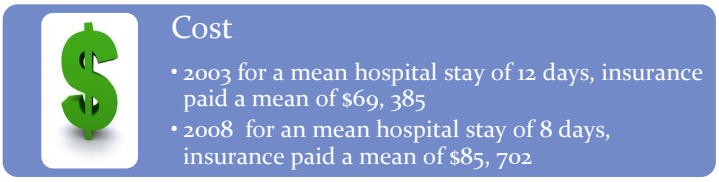
Subarachnoid Hemorrhagic Stroke

Mortality

In 2003, the 30-day mortality rate was 31.3% and in 2008, it was 28.8%. Being age 65 or older (2.43), having prior hypertension (1.70) or having MaineCare (1.84) all resulted in greater mortality rates while being treated at a stroke center decreased mortality rates (0.34).



Cost

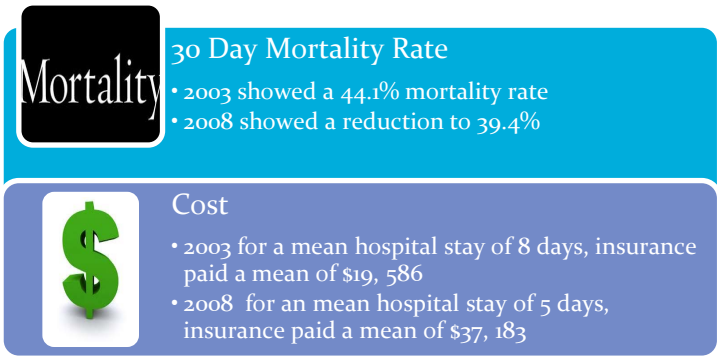


The mean length of stay in hospitals has decreased from 11.94 days in 2003 to 7.59 days in 2008. At the same time mean insurance payments have increased from $69, 385 in 2003 to $85,702 in 2008. The mean insurance payment did not show a consistent trend over time with extreme variations year to year likely dependent on the severity of the cases. The mean length of stay was increased if the patient had been intercepted, received a CAT scan or received critical care. The greatest mean insurance payments resulted from patients who received a CAT scan or had a neurologist visit.

Intracerebral Hemorrhagic Stroke

Mortality

In 2003, the 30-day mortality rate was 44.1% and in 2008, it was 39.4%. Being age 65 or older (1.94), having prior atrial fibrillation (1.61) or having critical care (1.42) all resulted in greater mortality rates while having a neurology visit (0.32) significantly decreased mortality rates.



Cost

The mean length of stay in hospitals has decreased from 7.49 days in 2003 to 4.89 days in 2008. At the same time mean insurance payments have increased from $19,856 in 2003 to $37,183 in 2008. The mean length of stay was increased if the patient had been intercepted, had a neurology visit, received a CAT scan or received critical care. The greatest mean insurance payments resulted from patients who received critical care.

General Trends

Mortality

When looking over the results as a whole including all types of strokes, a few general mortality trends begin to emerge. From 2003 to 2008, 30-day mortality rates have decreased in general which is consistent with national trends. In general, being 65 or over, having prior atrial fibrillation or prior hypertension or receiving critical care all resulted in greater mortality rates while having a neurology visit decreased mortality rates.

Cost

When looking over the results as a whole including all types of strokes, a few general cost trends begin to emerge. From 2003 to 2008, mean length of stay has decreased while mean insurance payments have increased. Additionally, the mean length of stay was increased for patients who were intercepted, received critical care or had a CAT scan. Meanwhile. The greatest mean insurance payments came from patients who received critical care or had a neurologist visit.

Conclusions

The All-Payer claims data, in this case, provided some intriguing findings. In regard to tPA administration, there has been a significant increase in administration since 2003 with a majority occurring at stroke centers. Those on MaineCare were less likely to receive tPA and those who saw a neurologist were more likely to receive tPA. In relation to this, the results suggest that patients who see a neurologist have a greater chance of 30-day post stroke survival while patients who had previous cardiovascular risk factors such as hypertension had a decreased 30-day survival rate. Since those who see a neurologist are more likely to receive tPA and those at the same time have a decreased mortality rate, it can be inferred that tPA is playing a role in decreasing mortality rates. In a rural state that is plagued by a shortage of neurologists, this connection between patient outcomes and neurology is critical. Southern Maine, specifically York and Cumberland County, had the lowest age-adjusted stroke death rates and it is also the area with the greatest access to neurologists[2]. In contrast, the more rural parts of the state including Western and Northern Maine had greater age-adjusted stroke death rates. When considering that tPA administration is time sensitive and depends on neurology access as well as hospital access and stroke symptom recognition, these results are not surprising. Additionally, the issue becomes more complicated as neurologist visits also caused a greater mean insurance premium, increasing costs. This suggests that there must be a trade-off either in terms of cost or mortality rates when considering neurology in Maine.

