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Texas Stroke Hospital Performance Measures

Stroke System of Care Report

Conducted to advance stroke reduction efforts, assess policies and practices regarding delivery of care across the state, and identify areas of opportunity for quality improvement



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



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EXECUTIVE SUMMARY

Between 2011 and 2013, the mean prevalence of stroke among adults in Texas was 2.6% (**Table 1**). In 2012, the annual age-adjusted hospitalization rate for stroke among Texas adults 18 years and older was 28.3 per 10,000 adults (data not shown). In order to advance stroke reduction efforts, it is important to analyze the system of care by collecting and analyzing data. During the 83rd Regular Texas Legislative Session, funds were appropriated to advance heart attack and stroke reduction efforts throughout Texas. To inform such efforts, the Texas Department of State Health Services (DSHS) has launched a heart attack and stroke data collection initiative.

To evaluate the care of patients diagnosed with a stroke, elements of care were assessed for timeliness and appropriateness. DSHS evaluated data collected from a group of hospitals that agreed to participate in this data collection initiative. The data is collected in the Get With The Guidelines[®]-Stroke database using the Quintiles PMT[®] system, and reflect hospital care from the **first quarter of 2008 through the fourth quarter of 2014**.

Substantial findings from these data are as follows:

- **40** participating hospitals provided data on individual episodes of care for stroke.
- Between 2008 and 2014, **54,966** cases of stroke were reported by participating hospitals.
- Among the **52,013** cases that occurred, **34.9%** of the patients were transported to the hospital by a private vehicle.
- **23%** of eligible patients with a diagnosis of ischemic stroke or stroke not otherwise specified (NOS) did not have a National Institutes of Health Stroke Scale (NIHSS) performed and reported.
 - The yearly percent trends ranged from a low of 44.2% in 2008 to a high of 91.3% in 2014. The number of hospitals reporting on this measure increased each year, increasing from 15 in 2008 to 40 hospitals overall.
- **42.4%** of eligible patients who arrived to the hospital within 3 hours of last known well did not receive a CT scan within 25 minutes of arrival.
 - The yearly percent trends ranged from a low of 39.3% in 2008 to a high of 66.7% in 2014. The number of hospitals reporting on this measure increased each year, increasing from 14 in 2008 to 39 hospitals overall.
- **55.7%** of eligible ischemic stroke patients did not receive IV tPA within 60 minutes of arriving at the hospital.
 - The yearly percent trends ranged from a low of 15.2% in 2008 to a high of 60.2% in 2014. The number of hospitals reporting on this measure increased each year, increasing from 11 in 2008 to 38 hospitals overall.
- **94.3%** of eligible patients who arrived within 2 hours of last known well (LKW) were treated within an hour of arrival to the hospital.
 - The yearly percent trends ranged from a low of 90.0% in 2008 to 96.2% in 2014. The number of hospitals reporting on this measure increased each year, increasing from 11 in 2008 to 39 hospitals overall.

- **37.6%** of eligible patients who arrived within 3.5 hours of LKW did not receive treatment within an hour of arrival to the hospital.
 - The yearly percent trends ranged from a low of 21.1% in 2008 to a high of 77.2% in 2014. The number of hospitals reporting on this measure increased each year, increasing from 12 in 2008 to 39 hospitals overall.
- **5%** of ischemic stroke case patients who received IV tPA or IA catheter-based treatment had bleeding complications after receiving thrombolytic therapy.
 - The yearly percent trends ranged from a low of 0.4% in 2008 to a high of 1.7% in 2009. The number of hospitals reporting on this measure increased each year, increasing from 13 in 2008 to 38 hospitals overall.
- **97.3%** of ischemic stroke patients eligible for stroke rehabilitation were assessed for rehabilitation services.
 - The yearly percent trends ranged from a low of 94.2% in 2009 to a high of 98.8% in 2014. The number of hospitals reporting on this measure increased each year, increasing from 16 in 2008 to 40 hospitals overall.
- Upon discharge from the hospital, **33%** were transferred to “other health care facility”, of which, more than half (58.9%) were discharged to an inpatient rehabilitation facility and approximately a third (33.9%) were transferred to a skilled nursing facility.

