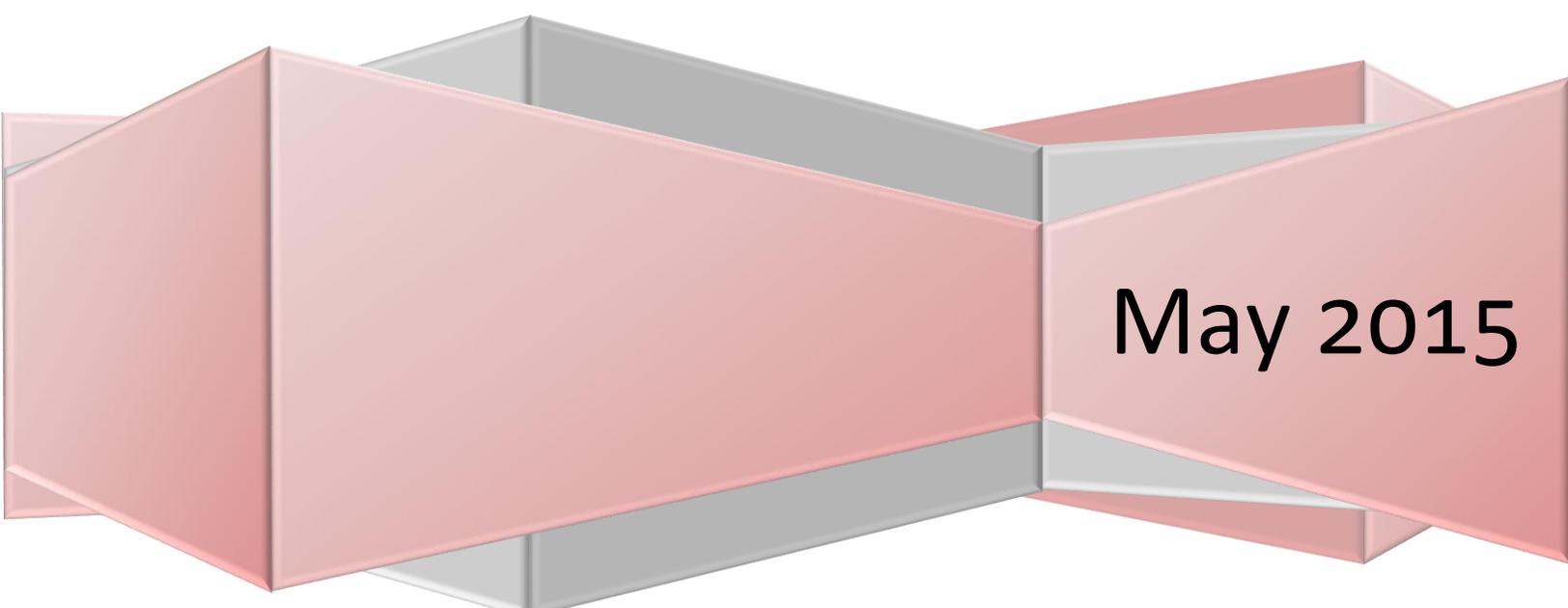


**Texas Council on Cardiovascular Disease and Stroke & Texas
Department of State Health Services**

Heart Attack and Stroke Data Collection Initiative

**Regional Advisory Council Heart Attack and
Stroke Data Report**



May 2015

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Acknowledgements

The Texas Council on Cardiovascular Disease and Stroke would like to express its sincere appreciation to all Regional Advisory Councils (RACs) for completing the survey. The Council would also like to thank the Texas Department of State Health Services Health Promotion and Chronic Disease Prevention Section, noted below, who helped prepare the report.

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Introduction

Heart disease and stroke are the number one and number four leading causes of death in Texas, respectively ¹. In order to advance reduction in death and disability, it is important to analyze the current state of systems of care for both conditions by collecting and analyzing data. The project data collection efforts focus on pre-hospital and hospital stroke and heart attack data elements, with a particular focus on ST-segment elevation myocardial infarction (STEMI). The 22 Regional Advisory Councils (RACs) were surveyed and asked to report stroke and STEMI data elements for their Trauma Service Area (TSA). **Figure 1** (Appendix A) shows the geographic coverage of the 22 RACs in Texas, all of which were represented in the survey. The objective of the data collection survey was to gain an understanding of the prevalence of STEMI and stroke in Texas and evaluate pre-hospital components of the systems of care and treatment of stroke patients. Survey findings will be used to assess policies and practices regarding delivery of stroke and STEMI care across the state and identify areas of opportunity for quality improvement.

Methodology

With guidance from the Texas Council on Cardiovascular Disease and Stroke, Governor's EMS and Trauma Advisory Council (GETAC), and the Texas Department of State Health Services (DSHS) Office of Surveillance, Evaluation and Research (OSER), the Texas Heart Disease and Stroke Program developed an online survey using Survey Monkey (<https://www.surveymonkey.com>) to gather pre-hospital and hospital stroke and STEMI regional data.

There were a total of 24 questions in the survey, consisting of the following elements: RAC leadership and contact information, pre-hospital stroke and STEMI data, and stroke treatment and admissions for DSHS designated and non-designated stroke facilities. RACs were asked to report data for Quarter 3 of 2014 (July-September).

Data Analysis

The participation rate from RACs was 100 percent, however some data points were missing. OSER cleaned the data to remove duplicate entries and followed up with RACs when clarification was needed. DSHS analyzed survey responses using Microsoft Excel 2010.

Results

Introduction to Stroke Systems of Care

Heart attack and stroke systems of care encompass disease prevention, acute care, chronic care, and rehabilitation. For heart attack and stroke, high quality care, which includes rapid diagnosis and treatment, can mean the difference between a positive and detrimental outcome.

The DSHS Office of EMS/Trauma Systems Coordination designates stroke facilities in the state of Texas. There are three levels of stroke designation: Comprehensive Level I, Primary Level II, and Support III. Each level has its own set of requirements; however, all levels require hospital participation in RAC activities. **Figure 2** (Appendix B) displays the geographic location of designated stroke facilities as of April 2014. **Table 1** below includes the total number of DSHS designated stroke facilities and the level of designation for each TSA as of September 2014.

Table 1. Number of DSHS Designated Stroke Facilities by Designation Level and RAC, September 2014.

TSA	Total Number of DSHS Stroke Designated Facilities	Number of Stroke Facilities		
		Comprehensive Level I	Primary Level II	Support Level III
A	1		1	
B	2		2	
C	1		1	
D	1		1	
E	37	3	31	3
F	2		2	
G	6		4	2
H	2		2	
I	6		6	
J	3		3	
K	0			
L	1		1	
M	2		2	
N	5		1	4
O	10	3	7	
P	9		9	
Q	29	5	24	
R	3		3	
S	2		2	
T	1		1	
U	1		1	
V	7		7	
Total	131	11	111	9

- There are only three TSAs or RACs with Comprehensive Level I facilities (E, O, and Q).