Furthermore, the mean length of stay for patients has decreased since 2003 while the mean insurance premiums in the state have increased. This suggests an unexpected disconnect with length of stay and insurance premiums, as generally it would be expected that a longer length of stay would result in greater insurance premiums and greater costs as a longer length of stay consists of a longer treatment period.

According to Schwamm et al., a comprehensive stroke system should consist of seven components primordial and primary prevention, community education, notification and response of emergency medical services, acute stroke treatment, sub-acute stroke treatment and secondary prevention, rehabilitation and continuous quality improvement (CQI) activities[6]. Considering the unique characteristics of Maine's population and the All-payers claims data, the greatest room for improvement within the current stroke care system pertains to primary prevention, community education and acute stroke treatment.

To address primary prevention the risk factors that contribute to stroke need to be controlled. 65% of Maine's adult population is obese or overweight and 22.1% are current smokers, increasing the risk of stroke among a significant population within the state[3]. Specific rural public health programs focusing on anti-smoking campaigns, physical activity promotion and nutrition education would go a long way towards reducing the risk factors of stroke and hypertension. There is a second key component to community education, which is to continue to educate the population (focusing on rural areas with higher stroke mortality rates) about identifying stroke symptoms, as only 23.1% of Maine adults were able to identify symptoms correctly[2]. This will allow for faster emergency response and the ability to treat with tPA in a greater number of patient cases resulting in better patient outcomes.

Concerning acute stroke treatment, Maine is deficient in a couple of ways, the first being a lack of neurologists in the state. Patients with access to neurologists have better outcomes, which is shown by the claims data, so it is crucial to either increase the number of neurologists in the state through incentives or to develop advanced 24-hour telehealth services with teleradiology to allow for CAT scans to be assessed from distance so that even the most remote areas in Maine have access to quality care. The second key issue

with acute stroke treatment in the state is that MaineCare patients have worse mortality rates. To alleviate this more research should be done focusing on the specific association between MaineCare and stroke treatment protocols. Finally, while the mean length of stay has decreased since 2003, mean insurance premiums have been increasing over time. This is counter-intuitive and creates more strain on the state's healthcare system. Additional research should be conducted to itemize specific costs within neurology care and critical care to assess potential areas of improvement and cost reduction.

Next Steps for State-Wide Stroke Care/Stroke Workgroup

(Led by the Maine Cardiovascular Health Council)

- Share all claims data report
- Attend NECC Fall 2014 and share report
- Coordination of current stroke workgroup
- Continue to engage Maine CDC Cardiovascular Health Program
- Stroke survey to all Maine hospitals
- Look at opportunities to reach into smaller, rural community hospitals
- Develop a larger state-wide stakeholder group
- Development of a 3 year action plan

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APPENDIX A

RELEVANT TABLES

Hospital Stays with Stroke Diagnosis

Table 1. Stroke Stays by Gender and Type of Stroke (n=10,494)

Gender	Ischemic stroke			Subarachnoid hemorrhage			Intracerrebral hemorrhage			All Strokes		
	N	Percent	95% CI (+/-)	N	Percent	95% CI (+/-)	N	Percent	95% CI (+/-)	N	Percent	95% CI (+/-)
Female	4,776	54.7%	1.0%	263	62.3%	4.6%	705	52.7%	2.7%	5,744	54.7%	1.0%
Male	3,957	45.3%	1.0%	159	37.7%	4.6%	634	47.3%	2.7%	4,750	45.3%	1.0%
Total	8,733			422			1,339			10,494		

Table 2. Age Group by Type of Stroke (n=10,406)'

Age group	Ischemic stroke			Subarachnoid hemorrhage			Intracerrebral hemorrhage			All Strokes		
	N	Percent	95% CI (+/-)	N	Percent	95% CI (+/-)	N	Percent	95% CI (+/-)	N	Percent	95% CI (+/-)
0-44	203	2.3%	0.3%	63	15.0%	3.4%	56	4.2%	1.1%	322	3.1%	0.3%
45-64	1,373	15.8%	0.8%	164	39.1%	4.7%	204	15.4%	1.9%	1,741	16.7%	0.7%
65-74	1,769	20.4%	0.8%	86	20.5%	3.9%	255	19.2%	2.1%	2,110	20.3%	0.8%
75 +	5,318	61.4%	1.0%	106	25.3%	4.2%	811	61.2%	2.6%	6,235	59.9%	0.9%
Total	8,663			419			1,326			10,408		

* 86 with unknown age

Table 3. Type of Health Insurance by Type of Stroke (n=10,494)

Insurance	Ischemic stroke			Subarachnoid hemorrhage			Intracerrebral hemorrhage			All Strokes		
	N	Percent	95% CI (+/-)	N	Percent	95% CI (+/-)	N	Percent	95% CI (+/-)	N	Percent	95% CI (+/-)
Dual eligible	1,421	16.3%	0.8%	42	10.0%	2.9%	194	14.5%	1.9%	1,657	15.8%	0.7%
MaineCare only	535	6.1%	0.5%	62	14.7%	3.4%	90	6.7%	1.3%	687	6.5%	0.5%
Medicare & Private	2,132	24.4%	0.9%	69	16.4%	3.5%	312	23.3%	2.3%	2,513	23.9%	0.8%
Medicare only	3,561	40.8%	1.0%	102	24.2%	4.1%	562	42.0%	2.6%	4,225	40.3%	0.9%
Private only	1,084	12.4%	0.7%	147	34.8%	4.5%	181	13.5%	1.8%	1,412	13.5%	0.7%
Total	8,733			422			1,339			10,494		