INTRODUCTION

A stroke occurs when a blood vessel that carries oxygen and nutrients to the brain is blocked by a clot or ruptures, leading to death of brain cells.³ The two most common types of stroke include ischemic stroke and hemorrhagic stroke. An ischemic stroke is caused when blood and oxygen to the brain is blocked by a clot in a blood vessel, and a hemorrhagic stroke is caused when a blood vessel ruptures, not allowing blood flow to the brain. An additional type of stroke, transient ischemic attack or TIA, is known as a “mini stroke” that is caused by a temporary clot in a blood vessel.³

BACKGROUND

In order to advance stroke reduction efforts, it is important to assess the system of care by collecting and analyzing data. During the 83rd Regular Texas Legislative Session, funds were appropriated to advance heart attack and stroke reduction efforts throughout Texas. To inform such efforts, the Texas Department of State Health Services (DSHS) has launched a heart attack and stroke data collection initiative. The data collection initiative focuses on pre-hospital and hospital data elements. This report includes de-identified, aggregate data for hospitals who have agreed to share Get With The Guidelines® (GWTG)-Stroke data with DSHS. All data is protected under Health Insurance Portability Accountability Act (HIPAA) guidelines. This aggregate data is intended to inform stakeholders about opportunities for collaboration and system enhancement. No hospital level data will be distributed, nor will any hospital name be identified in the report.

The objective of the data collection is to gain an understanding of the prevalence of stroke in Texas, evaluate pre-hospital components of the systems of care, and treatment of stroke patients. The findings will be used to assess policies and practices regarding delivery of care across the state and identify areas of opportunity for quality improvement.

STROKE IN TEXAS

Table 1 shows the unadjusted overall stroke prevalence trends among adults, 18 years and older in Texas, and stratifications by race-ethnicity and gender. Between 2011 and 2013, the mean prevalence of stroke among adults in Texas was 2.6%.

Across all the three years, when stratified by racial categories, Blacks had the highest prevalence of stroke and Hispanics had the lowest. However, prevalence among Blacks reduced from 5.1% in 2011 to 3.6% in 2013. There was no statistical difference in prevalence of stroke by gender.

Table 1. Unadjusted prevalence, Adults, 18 years and older, 2011, 2012 and 2013

	% of Adults (95% CI)	% of Adults (95% CI)	% of Adults (95% CI)
	Year 2011	Year 2012	Year 2013
Total	2.7 (2.3-3.0)	2.7 (2.3-3.1)	2.5 (2.1-2.9)

Non-Hispanic White	2.8 (2.3-3.2)	3.2 (2.7-3.8)	3.0 (2.5-3.6)
Non-Hispanic Black	5.1 (3.1-7.0)	4.0 (2.5-5.5)	3.6 (1.9-5.1)
Hispanic	1.8 (1.1-2.4)	1.5 (0.9-2.0)	1.6 (1.0-2.2)
Men	2.4 (1.9-3.0)	2.9 (2.2-3.5)	2.5 (1.9-3.1)
Women	2.9 (2.4-3.4)	2.5 (2.0-3.0)	2.5 (2.0-3.0)

Abbreviations: CI, confidence interval.

According to the 2013 Texas Behavioral Risk Factor Surveillance System (BRFSS) survey, an estimated 86.9% of adults in Texas said they would call 911 if they thought someone was having a heart attack or stroke. The remaining 13.1% of adults said they would take other action, such as taking the person to the hospital, telling them to call their doctor, call their spouse or family member, or do something else.

In 2012, the annual age-adjusted hospitalization rate for stroke among Texas adults 18 years and older was 28.3 per 10,000 adults (data not shown). During 2012, the overall age-adjusted death rate due to stroke was 42.6 per 100,000 adults. Among various racial groups, Blacks were more likely to die of stroke (61.9 per 100,000) as compared to other racial groups. Women were slightly more likely to die of stroke as compared to men (**Table 2**).