- There are 15 RACs with five or fewer designated facilities, and one of these does not have any DSHS designated facilities.

Acute Suspected Stroke Runs

RACs were asked to report the number of acute suspected stroke emergency medical services (EMS) runs. The definition for an acute suspected stroke run included documentation that the EMS unit was dispatched for a patient 18 years or older with the caller reporting the presence of signs and symptoms of a stroke.

Signs and symptoms included:

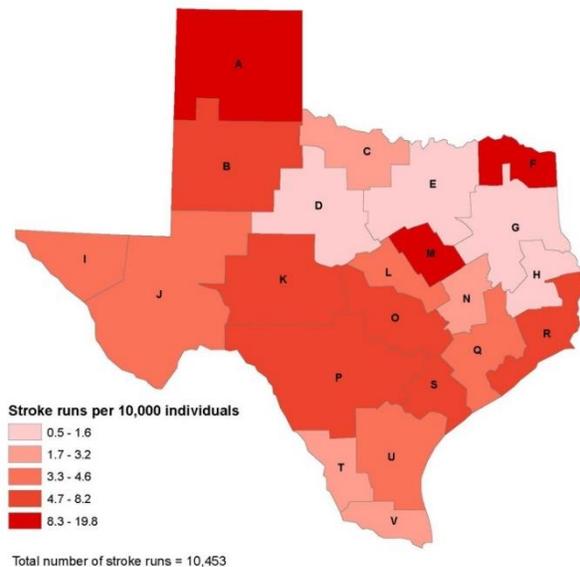
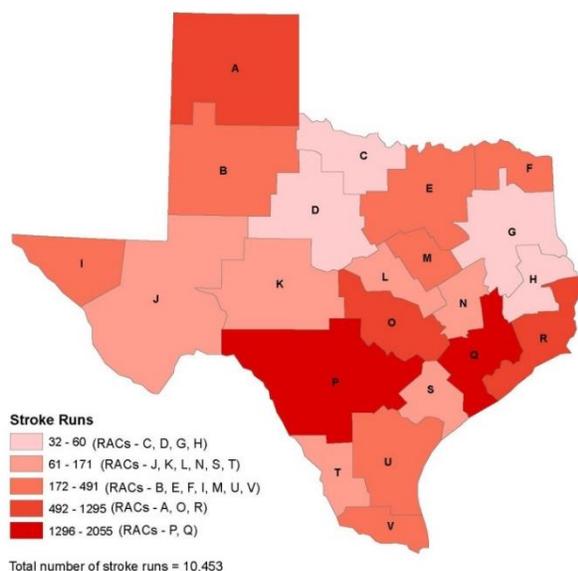
- ❖ Sudden numbness or weakness of face, arm or leg, especially on one side of the body.
- ❖ Sudden confusion, trouble speaking or understanding.
- ❖ Sudden trouble seeing in one or both eyes.
- ❖ Sudden trouble walking, dizziness, loss of balance or coordination.
- ❖ Sudden severe headache with no known cause.



Figure 3 displays total number of stroke EMS runs reported by RACs from January to September 2014. **Figure 4** displays total number of stroke EMS runs per 10,000 individuals for the same time period. Each RAC was placed into a category based on the number of stroke runs reported, with darker shading representing a higher number of reported runs per 10,000 individuals.

Figure 3. Total Number of Stroke EMS Runs, by RAC, Jan-Sept 2014

Figure 4. Stroke Runs per 10,000 Individuals, by RAC, Jan-Sept 2014

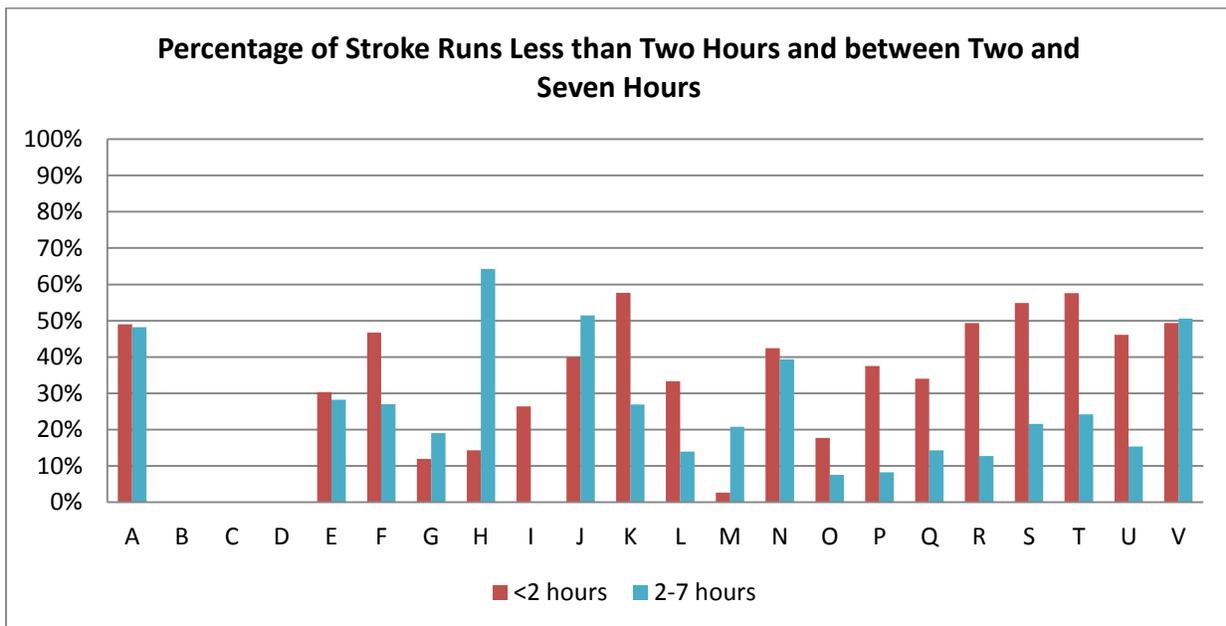


- The total number of acute suspected stroke runs reported from January to September 2014 was 10,453.
- The total number of runs reported per RAC ranged from 32 to 2,055 with the average being 475.
- There were five RACs (A, O, P, Q, R) that reported more than 491 suspected EMS stroke runs each (see **Figure 3**).
- Some of the RACs had missing or incomplete data, so **Figure 4** may not be representative of the total number of runs per 10,000 people.
- One RAC did not report total number of stroke runs for Quarters 1-2 and two RACs did not report data for Quarter 3.

Stroke Transport

The survey asked RACs to report how many acute suspected stroke runs resulted in the patient arriving at the hospital in less than two hours and between two and seven hours. **Figure 5** illustrates the percentage of acute suspected stroke runs with patients arriving at the hospital in less than two hours and between two and seven hours of last known well by RAC.