Table 4. Type of Hospital by Type of Stroke, 2007-2008 (n=3,227)

Hospital Type	Ischemic stroke			Subarachnoid hemorrhage			Intracerrebral hemorrhage			All Strokes		
	N	Percent	95% CI (+/-)	N	Percent	95% CI (+/-)	N	Percent	95% CI (+/-)	N	Percent	95% CI (+/-)
Unidentified	10	0.4%	0.2%	2	1.4%	2.0%	1	0.2%	0.5%	13	0.4%	0.2%
Stroke Centers	877	31.6%	1.7%	106	76.8%	7.0%	207	50.4%	4.8%	1190	35.8%	1.6%
Other Large Hospitals	942	33.9%	1.8%	21	15.2%	6.0%	104	25.3%	4.2%	1067	32.1%	1.6%
Smaller Hospitals	949	34.2%	1.8%	9	6.5%	4.1%	99	24.1%	4.1%	1057	31.8%	1.6%
Total	2778			138			411			3327		

Table 5. Residence by Type of Stroke (n=10,281)

Region of residence	Ischemic stroke			Subarachnoid hemorrhage			Intracerrebral hemorrhage			All Strokes		
	N	Percent	95% CI (+/-)	N	Percent	95% CI (+/-)	N	Percent	95% CI (+/-)	N	Percent	95% CI (+/-)
Southern Maine	2,460	28.8%	1.0%	130	31.2%	4.4%	360	27.4%	2.4%	2,950	28.7%	0.9%
Bangor/Penobscot Bay	1,290	15.1%	0.8%	71	17.0%	3.6%	195	14.9%	1.9%	1,556	15.1%	0.7%
Central Maine	1,652	19.3%	0.8%	75	18.0%	3.7%	283	21.6%	2.2%	2,010	19.6%	0.8%
Midcoast & Downeast	1,215	14.2%	0.7%	55	13.2%	3.2%	177	13.5%	1.8%	1,447	14.1%	0.7%
Western Maine	941	11.0%	0.7%	51	12.2%	3.1%	142	10.8%	1.7%	1,134	11.0%	0.6%
Northern Maine	994	11.6%	0.7%	35	8.4%	2.7%	155	11.8%	1.7%	1,184	11.5%	0.6%
Total	8,552			417			1,312			10,281		

Frequency Missing = 213

Table 6. Services Received during Hospital Stay (n=10,494)

Services	Ischemic stroke			Subarachnoid hemorrhage			Intracerrebral hemorrhage			All Strokes		
	N	Percent	95% CI (+/-)	N	Percent	95% CI (+/-)	N	Percent	95% CI (+/-)	N	Percent	95% CI (+/-)
Critical/Intensive Care	1,723	19.7%	0.8%	345	81.8%	3.7%	713	53.2%	2.7%	2,781	26.5%	0.8%
Neurology	2,234	25.6%	0.9%	85	20.1%	3.8%	305	22.8%	2.2%	2,624	25.0%	0.8%
Cat Scan	4,362	49.9%	1.0%	263	62.3%	4.6%	737	55.0%	2.7%	5,362	51.1%	1.0%
Brain MRI	2,058	23.6%	0.9%	74	17.5%	3.6%	177	13.2%	1.8%	2,309	22.0%	0.8%
Total	8,733			422			1,339			10,494		

Table7. Diagnoses in Claims Prior to Stays (n=10,494)

Prior Diagnoses	Ischemic stroke			Subarachnoid hemorrhage			Intracerrebral hemorrhage			All Strokes		
	N	Percent	95% CI (+/-)	N	Percent	95% CI (+/-)	N	Percent	95% CI (+/-)	N	Percent	95% CI (+/-)
Hypertension	6,123	70.1%	1.0%	180	42.7%	4.7%	870	65.0%	2.6%	7,173	68.4%	0.9%
Atrial Fibrillation	2,208	25.3%	0.9%	43	10.2%	2.9%	321	24.0%	2.3%	2,572	24.5%	0.8%
Prior TIA	1,185	13.6%	0.7%	27	6.4%	2.3%	149	11.1%	1.7%	1,361	13.0%	0.6%
Prior Stroke	2,396	27.4%	0.9%	62	14.7%	3.4%	336	25.1%	2.3%	2,794	26.6%	0.8%
Total	8,733			422			1,339			10,494		

Ischemic Stroke Hospital Stays

Table 8. Number of Hospital Stays with tPA Administration by Year (n=8,733)