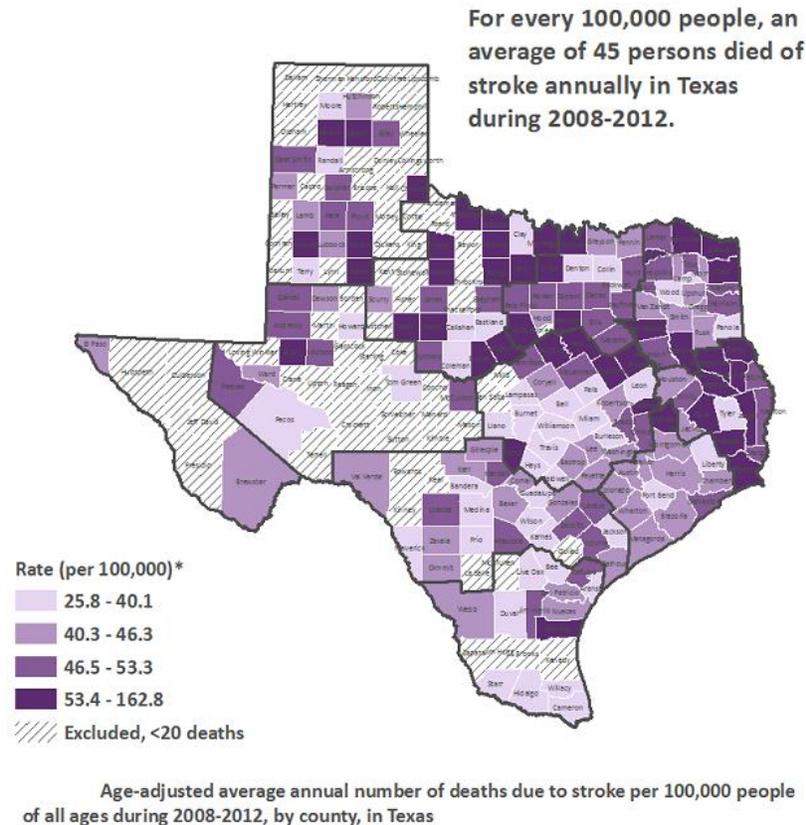
Table 2. Age-adjusted death rates for stroke (2012): overall, by race-ethnicity, gender

	Annual deaths per 100,000 adults (95% CI)
Overall	42.6 (41.7-43.5)
Non-Hispanic White	42.1 (41.0-43.2)
Non-Hispanic Black	61.9 (58.5-65.4)
Hispanic	36.5 (34.8-38.2)
Other	30.0 (26.3 -33.8)
Men	41.2 (39.9-42.5)
Women	43.1 (41.9-44.2)

Abbreviations: CI, confidence interval.

Looking at the geographic distribution of death rates, the highest rates appear to emerge in counties located in north and east Texas (**Figure 1**).

Figure 1. Age-adjusted average annual number of deaths due to stroke per 100,000 people of all ages during 2008-2012, by county, in Texas



EVALUATING HOSPITAL CARE FOR STROKE IN TEXAS

In an ideal system of care, all patients should receive proper care with minimal delays to treatment. To evaluate the care of patients diagnosed with a stroke, elements of care were assessed for timeliness and appropriateness.

DSHS evaluated data collected from a group of hospitals that agreed to participate in this data collection initiative. The data is collected in the Get With The Guidelines®-Stroke database using the Quintiles PMT® system, and reflect hospital care from the **first quarter of 2008 through the fourth quarter of 2014**. Findings from these data are as follows:

- **40** participating hospitals provided data on individual episodes of care for stroke.
- Between 2008 and 2014, **54,966** cases of stroke were reported by participating hospitals. **Table 3** on the following page includes the number of stroke cases reported by these participating hospitals each year.

- Among the **52,013** cases that occurred, **34.9%** of the patients were transported to the hospital by a private vehicle.

Table 3. Site participation by year

Year	Participating sites	Reported stroke cases
2008	16	4,375
2009	22	5,052
2010	27	6,607
2011	30	7,465
2012	34	8,810
2013	37	10,837
2014	40	11,820

Table 4 shows the distribution of stroke patients by type of stroke. Ischemic stroke (65.4%) was the most common type of stroke among Texas adults 18 years and older. Other stroke types included transient ischemic attack (TIA) (15.1%) and intracerebral hemorrhage (10.2%).