Figure 5. Percentage of Stroke Runs Less than Two Hours and between Two and Seven Hours



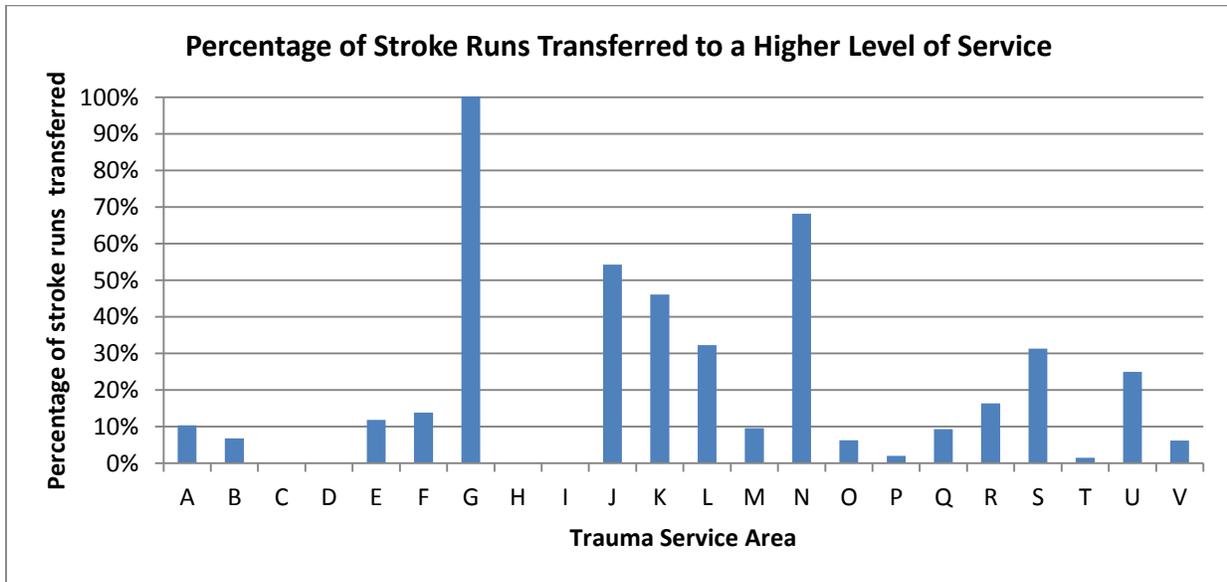
*The number of runs less than 2 hours and between 2 and 7 hours may not equal the total number of runs reported. Therefore, two percentages listed for each RAC may not total 100%.

- 18 RACs reported data for both data elements (<2 hours and between 2-7 hours).
- Among these 18, 35% of all acute suspected stroke runs reported were less than 2 hours and 20% were between two and seven hours.
- 13 out of the 18 RACs reported a higher percentage of patients arriving at the hospital in less than 2 hours from last known well versus arriving between 2 and 7 hours from last known well.

Stroke Transfers

The RACs were asked to report the total number of acute stroke transfers to a higher level of service. This includes any suspected stroke run in which the patient was seen at one hospital prior to being transferred to another hospital with a higher level of service. A total of 18 RACs reported 505 stroke transfers to a higher level of service. **Figure 6** below displays the percentage of stroke runs transferred to a higher level of service by RAC.

Figure 6. Percentage of Stroke Runs Transferred to a Higher Level of Service



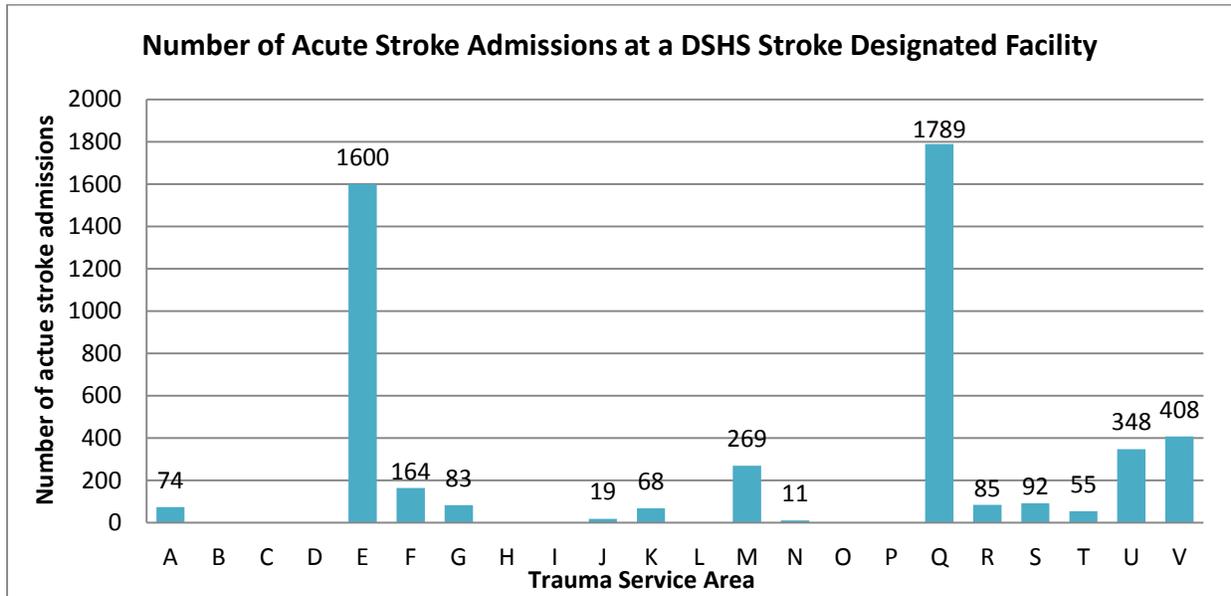
- Among the 18 RACs who reported complete data, 12% of all acute suspected stroke runs reported were transferred to a higher level of service.
- 12 RACs reported that 25% or fewer of their stroke runs were transferred to a higher level of service.
- Three RACs reported that 26-50% of their stroke runs were transferred to a higher level of service.
- Three RACs reported that more than 50% of their stroke runs were transferred to a higher level of service.
 - These three RACs only have primary level II or support level III designated stroke facilities in their TSAs.

Acute Stroke Admissions and Treatment at DSHS Designated Stroke Facilities

Several hospital data elements were requested from RACs, including data from DSHS designated stroke facilities related to stroke admissions, fibrinolytics, and endovascular treatments. In order to avoid data duplication with other DSHS Heart Attack and Stroke Data Collection projects, the RACs were asked not to report data from hospitals that are participating in the American Heart Association Get with the Guidelines (GWTG) Stroke Program for all of the stroke hospital data elements. For this reason, hospital data described below represents data from hospitals that do not participate in GWTG Stroke.