Year	Number	Percent	95% Confidence Interval		Total
			Lower	Upper	
2003	6	0.4%	0.1%	0.8%	1,428
2004	4	0.3%	0.0%	0.5%	1,502
2005	15	0.9%	0.5%	1.4%	1,591
2006	40	2.8%	1.9%	3.6%	1,434
2007	34	2.6%	1.7%	3.4%	1,321
2008	36	2.5%	1.7%	3.3%	1,457
Total	135	1.5%	1.3%	1.8%	8,733

Table 9. Number & Percent of Stays where Patient died within 30 days (n=8,733)

Year	Number	Percent	95% Confidence Interval		Total
			Lower	Upper	
2003	189	13.2%	11.5%	15.0%	1,428
2004	206	13.7%	12.0%	15.5%	1,502
2005	199	12.5%	10.9%	14.1%	1,591
2006	151	10.5%	8.9%	12.1%	1,434
2007	173	13.1%	11.3%	14.9%	1,321
2008	161	11.1%	9.4%	12.7%	1,457
Total	1079	12.4%	11.7%	13.0%	8,733

Table 10. Mean Length of Hospital Stay by Year (n=8,733)

Year	Number	Mean	95% Confidence Interval	
			Lower	Upper
2003	1,428	6.75	6.35	7.14
2004	1,502	6.3	5.92	6.68
2005	1,591	6.77	6.35	7.19
2006	1,434	6.04	5.63	6.45
2007	1,321	4.59	4.33	4.85
2008	1,457	4.52	4.29	4.74

Table 11. Mean Insurance Payment for Hospital Stays by Year (n=8,733)

Year	Number	Mean	95% Confidence Interval	
			Lower	Upper
2003	1,428	$15,684	$14,071	$17,297
2004	1,502	$15,857	$14,761	$16,952
2005	1,591	$20,188	$17,509	$22,868
2006	1,434	$23,758	$14,700	$32,816
2007	1,321	$30,281	$27,832	$32,729
2008	1,457	$34,156	$28,976	$39,337

Table 12. Number & Percent of Stays with TPA Administration by Hospital Type, 2007-08 (n=2,768)

Hospital Type	Number	Percent	95% Confidence Interval		Total
			Lower	Upper	
Smaller hospitals	12	1.3%	0.6%	2.0%	949
Large hospitals	8	0.8%	0.3%	1.4%	942
Stroke Centers	50	5.7%	4.2%	7.2%	877
TOTAL	70	2.5%	1.9%	3.1%	2,768

Table 13. Number & Percent of Stays where Patient Died within 30 Days by Hospital Type, 2007-08 (n=2,768)

Hospital Type	Number	Percent	95% Confidence Interval		Total
			Lower	Upper	
Smaller hospitals	138	14.5%	12.3%	16.8%	949
Large hospitals	102	10.8%	8.8%	12.8%	942
Stroke Centers	94	10.7%	8.7%	12.8%	877
TOTAL	334	12.1%	10.9%	13.3%	2,768

Table 14. Mean Length of Stay by Type of Hospital, 2007-08 (n=2,768)

Hospital Type	Number	Mean	95% Confidence Interval	
			Lower	Upper
Smaller hospitals	949	4.29	4.04	4.54
Large hospitals	942	4.36	4.07	4.64
Stroke Centers	877	5.04	4.68	5.39

Table 15. Mean Insurance Payment per Stay by Type of Hospital, 2007-08 (n=2,768)

Hospital Type	Number	Mean	95% Confidence Interval	
			Lower	Upper
Smaller hospitals	949	$29,978	$23,393	$36,563
Large hospitals	942	$31,332	$27,212	$35,452
Stroke Centers	877	$36,032	$31,863	$40,200

Table 16. Odds Ratios from Logistic Regression for tPA Administration, 2003-08 (n=8,733)

Independent Variable	Point Estimate	95% Confidence Limits	
Year *	1.35	1.19	1.52
Female	0.74	0.52	1.06
MaineCare *	0.41	0.23	0.73
Age 65 or more	1.17	0.74	1.87
Cat Scan *	1.78	1.21	2.60
Neurologist Visit *	2.32	1.59	3.40
Critical/Intensive Care *	15.42	9.97	23.85
Prior Hypertension	1.03	0.68	1.57
Prior TIA	0.89	0.48	1.63
Prior Stroke	0.87	0.54	1.40
Prior Atrial Fibrillation	0.95	0.61	1.47

* Statistically significant effect

Table 17. Odds Ratios from Logistic Regression for30-day Death Rate, 2003-08 (n=8,733)

Independent Variable	Point Estimate	95% Confidence Limits	
Year	0.98	0.94	1.02
Female *	1.16	1.02	1.33
MaineCare *	1.56	1.33	1.83
Age 65 or more *	3.46	2.68	4.47
Cat Scan	0.88	0.77	1.01
Neurologist Visit *	0.79	0.67	0.94
Critical/Intensive Care *	2.56	2.21	2.96
Prior Hypertension	0.91	0.78	1.07
Prior TIA *	0.78	0.63	0.96
Prior Stroke	1.10	0.93	1.29
Prior Atrial Fibrillation *	1.95	1.69	2.25