Table 4. Distribution of stroke patients by type of stroke

Stroke Type	Reported number of stroke cases (% of stroke cases)
Ischemic Stroke	35,880 (65.4)
Transient Ischemic Attack (< 24 hours)	8,282 (15.1)
Subarachnoid Hemorrhage	1,988 (3.6)
Intracerebral Hemorrhage	5,565 (10.2)
Stroke not otherwise specified	783 (1.4)
No stroke related diagnosis	674 (1.2)
Elective Carotid Intervention only	1,653 (3.0)
Missing	141

Table 5 shows the demographic characteristics of patients reported between 2008 and 2014. Median age of the stroke patients was 69 years. Slightly more than half of the patients (51.7%) in the database were women (n=28,399).

Table 5. Demographic characteristics of stroke patients, 2008-2014

<u>Age (years)</u>	
Median	69
Interquartile range	22
<u>Gender</u>	
Men	26,500 (48.3%)
Women	28,399 (51.7%)

The graphs and tables that follow display data for specific reporting, quality, and achievement measures for effective care for stroke patients. We have also included yearly percent trends (2008 – 2014) for the listed reporting, quality and achievement measures of care for stroke patients. Additional information, including data source, inclusion criteria, and exclusion criteria, can be found in Appendix I. The measures include:

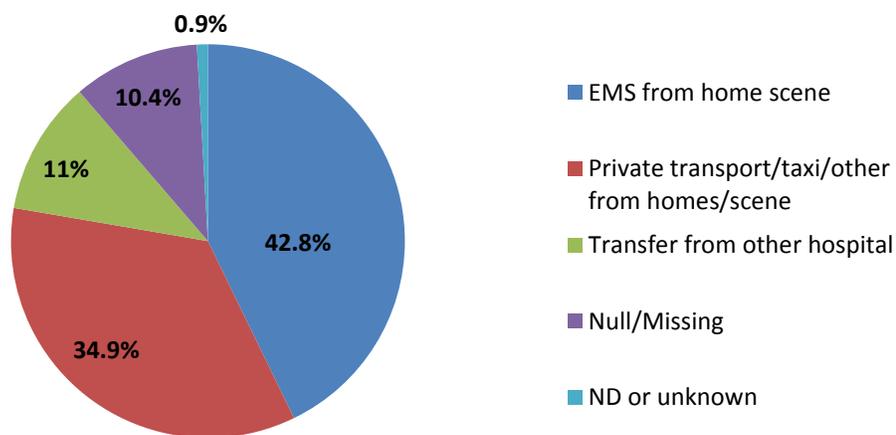
1. Arrival mode
2. National Institutes of Health Stroke Scale (NIHSS) reported
3. Time to initial brain imaging
4. Time to IV thrombolytic therapy
5. IV tPA arrive by 2 hours, treat by 3 hours
6. IV tPA arrive by 3.5 hours, treat by 4.5 hours
7. Drip and ship therapy
8. Endovascular therapy
9. Thrombolytic complications
10. Rehabilitation considered
11. Discharge disposition

ARRIVAL MODE

Time to treatment can have a significant effect on stroke patient survival rate and potential disability. For that reason, the mode of arrival for stroke patients is important to evaluate. Transport protocols should be in place for EMS units to take a suspected stroke patient to a hospital with the appropriate level of stroke care, whereas patients who arrive by private vehicle may be taken to a hospital that does not meet their medical and treatment needs.⁴

Figure 2 below displays the percentage of stroke patients grouped by their mode of arrival to the hospital.

Figure 2. Percentage of patients by mode of arrival to the hospital



Between 2008 and 2014, the most common mode of arrival was EMS from home/scene (42.8%), followed by private transport/taxi/other method from home or scene (34.9%). **Figure 3** and **Table 6** display the yearly trends in percentage of stroke patients grouped by their mode of arrival to the hospital.