RACs were asked to report the number of patients 18 years or older who were discharged with a final clinical diagnosis related to stroke, which includes Transient Ischemic Attack (TIA), acute ischemic stroke, subarachnoid hemorrhage, and intracerebral hemorrhage. A total of 5,065 acute stroke admissions were reported by 14 RACs for July-September 2014. The most stroke admissions reported by one RAC was 1,789. Acute stroke admissions reported by each RAC can be seen in **Figure 7**.

Figure 7. Number of Acute Suspected Stroke Admissions at a DSHS Stroke Designated Facility



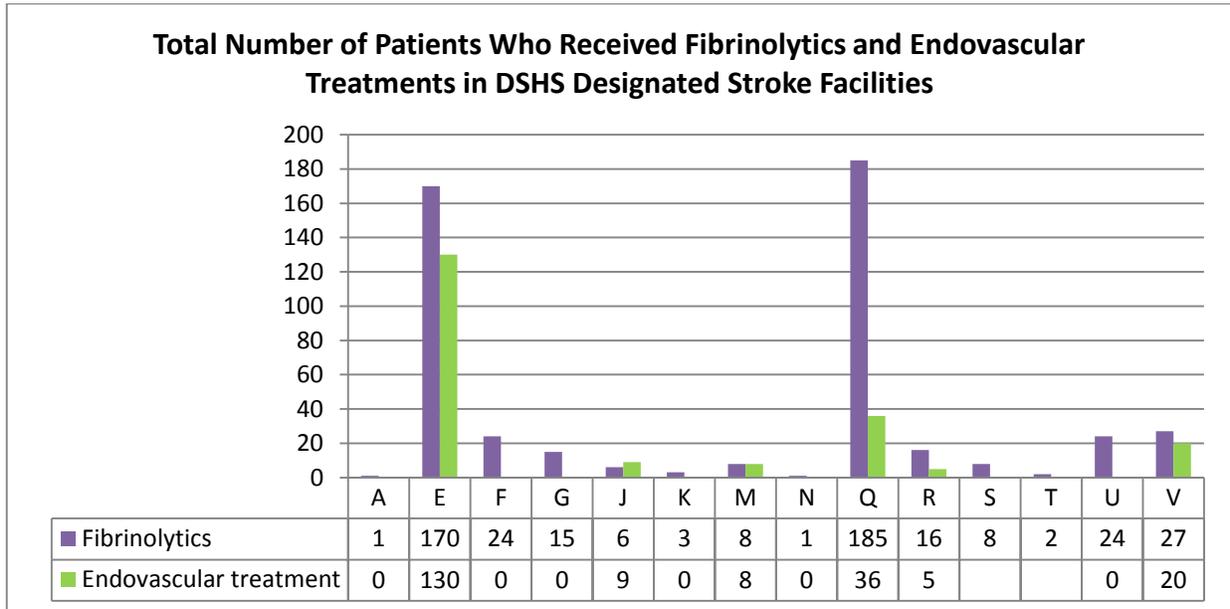
Eight of the 22 RACs did not report stroke admissions and the reasons for not reporting are listed below.

- Six RACs reported that the designated stroke facilities in their TSAs were already participating in the GWTG-Stroke program and thus, did not report data for designated stroke facilities in their TSAs.
- One RAC reported that it was not able to collect the data from the designated stroke facilities in its TSA.
- One RAC did not specify the reason for not reporting.

From July to September 2014, a total of 490 patients were reported to have received intravenous (IV) fibrinolytics or tPA at a DSHS designated stroke facility, while 208 received an endovascular treatment.

Figure 8 displays the number of patients who received fibrinolytics and endovascular treatments in DSHS designated stroke facilities.

Figure 8. Total Number of Patients Who Received Fibrinolytics and Endovascular Treatments in DSHS Designated Stroke Facilities



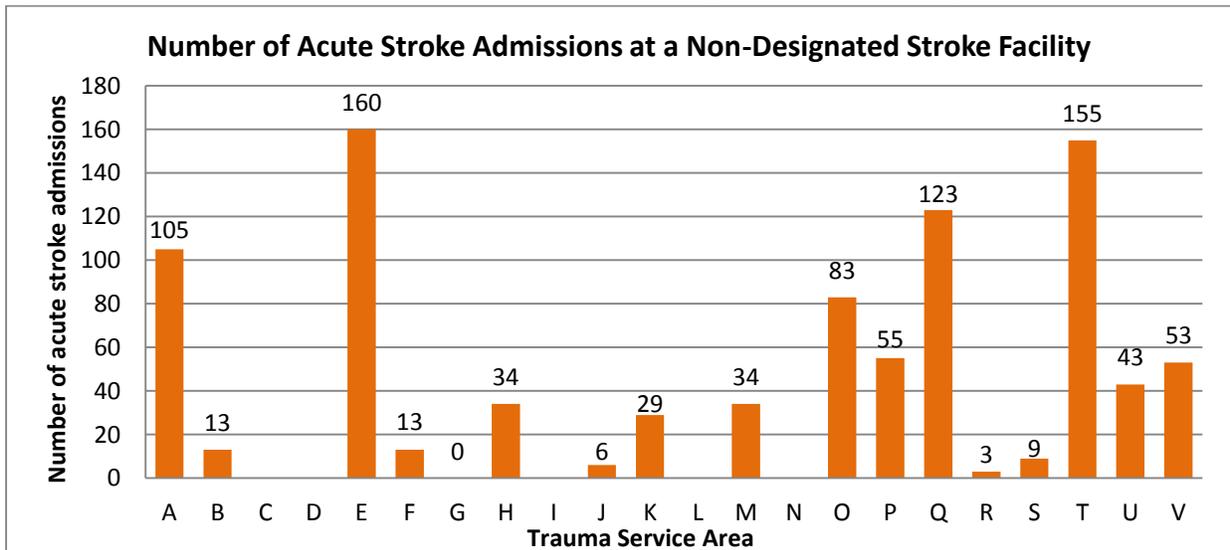
Note: This figure only includes information for 14 RACs that responded to at least one of the survey questions (i.e. fibrinolytics or endovascular treatments).

- One RAC reported more patients receiving endovascular treatments than fibrinolytics.
- Six RACs reported that no endovascular treatments were performed in their TSAs.

Acute Stroke Admissions and Treatment at Non-Designated Stroke Facilities

A total of 918 stroke admissions at a non-designated stroke facility between July to September 2014 were reported by 17 RACs, with 160 being the highest number of admissions reported by one RAC. The number of stroke admissions by TSA is provided in **Figure 9**.