Table 18. Parameter Estimates from Linear Regression for Length of Stay, 2003-08 (n=8,733)

Independent Variable	Parameter Estimate	Standard Error	Pr > |t|
Intercept *	29.26	2.08	<.0001
Admission date *	-0.002	0.00	<.0001
Female	0.24	0.15	0.11
MaineCare	-0.11	0.19	0.56
Age 65 or more *	1.21	0.21	<.0001
Cat Scan	0.07	0.15	0.65
Neurologist Visit *	0.92	0.18	<.0001
Critical/Intensive Care *	2.00	0.19	<.0001
Prior Hypertension	0.12	0.18	0.50
Prior TIA	-0.28	0.24	0.24
Prior Stroke *	0.95	0.19	<.0001
Prior Atrial Fibrillation	-0.19	0.18	0.28

Table 19. Parameter Estimates from Linear Regression for Insurance Payment, 2003-08 (n=8,733)

Independent Variable	Parameter Estimate	Standard Error	Pr > |t|
Intercept *	($114,174)	$26,298	<.0001
Admission date *	$8	$2	<.0001
Female	$661	$1,917	0.73
MaineCare	$3,201	$2,358	0.17
Age 65 or more *	($13,240)	$2,628	<.0001
Cat Scan	($1,330)	$1,892	0.48
Neurologist Visit *	$7,782	$2,297	0.00
Critical/Intensive Care *	$16,477	$2,384	<.0001
Prior Hypertension	$4,239	$2,210	0.06
Prior TIA	($1,141)	$3,013	0.70
Prior Stroke	($1,680)	$2,372	0.48
Prior Atrial Fibrillation	($2,451)	$2,278	0.28

Table 20. Odds Ratios from Logistic Regression for tPA Administration with Stroke Center, 2007-08 (n=3,636)

Independent Variable	Point Estimate	95% Confidence Limits	
Stroke Center	1.63	0.89	2.98
Female	0.82	0.48	1.41
MaineCare *	0.38	0.16	0.89
Age 65 or more	1.18	0.63	2.23
Cat Scan	0.94	0.55	1.63
Neurologist Visit *	3.18	1.62	6.26
Critical/Intensive Care *	11.82	6.37	21.90
Prior Hypertension	1.03	0.56	1.89
Prior TIA	0.63	0.23	1.74
Prior Stroke	0.99	0.49	1.98
Prior Atrial Fibrillation	0.81	0.41	1.62

Table 21. Odds Ratios from Logistic Regression for 30-day Death Rate with Stroke Center, 2007-08 (n=3,636)

Independent Variable	Point Estimate	95% Confidence Limits	
Stroke Center	1.13	0.86	1.49
Female	1.15	0.93	1.44
MaineCare *	1.68	1.30	2.19
Age 65 or more *	3.09	2.20	4.35
Cat Scan	0.97	0.78	1.21
Neurologist Visit *	0.71	0.54	0.93
Critical/Intensive Care *	2.78	2.19	3.52
Prior Hypertension	1.00	0.77	1.30
Prior TIA	0.82	0.58	1.16
Prior Stroke	1.14	0.87	1.49
Prior Atrial Fibrillation *	1.85	1.45	2.36

Table 22. Parameter Estimates from Linear Regression for Length of Stay with Stroke Center, 2007-08 (n=3,636)

Independent Variable	Parameter Estimate	Standard Error	Pr > |t|
Intercept *	3.39	0.31	<.0001
Stroke Center	0.17	0.25	0.50
Female	0.29	0.21	0.17
MaineCare	0.14	0.26	0.58
Age 65 or more *	0.99	0.26	0.00
Cat Scan	0.09	0.21	0.67
Neurologist Visit *	0.96	0.25	<.0001
Critical/Intensive Care *	1.53	0.26	<.0001
Prior Hypertension	0.30	0.24	0.20
Prior TIA	-0.36	0.34	0.30
Prior Stroke	0.18	0.27	0.49
Prior Atrial Fibrillation	-0.29	0.26	0.26

Table 23. Parameter Estimates from Linear Regression for Insurance Payment with Stroke Center, 2007-08 (n=3,636)

Independent Variable	Parameter Estimate	Standard Error	Pr > |t|
Intercept *	$21,948	$6,002	0.00
Stroke Center	-$7,109	$4,913	0.15
Female	$5,077	$4,016	0.21
MaineCare	$6,052	$4,971	0.22
Age 65 or more *	-$15,767	$5,003	0.00
Cat Scan	-$2,190	$3,999	0.58
Neurologist Visit *	$13,375	$4,740	0.00
Critical/Intensive Care *	$24,419	$5,012	<.0001
Prior Hypertension	$7,829	$4,558	0.09
Prior TIA	-$989	$6,647	0.88
Prior Stroke	-$2,443	$5,172	0.64
Prior Atrial Fibrillation	-$2,128	$5,047	0.67