Figure 3. Arrival mode for stroke patients by year

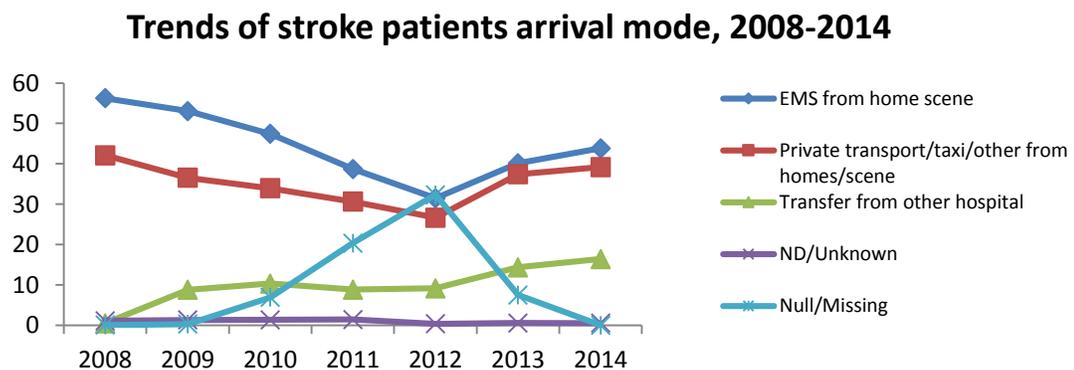


Table 6. Arrival mode for stroke patients by year

Year	Total stroke cases (n)	Stroke cases arriving via EMS	% of total stroke cases arriving via EMS	Stroke cases arriving via private transport	% of total stroke cases arriving via private transport	Stroke cases transferred from other hospital	% of total stroke cases transferred from other hospital	Reporting hospitals (n)
2008	4357	2450	56.2	1834	42.1	21	0.5	16
2009	5006	2656	53.1	1829	36.6	439	8.8	22
2010	6443	3056	47.4	2188	33.9	667	10.4	27
2011	7267	2812	38.7	2227	30.7	643	8.9	30
2012	8450	2659	31.5	2254	26.7	773	9.2	34
2013	9867	3959	40.1	3691	37.4	1416	14.4	37
2014	10623	4656	43.8	4163	39.2	1744	16.4	40

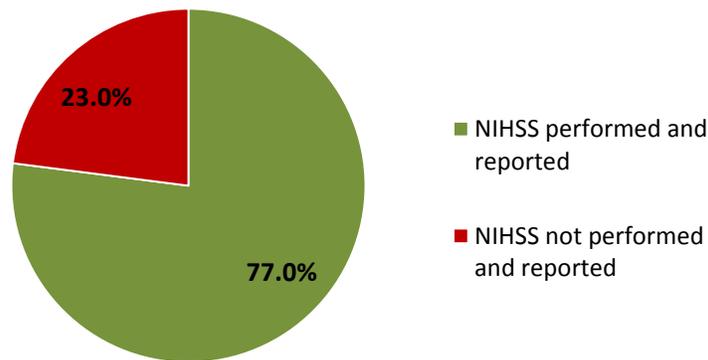
Between 2008 and 2014, the percent of patients who arrived by EMS ranged from a low of 31.5% in 2012 to a high of 56.2% in 2008. In the same time period, the percent of patients who were transferred in from another hospital ranged from a low of 0.5% in 2008 to a high of 16.4% in 2014. The number of hospitals reporting on this measure increased each year, increasing from 16 to 40 overall. Opportunities may exist to understand why Texans use private transportation methods and to address identified barriers.

NATIONAL INSTITUTES OF HEALTH STROKE SCALE (NIHSS) REPORTED

When a stroke patient arrives at a hospital, it is standard to conduct a clinical stroke assessment, such as the NIHSS, to evaluate the patient. The NIHSS allows healthcare providers to assess stroke-related neurologic deficit and severity and identify the most appropriate level of treatment and care.⁴

Figure 4 below displays the percent of ischemic stroke and stroke not otherwise specified (NOS) patients with a NIHSS score reported.

Figure 4. Percent of ischemic stroke and stroke not otherwise specified patients with a score reported for the NIH Stroke Scale (Initial)



Between 2008 and 2014, there were a total of 23% of eligible patients with a diagnosis of ischemic stroke or stroke NOS who did not have a NIHSS performed and reported. NIHSS was performed as part of an initial evaluation and a total score was reported for 77% (n=26,343) of eligible patients. Opportunities may exist for improving the implementation and reporting of NIHSS for stroke patients.