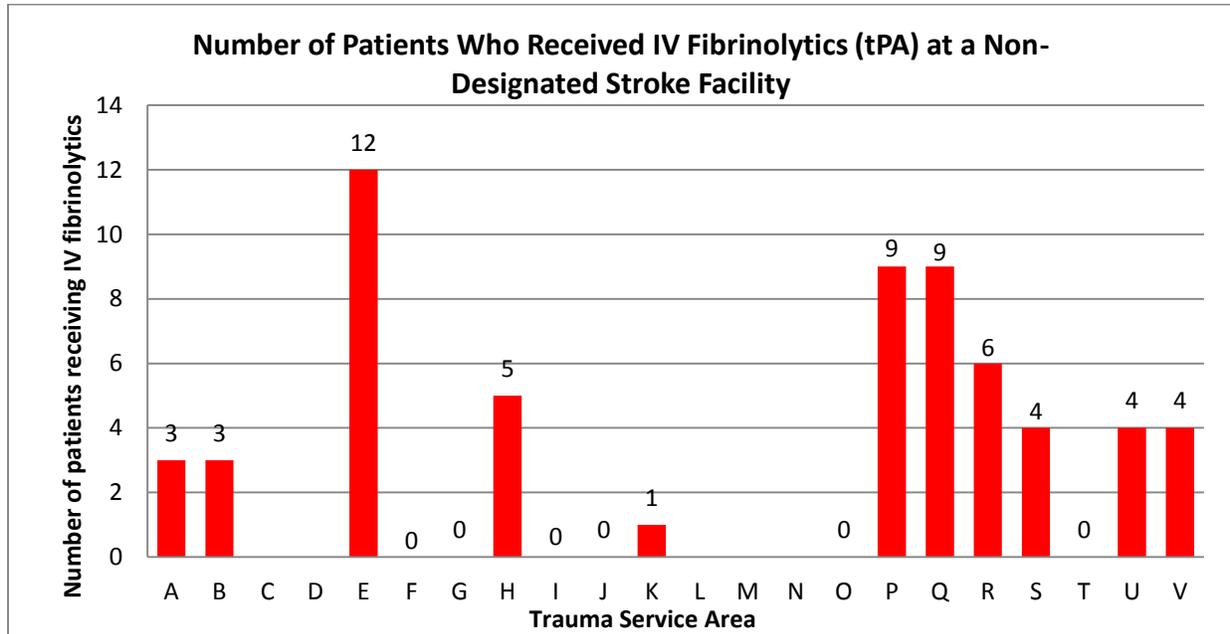
Figure 9. Number of Acute Stroke Admissions at a Non-Designated Stroke Facility



- Four of the 17 RACs reported more than 100 stroke admissions each.
- Two of the 17 RACs (A, T) reported more stroke admissions in a non-designated stroke facility than a designated stroke facility.
 - These two RACs only have one designated stroke facility in their TSAs.

Between July and September 2014, 17 RACs reported that a total of 60 patients received IV fibrinolytics or tPA at a non-designated stroke facility.

Figure 10. Number of Patients Who Received IV Fibrinolytics (tPA) at a Non-Designated Stroke Facility



- One of the 17 RACs reported more patients receiving IV fibrinolytics in a non-designated stroke facility than a designated stroke facility (A).
 - This RAC (A) has only one designated stroke facility in its TSA.

RACs were asked to report number of patients receiving endovascular treatments at a non-designated stroke facility. A total of 17 were reported. **Table 2** below includes the totals reported by 13 RACs.

Table 2. Number of Endovascular Treatments in a Non-Designated Stroke Facility by TSA

TSA	Number of endovascular treatments in non-designated stroke facility
A, B, F, G, J, K, O, T, U*	0
E	7
P	5
Q	3
R	2

*These RACs reported that no endovascular treatments were performed in their TSA.

Introduction to STEMI System of Care

RACs were asked to report on three data elements related to the STEMI system of care including the total number of STEMI runs, total number of STEMI runs with 12 lead electrocardiograms (ECGs) transmitted and total number of STEMI runs less than 30 minutes. It is important to understand prevalence of STEMIs in Texas, as well as the transport time and pre-hospital diagnosis, which are both critical components of the STEMI system of care. An EMS unit equipped with 12-lead equipment is able to identify a STEMI patient and communicate this to the hospital, leading to activation of the catheterization lab and a more efficient system of care.

Figure 11 (Appendix C) displays the PCI-capable hospitals in Texas ². Hospitals are considered PCI-capable if they have a catheterization lab that is available 24 hours a day and are able to perform percutaneous coronary interventions (PCIs). There are gaps in PCI capability across the state, primarily in the western and southern regions, and primarily rural areas. **Table 3** includes the approximate number of PCI-capable facilities by TSA.

Table 3. Number of PCI-Capable Hospitals by TSA

TSA	Total Number of PCI-Capable Hospitals
A	2
B	2
C	1
D	2
E	44
F	0
G	3
H	4
I	6
J	2
K	2
L	3
M	2
N	2
O	14
P	16
Q	30
R	8
S	2
T	1
U	2
V	6
Total	154

- There are 15 RACs with five or fewer PCI-capable hospitals.
 - One of these RACs does not have any PCI-capable hospitals.

STEMI Runs

RACs were asked to report the number of STEMI runs defined by patients 18 years or older with a STEMI, as defined by the EMS agency protocol, noted on a pre-hospital ECG who were transported directly to an acute care hospital. **Figure 12** illustrates the total number of STEMI EMS runs reported by RAC for January through September 2014. **Figure 13** displays the number of STEMI runs per 10,000 individuals, reported for the same time period.

Figure 12. Total Number of STEMI EMS Runs, by RAC, Jan-Sept 2014

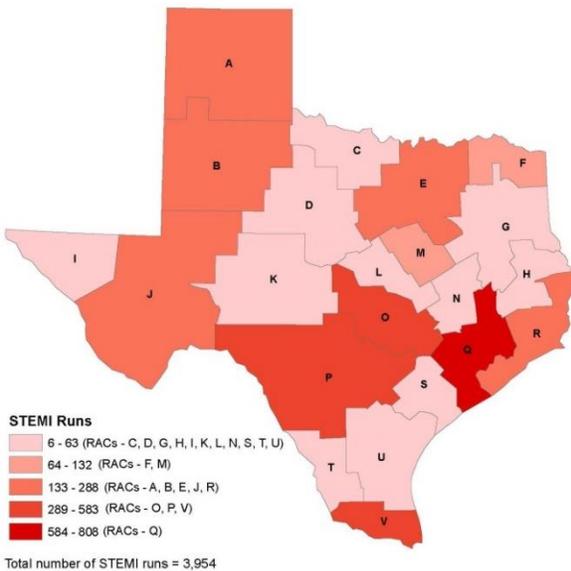
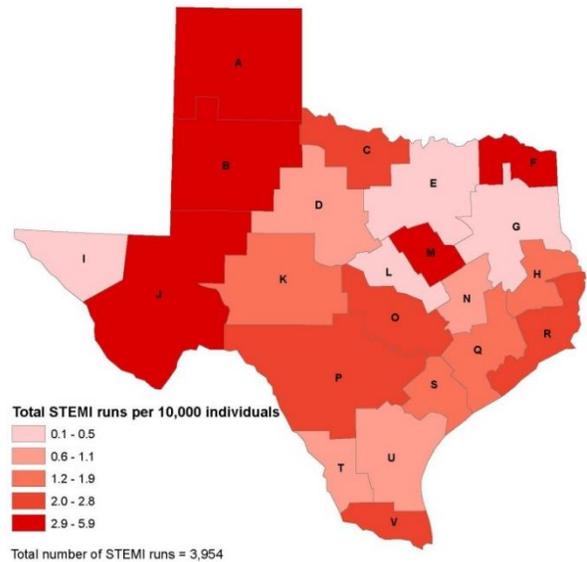