Subarachnoid Hemorrhage Hospital Stays

Table 24. Number & Percent of Stays where Patient died within 30 days [n=422)

Year	Number	Percent	95% Confidence Interval		Total
			Lower	Upper	
2003	20	31.3%	19.9%	42.6%	64
2004	18	21.7%	12.8%	30.6%	83
2005	11	20.0%	9.4%	30.6%	55
2006	16	19.5%	10.9%	28.1%	82
2007	18	25.0%	15.0%	35.0%	72
2008	19	28.8%	17.9%	39.7%	66
Total	102	24.2%	20.1%	28.3%	422

Table 25. Mean Length of Hospital Stay by Year (n=422)

Year	Number	Mean	95% Confidence Interval	
			Lower	Upper
2003	64	11.94	8.29	15.59
2004	83	14.51	10.13	18.88
2005	55	12.91	9.10	16.72
2006	82	10.15	7.74	12.56
2007	72	10.33	6.55	14.12
2008	66	7.59	4.81	10.37

Table 26. Mean Insurance Payment for Hospital Stays by Year (n=422)

Year	Number	Mean	95% Confidence Interval	
			Lower	Upper
2003	64	$69,385	$39,330	$99,440
2004	83	$82,929	$57,074	$108,784
2005	55	$158,990	$43,703	$274,277
2006	82	$67,249	$47,478	$87,019
2007	72	$225,528	$48,758	$402,299
2008	66	$85,702	$44,390	$127,013

Table 27. Number & Percent of Stays where Patient Died within 30 Days by Hospital Type, 2007-08 (n=136)

Hospital Type	Number	Percent	95% Confidence Interval		Total
			Lower	Upper	
Smaller hospitals	1	11.1%	-9.4%	31.6%	9
Large hospitals	12	57.1%	36.0%	78.3%	21
Stroke Centers	24	22.6%	14.7%	30.6%	106
TOTAL	37	27.2%	19.7%	34.7%	136

Table 28. Mean Length of Stay by Type of Hospital, 2007-08 (n=136)

Hospital Type	Number	Mean	95% Confidence Interval	
			Lower	Upper
Smaller hospitals	9	5.11	0.24	9.98
Large hospitals	21	5.00	1.27	8.73
Stroke Centers	106	9.99	7.06	12.92

Table 29. Mean Insurance Payment per Stay by Type of Hospital, 2007-08 (n=136)

Hospital Type	Number	Mean	95% Confidence Interval	
			Lower	Upper
Smaller hospitals	9	$23,657	$7,625	$39,688
Large hospitals	21	$213,173	-$122,289	$548,634
Stroke Centers	106	$160,944	$55,339	$266,549

Table 30. Odds Ratios from Logistic Regression for 30-day Death Rate, 2003-08 (n=422)

Independent Variable	Point Estimate	95% Confidence Limits	
Year	0.97	0.84	1.12
Female	0.80	0.50	1.30
MaineCare *	1.84	1.06	3.18
Age 65 or more *	2.43	1.41	4.18
Cat Scan	0.67	0.41	1.11
Neurologist Visit	0.72	0.38	1.35
Critical/Intensive Care	1.35	0.72	2.54
Prior Hypertension *	1.70	1.01	2.85
Prior TIA	1.44	0.52	3.97
Prior Stroke	0.62	0.29	1.31
Prior Atrial Fibrillation	1.48	0.71	3.07

Table 31. Parameter Estimates from Linear Regression for Length of Stay, 2003-08 (n=422)

Independent Variable	Parameter Estimate	Standard Error	Pr > |t|
Intercept *	43.85	20.08	0.03
Admission date *	-0.003	0.00	0.03
Female	1.61	1.48	0.28
MaineCare	1.00	1.70	0.56
Age 65 or more	1.59	1.63	0.33
Cat Scan *	4.19	1.53	0.01
Neurologist Visit	1.11	1.87	0.55
Critical/Intensive Care *	7.69	1.96	0.00
Prior Hypertension	0.70	1.62	0.67
Prior TIA	-0.28	3.35	0.93
Prior Stroke	-3.34	2.34	0.15
Prior Atrial Fibrillation	-2.90	2.52	0.25

Table 32. Parameter Estimates from Linear Regression for Insurance Payment, 2003-08 (n=422)

Independent Variable	Parameter Estimate	Standard Error	Pr > |t|
Intercept	-$461,734	$495,004	0.35
Admission date	$29	$30	0.32
Female	-$51,902	$36,413	0.15
MaineCare	$42,997	$41,876	0.31
Age 65 or more	-$55,386	$40,296	0.17
Cat Scan *	$88,854	$37,707	0.02
Neurologist Visit *	$118,908	$46,119	0.01
Critical/Intensive Care	$57,008	$48,301	0.24
Prior Hypertension	$24,534	$39,937	0.54
Prior TIA	$85,613	$82,528	0.30
Prior Stroke	-$51,651	$57,651	0.37
Prior Atrial Fibrillation	-$72,726	$62,182	0.24