Figure 5 and **Table 7** below display the percent of ischemic stroke and stroke not otherwise specified (NOS) patients with a NIHSS score reported by year.

Figure 5. NIH Stroke Scale (initial) score reported among ischemic stroke and stroke not otherwise specified patients by year

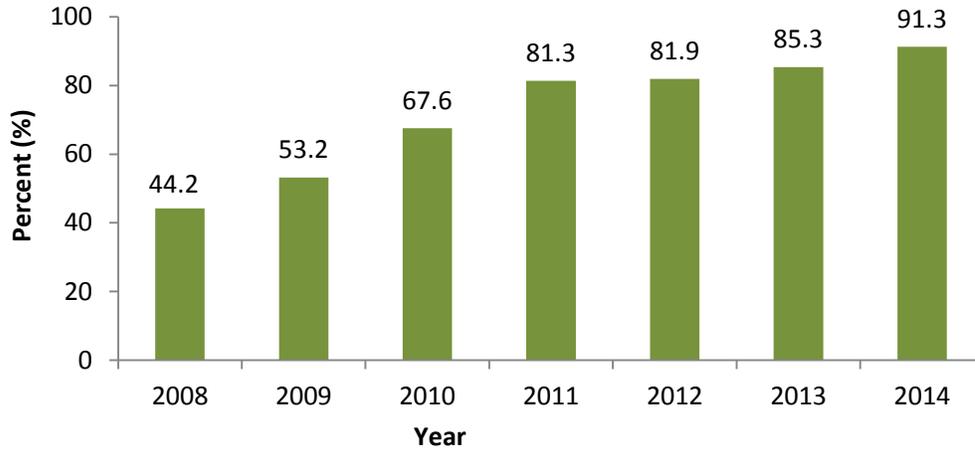


Table 7. NIH Stroke Scale (initial) score reported among ischemic stroke and stroke not otherwise specified patients by year

Year	Ischemic stroke and stroke (NOS) cases (n)	Ischemic stroke and stroke NOS cases with NIHSS performed and reported	% of Ischemic stroke and stroke NOS cases with NIHSS performed and reported	Reporting hospitals (n)
2008	2783	1230	44.2	15
2009	3025	1608	53.2	22
2010	4264	2882	67.6	27
2011	4916	3997	81.3	30
2012	5650	4628	81.9	34
2013	6379	5442	85.3	36
2014	7182	6556	91.3	40

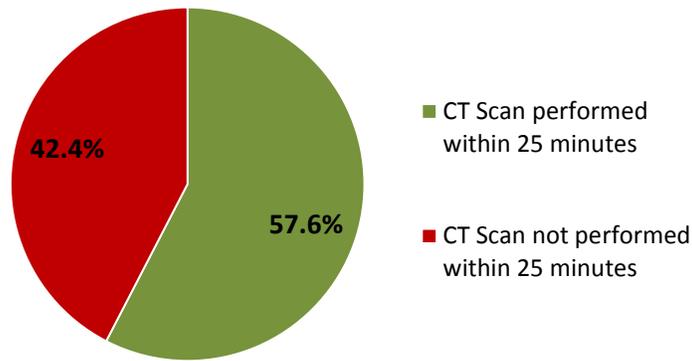
Between 2008 and 2014, the number of hospitals reporting on this measure increased each year, increasing from 15 to 40 hospitals overall. The percent of eligible patients with a diagnosis of ischemic stroke or stroke NOS who received an NIHSS initial evaluation ranged from a low of 44.2% in 2008 to a high of 91.3% in 2014.

TIME TO INITIAL BRAIN IMAGING

Brain imaging or CT scan is used to identify the type and acuity of a stroke and to locate the blockage or clot.¹ A timely initial CT scan is vital to providing effective treatment for a stroke patient. A CT scan should be performed within 25 minutes of hospital arrival and interpreted within 45 minutes of arrival.⁴

Figure 6 on the following page displays the percent of patients who arrived within 3 hours of last known well and had a CT scan performed within 25 minutes of arrival.