Figure 13. STEMI Runs per 10,000 Individuals, by RAC, Jan-Sept 2014

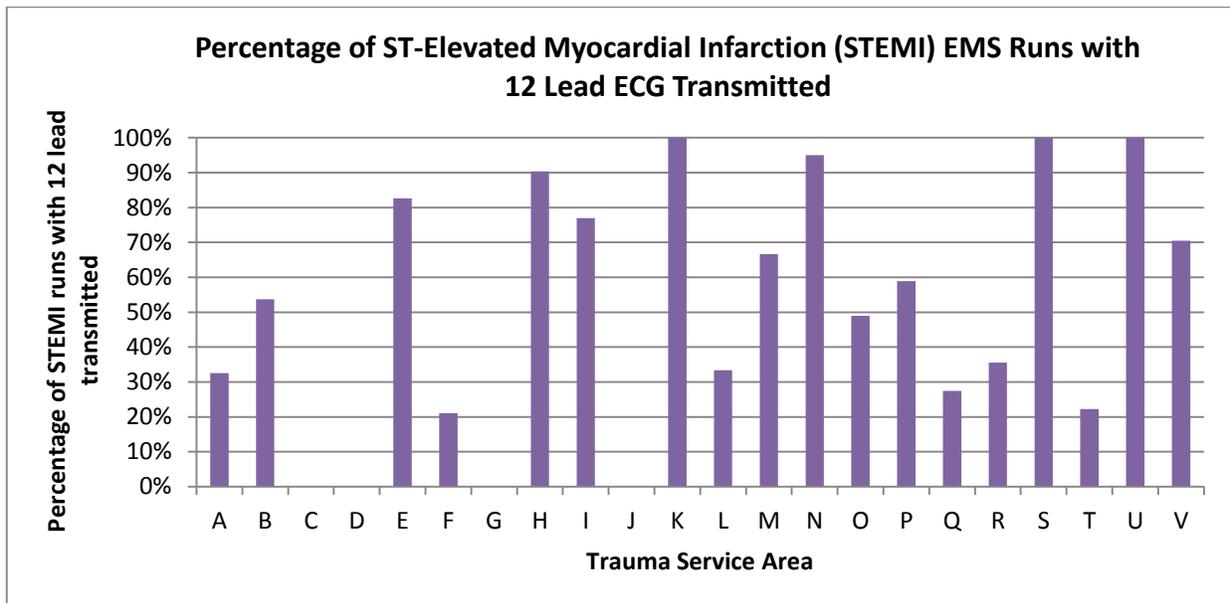


- The total number of STEMI runs reported from January to September 2014 was 3,954.
- The highest number of STEMI runs by one RAC was 808.
- Four RACs (O, P, Q, V) reported more than 288 STEMI runs each.
- Some of the RACs had missing or incomplete data resulting in **Figure 13** potentially displaying lower number of runs per 10,000 people.
- One RAC did not report this data element for Quarters 1-2 and three RACs did not report or were not able to collect the data for Quarter 3.

Transmission of 12 Lead ECG

RACs were asked to report on the number of patients, out of the previously reported number of STEMI runs, that received a pre-hospital 12 lead ECG which was communicated to the receiving hospital as an electronic transmission or by phone. **Figure 14** illustrates the percentage of STEMI runs where a 12 lead ECG was transmitted to the receiving hospital.

Figure 14. Percentage of STEMI EMS Runs with 12 Lead ECG Transmitted



- Among the 19 RACs who reported complete data, 49% of all STEMI runs reported had a 12 lead ECG transmitted to the receiving hospital.
- Eight RACs reported that a 12 lead ECG was transmitted for 50% or less of their STEMI runs.
- Four RACs reported that a 12 lead ECG was transmitted for 51-75% or more of their STEMI runs.
- Seven RACs reported that a 12 lead ECG was transmitted for 76-100% of their STEMI runs, of which three RACs reported 100%.

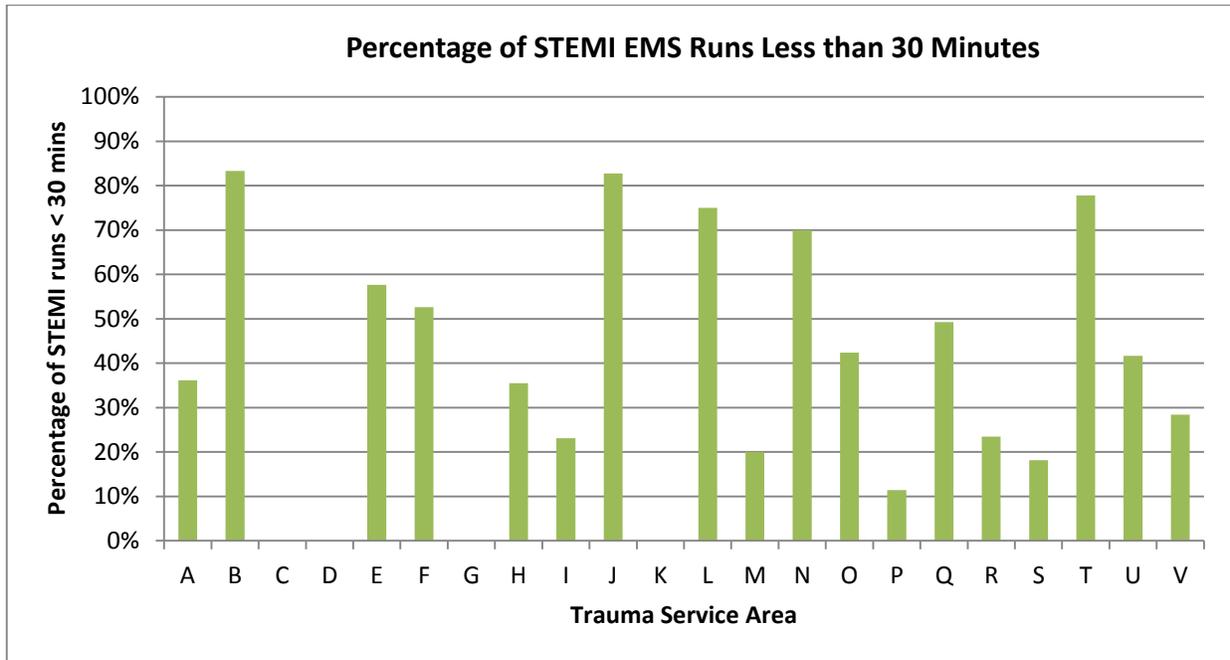


In a 2014 survey conducted on the STEMI system of care, twelve RACs responded that more than 80% of their EMS agencies had at least half of their units with 12 lead capabilities.