Table 33. Odds Ratios from Logistic Regression for 30-day Death Rate with Stroke Center, 2007-08 (n=253)

Independent Variable	Point Estimate	95% Confidence Limits	
Stroke Center *	0.34	0.14	0.79
Female	0.67	0.35	1.29
MaineCare	1.24	0.55	2.77
Age 65 or more *	3.03	1.38	6.64
Cat Scan	0.70	0.34	1.40
Neurologist Visit	0.56	0.22	1.46
Critical/Intensive Care	2.65	0.98	7.14
Prior Hypertension	1.08	0.52	2.25
Prior TIA	0.72	0.13	3.87
Prior Stroke	1.27	0.40	4.09
Prior Atrial Fibrillation	1.14	0.32	4.07

Table 34. Parameter Estimates from Linear Regression for Length of Stay with Stroke Center, 2007-08 (n=253)

Independent Variable	Parameter Estimate	Standard Error	Pr > |t|
Intercept	-5.30	3.68	0.15
Stroke Center *	6.41	2.76	0.02
Female	0.87	1.87	0.64
MaineCare	3.02	2.21	0.17
Age 65 or more	2.83	2.34	0.23
Cat Scan *	4.75	1.99	0.02
Neurologist Visit	3.82	2.46	0.12
Critical/Intensive Care *	5.99	2.61	0.02
Prior Hypertension	1.75	2.13	0.41
Prior TIA	2.16	5.05	0.67
Prior Stroke	-4.91	3.61	0.18
Prior Atrial Fibrillation	-2.07	4.07	0.61

Table 35. Parameter Estimates from Linear Regression for Insurance Payment with Stroke Center, 2007-08 (n=253)

Independent Variable	Parameter Estimate	Standard Error	Pr > |t|
Intercept	$91,229	$113,105	0.42
Stroke Center	-$130,906	$84,858	0.12
Female	-$97,059	$57,502	0.09
MaineCare	$64,078	$67,898	0.35
Age 65 or more	-$88,809	$71,883	0.22
Cat Scan *	$137,221	$61,100	0.03
Neurologist Visit *	$295,201	$75,764	0.00
Critical/Intensive Care	$96,386	$80,233	0.23
Prior Hypertension	$45,455	$65,586	0.49
Prior TIA	$239,713	$155,323	0.12
Prior Stroke	-$115,702	$111,098	0.30
Prior Atrial Fibrillation	-$128,988	$125,350	0.30

Intracerebral Hemorrhage Hospital Stays

Table 36. Number & Percent of Stays where Patient died within 30 days [n=1,339

Year	Number	Percent	95% Confidence Interval		Total
			Lower	Upper	
2003	97	44.1%	37.5%	50.7%	220
2004	101	39.1%	33.2%	45.1%	258
2005	87	38.8%	32.5%	45.2%	224
2006	72	31.9%	25.8%	37.9%	226
2007	83	41.9%	35.0%	48.8%	198
2008	84	39.4%	32.9%	46.0%	213
Total	524	39.1%	36.5%	41.7%	1,339

Table 37. Mean Length of Hospital Stay by Year (n=1,339)

Year	Number	Mean	95% Confidence Interval	
			Lower	Upper
2003	220	7.49	6.1	8.87
2004	258	7.33	6.08	8.58
2005	224	8.23	6.74	9.73
2006	226	8.31	6.78	9.84
2007	198	4.77	4.14	5.4
2008	213	4.89	4.15	5.63

Table 38. Mean Insurance Payment per Hospital Stay by Year (n=1,339)

Year	Number	Mean	95% Confidence Interval	
			Lower	Upper
2003	220	$19,586	$15,748	$23,424
2004	258	$25,919	$20,163	$31,676
2005	224	$37,329	$23,236	$51,422
2006	226	$29,250	$20,623	$37,877
2007	198	$35,599	$27,794	$43,403
2008	213	$37,183	$22,350	$52,016

Table 39. Number & Percent of Stays where Patient Died within 30 Days by Hospital Type, 2007-08 (n=1,339)

Hospital Type	Number	Percent	95% Confidence Interval		Total
			Lower	Upper	
Smaller hospitals	49	49.5%	39.6%	59.3%	99
Large hospitals	43	41.3%	31.9%	50.8%	104
Stroke Centers	75	36.2%	29.7%	42.8%	207
TOTAL	167	40.7%	36.0%	45.5%	410

Table 40. Mean Length of Stay by Type of Hospital, 2007-08 (n=410)

Hospital Type	Number	Mean	95% Confidence Interval	
			Lower	Upper
Smaller hospitals	99	3.52	2.95	4.08
Large hospitals	104	4.77	3.89	5.65
Stroke Centers	207	5.49	4.69	6.3

Table 41. Mean Insurance Payment per Stay by Type of Hospital, 2007-08 (n=410)