Figure 6. Percent of patients with a CT scan performed within 25 minutes



Among eligible patients who arrived to the hospital within 3 hours of last known well (n=10,059), 42.4% (n=4,259) did not receive a CT scan within 25 minutes of arrival. Opportunities may exist for hospitals to reduce the time from ED arrival to CT scan to promote timely and effective stroke treatment. **Figure 7** and **Table 8** below display the percent of patients who arrived within 3 hours of last known well and had a CT scan performed within 25 minutes of arrival by year.

Figure 7. CT scan performed within 25 minutes of arrival among stroke patients (who arrived within three hours of last known well) by year

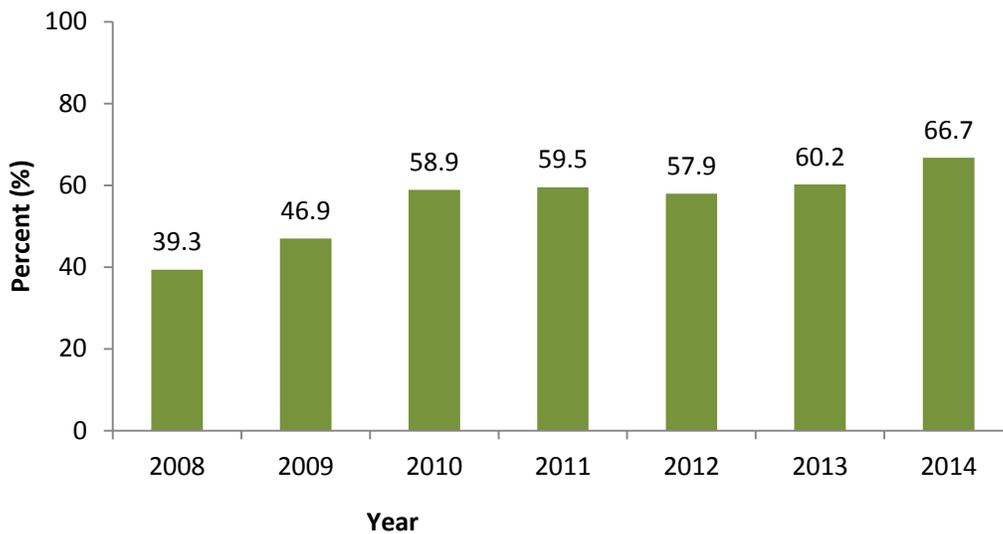


Table 8. CT scan performed within 25 minutes of arrival among stroke patients (who arrived within three hours of last known well) by year

Year	Stroke cases (n)	Stroke cases with CT scan performed within 25 minutes of arrival	% of stroke cases with CT scan performed within 25 minutes of arrival	Reporting hospitals (n)
2008	829	326	39.3	14
2009	1012	475	46.9	20
2010	1399	824	58.9	27
2011	1533	912	59.5	29
2012	1653	958	57.9	33
2013	1820	1095	60.2	37

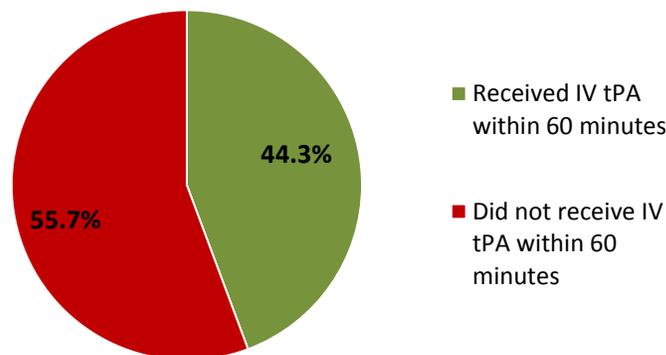
Between 2008 and 2014, the number of hospitals reporting on this measure increased each year, increasing from 14 to 39 hospitals overall. Among eligible patients who arrived to the hospital within 3 hours of last known well, the percent of patients who had a CT scan performed within 25 minutes of arrival ranged from a low of 39.3% in 2008 to a high of 66.7% in 2014.