STEMI Transport

The RACs were surveyed to collect the number of STEMI runs for which the time from first field contact to the hospital was less than 30 minutes. **Figure 15** displays the percentage of STEMI EMS runs less than 30 minutes.

Figure 15. Percentage of STEMI EMS Runs Less than 30 Minutes



- Among the 19 RACs who reported complete data, 42% of all STEMI runs reported were less than 30 minutes.
- Three RACs did not report because they were unable to collect this data from stakeholders.
- 12 RACs reported that 50% or less of their STEMI runs were less than 30 minutes.
- Four RACs reported that 51-75% of their STEMI runs were less than 30 minutes.
- Three RACs reported that 76-100% of their STEMI runs were less than 30 minutes.

Conclusion

The Quarter 3 stroke and STEMI data reported by the RACs brings to light a number of important findings. It was found that 68% of RACs have five or fewer designated stroke facilities and PCI-capable hospitals in their TSAs. The resulting reliance on emergency medical services for stroke and STEMI patients is evident in the number of reported runs from January to September 2014 for each condition, 10,453 and 3,954, respectively.

Transport time continues to be a challenge in Texas, with a large geographical expanse. It was reported that less than half (34%) of reported stroke runs between July and September 2014 were less than two hours and 42% of STEMI runs were less than 30 minutes. Additionally, only about half (49%) of STEMI runs reported for July-September 2014 had a 12 lead ECG transmitted to the receiving hospital.

DSHS designated stroke facilities reported more stroke admissions for July- September 2014 (5,065) than did non-designated stroke facilities (918). Finally, the majority of RACs reported more patients receiving fibrinolytics than endovascular treatments during this time period.

Limitations

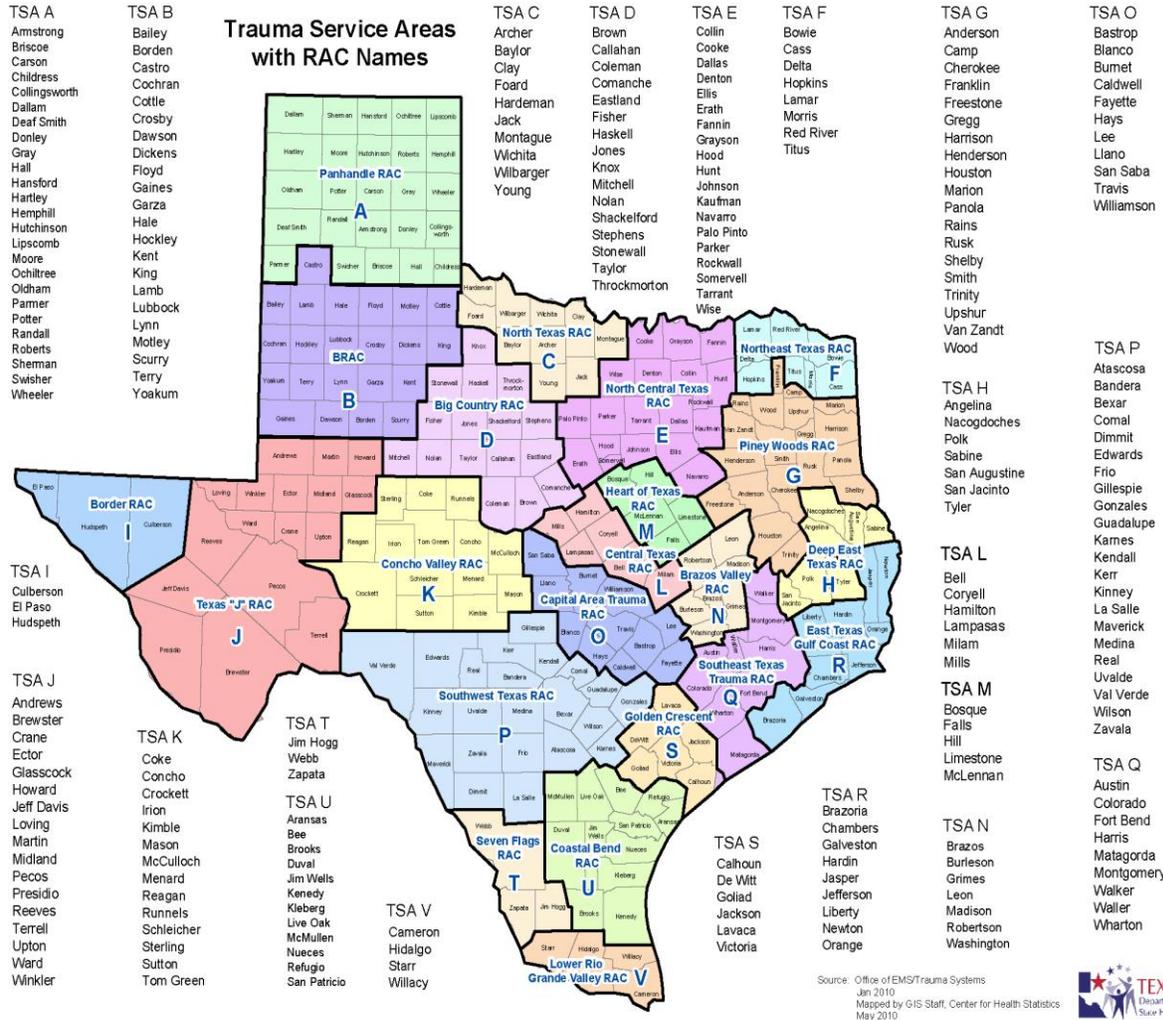
There were limitations to the data reported by the RACs. The RACs were dependent on not only their own data collection systems, but those of the EMS agencies and hospitals. Therefore, many RACs noted the difficulty in collecting the data from these stakeholders. Several barriers noted by RACs for collecting and reporting data included:

- EMS reporting software was not set up to collect the data being requested
- Low stakeholder participation and responsiveness
- Minimal RAC capacity to collect the data
- The data was not readily available to stakeholders
- Difficulty in identifying and/or contacting the correct person at each EMS agency or hospital to request data

Several RACs did not submit complete data for every data element that was requested. In order to gain an accurate understanding of the systems of care, it is important to have complete data. For this reason, many RACs have indicated they are working with the stakeholders in their TSAs to increase capability to collect and the report the data that is being requested. During follow up with the RACs, seven of them reported an increase of stakeholder participation (EMS and hospitals) for several quarter 3 reporting elements. The increase in stakeholder participation, has led to an increase in data reported by RACs.