Hospital Type	Number	Mean	95% Confidence Interval	
			Lower	Upper
Smaller hospitals	99	$22,190	$16,451	$27,929
Large hospitals	104	$45,899	$16,206	$75,592
Stroke Centers	207	$38,547	$30,819	$46,274

Table 42. Odds Ratios from Logistic Regression for 30-day Death Rate, 2003-08 (n=1,339)

Independent Variable	Point Estimate	95% Confidence Limits	
Year	1.03	0.96	1.10
Female	1.02	0.81	1.28
MaineCare	1.18	0.88	1.58
Age 65 or more *	1.94	1.39	2.71
Cat Scan	0.80	0.63	1.00
Neurologist Visit *	0.37	0.27	0.50
Critical/Intensive Care *	1.42	1.12	1.80
Prior Hypertension	0.98	0.75	1.26
Prior TIA	0.89	0.60	1.30
Prior Stroke	1.01	0.76	1.35
Prior Atrial Fibrillation *	1.61	1.21	2.13

Table 43. Parameter Estimates from Linear Regression for Length of Stay, 2003-08 (n=1,339)

Independent Variable	Parameter Estimate	Standard Error	Pr > |t|
Intercept *	38.164	7.102	<.0001
Admission date *	-0.002	0.000	<.0001
Female	0.293	0.524	0.577
MaineCare	-0.673	0.654	0.304
Age 65 or more	-1.338	0.704	0.058
Cat Scan *	1.587	0.522	0.002
Neurologist Visit *	1.443	0.638	0.024
Critical/Intensive Care *	3.020	0.530	<.0001
Prior Hypertension	0.737	0.577	0.202
Prior TIA	0.085	0.873	0.923
Prior Stroke	-0.105	0.644	0.870
Prior Atrial Fibrillation	0.599	0.645	0.353

Table 44. Parameter Estimates from Linear Regression for Insurance Payment, 2003-08 (n=1,339)

Independent Variable	Parameter Estimate	Standard Error	Pr > |t|
Intercept	-$63,209	$55,331	0.25
Admission date	$6	$3	0.07
Female	-$5,770	$4,083	0.16
MaineCare	$8,786	$5,094	0.08
Age 65 or more *	-$26,733	$5,487	<.0001
Cat Scan	$5,343	$4,067	0.19
Neurologist Visit	$5,971	$4,971	0.23
Critical/Intensive Care *	$20,132	$4,129	<.0001
Prior Hypertension	$3,631	$4,495	0.42
Prior TIA	-$1,894	$6,800	0.78
Prior Stroke	-$3,192	$5,018	0.52
Prior Atrial Fibrillation	$2,641	$5,026	0.60

Table 45. Odds Ratios from Logistic Regression for 30-day Death Rate with Stroke Center, 2007-08 (n=577)

Independent Variable	Point Estimate	95% Confidence Limits	
Stroke Center	0.76	0.51	1.14
Female	1.04	0.71	1.52
MaineCare	1.10	0.69	1.75
Age 65 or more *	2.17	1.35	3.49
Cat Scan	0.87	0.60	1.27
Neurologist Visit *	0.38	0.25	0.59
Critical/Intensive Care *	1.99	1.33	2.97
Prior Hypertension	0.98	0.65	1.47
Prior TIA	0.74	0.37	1.49
Prior Stroke	0.98	0.59	1.62
Prior Atrial Fibrillation *	2.35	1.47	3.76

Table 46. Parameter Estimates from Linear Regression for Length of Stay with Stroke Center, 2007-08 (n=577)

Independent Variable	Parameter Estimate	Standard Error	Pr > |t|
Intercept	2.85	1.23	0.02
Stroke Center *	1.77	0.84	0.04
Female	0.04	0.79	0.96
MaineCare	0.57	0.97	0.55
Age 65 or more	-0.33	0.95	0.73
Cat Scan *	2.06	0.78	0.01
Neurologist Visit	1.45	0.86	0.09
Critical/Intensive Care *	2.76	0.83	0.00
Prior Hypertension	0.51	0.84	0.54
Prior TIA	0.01	1.45	1.00
Prior Stroke *	-2.09	1.06	0.05
Prior Atrial Fibrillation	0.40	1.02	0.70

Table 47. Parameter Estimates from Linear Regression for Insurance Payment with Stroke Center, 2007-08 (n=577)

Independent Variable	Parameter Estimate	Standard Error	Pr > |t|
Intercept *	$35,240	$11,236	0.00
Stroke Center	-$5,726	$7,719	0.46
Female	-$9,008	$7,240	0.21
MaineCare	$16,907	$8,870	0.06
Age 65 or more *	-$24,242	$8,672	0.01
Cat Scan	$3,083	$7,152	0.67
Neurologist Visit	$13,752	$7,871	0.08
Critical/Intensive Care *	$28,212	$7,597	0.00
Prior Hypertension	$1,598	$7,739	0.84
Prior TIA	-$10,311	$13,257	0.44
Prior Stroke	-$407	$9,679	0.97
Prior Atrial Fibrillation	$2,859	$9,361	0.76