Appendix A

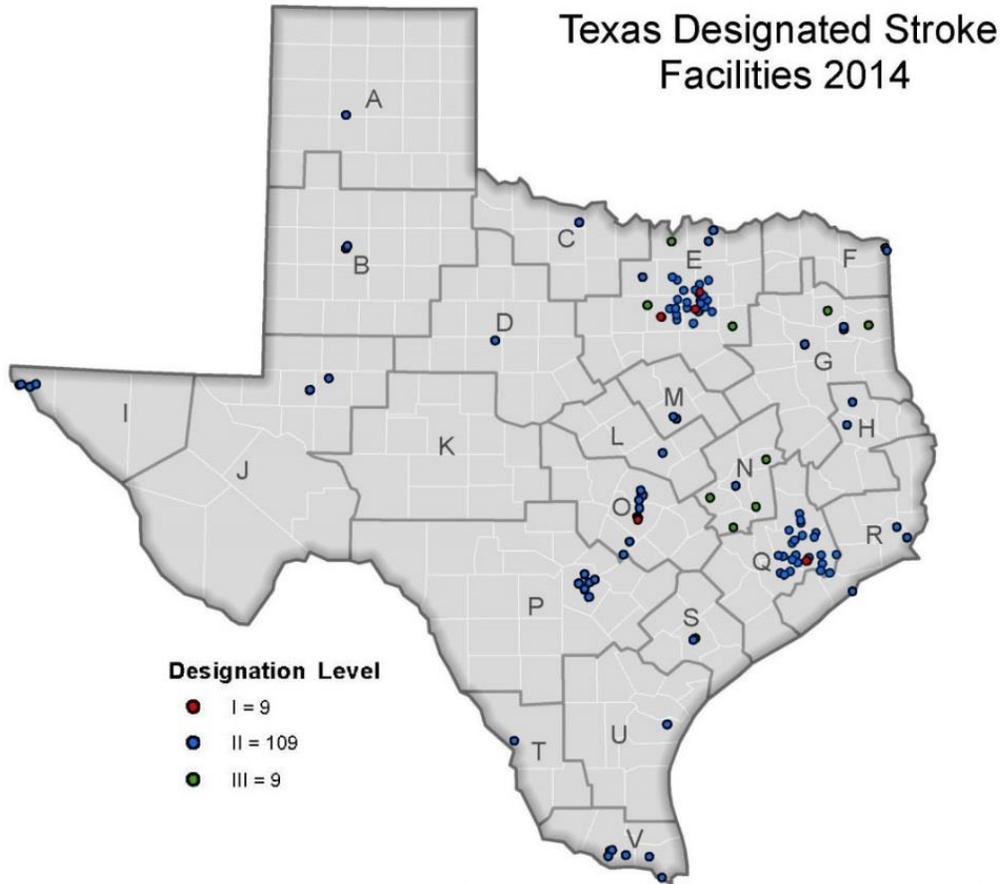
Figure 1. Map of Trauma Service Areas with RAC Names, October 2006



Source: Office of EMS/Trauma Systems, Jan 2010
 Mapped by GIS Staff, Center for Health Statistics, May 2010

Appendix B

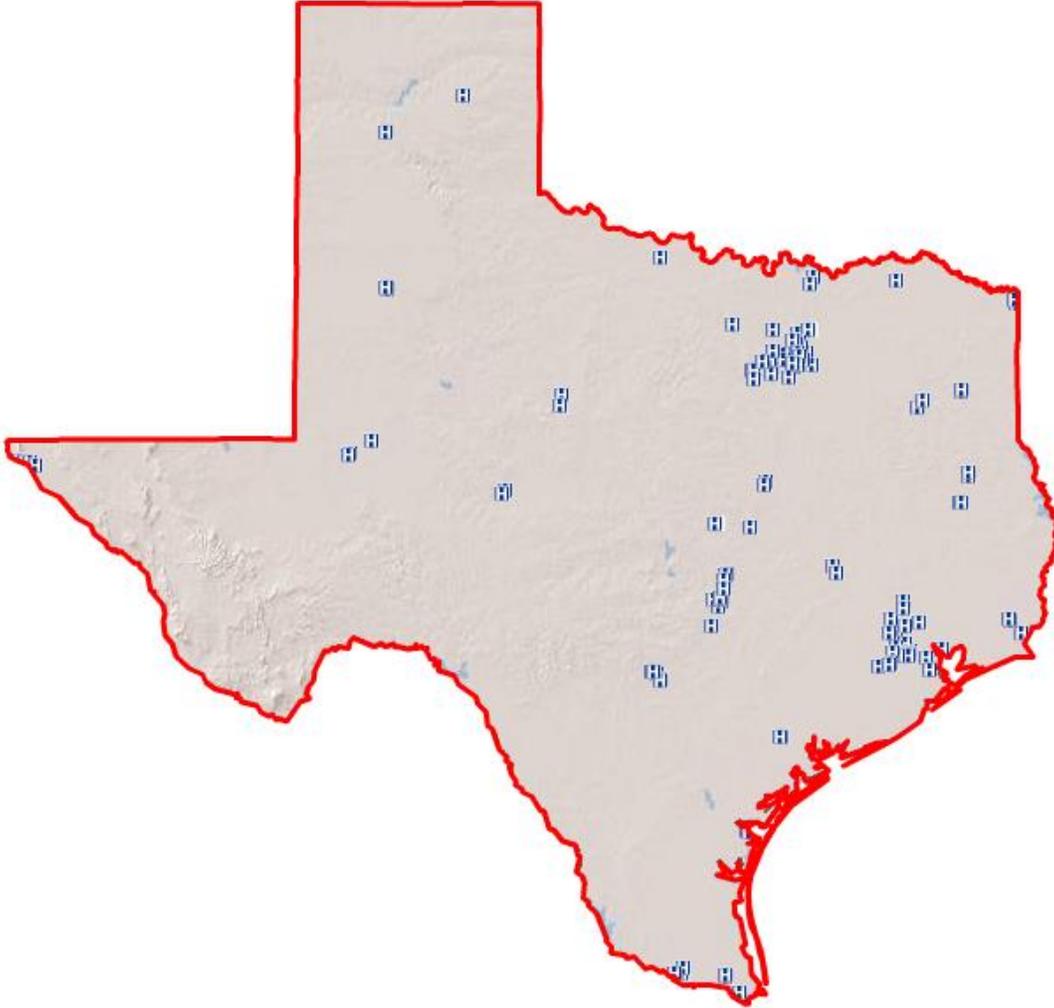
Figure 2. Map of Texas Designated Stroke Facilities by RAC, April 2014



Source: Office of EMS/Trauma Systems Coordination
Map Source: Center for Health Statistics, GIS, April 2014

Appendix C

Figure 11. Map of PCI-Capable Hospitals in Texas, October 2014



Source: www.heart.org/missionlifeline

References

1. 2012 Texas Mortality Data, Vital Statistics Unit, Center for Health Statistics, Texas Department of State Health Services.
2. American Heart Association. (2014). *Mission: Lifeline directory*. Retrieved from www.heart.org/missionlifeline.