TIME TO IV THROMBOLYTIC THERAPY

Thrombolytic therapy using intravenous tissue plasminogen activator (IV tPA) is the preferred reperfusion strategy for patients who have had an ischemic stroke where a blood vessel is blocked by a clot.⁴ Time to IV thrombolytic therapy, often referred to as door-to-needle time, is a significant measure that encompasses multiple elements within the stroke system of care, from first medical contact to arrival at the hospital, time in ED to CT scan, and initiation of thrombolytic therapy. An ischemic stroke patient should receive IV tPA within 60 minutes of arriving at the hospital.⁴

Figure 8 below includes the percent of acute ischemic stroke patients who received IV tPA within 60 minutes of arrival time.

Figure 8. Percent of patients who received IV tPA within 60 minutes of hospital arrival



Among eligible ischemic stroke patients (n=3,014), 55.7% (n= 1,678) did not receive IV tPA within 60 minutes of arriving in the ED. There is a significant gap in care across the participating hospitals, as more than half of the patients did not receive treatment in a timely manner. This presents an opportunity for standardization of protocols and care across systems, as treatment delay may negatively affect patient outcomes. **Figure 9** and **Table 9** on the following page display the percent of acute ischemic stroke patients who received IV tPA within 60 minutes of arrival to the hospital by year.

Figure 9. IV tPA received within 60 minutes of arrival among ischemic stroke patients by year

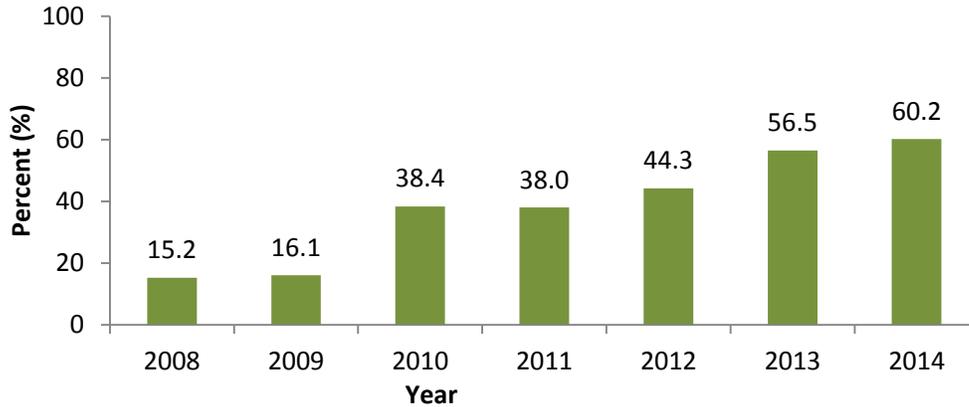


Table 9. IV tPA received within 60 minutes of arrival among ischemic stroke patients by year

Year	Ischemic stroke cases (n)	Ischemic stroke cases receiving IV tPA within 60 minutes of arrival	% Ischemic stroke cases receiving IV tPA within 60 minutes of arrival	Reporting hospitals (n)
2008	138	21	15.2	11
2009	230	37	16.1	16
2010	422	162	38.4	24
2011	542	206	38.0	28
2012	515	228	44.3	28
2013	556	314	56.5	35
2014	611	368	60.2	38

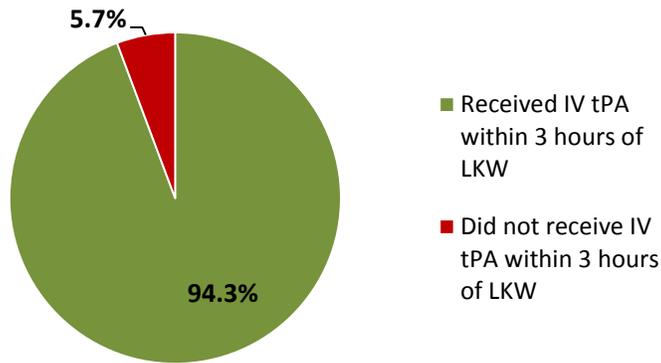
Between 2008 and 2014, the number of hospitals reporting on this measure increased each year, increasing from 11 to 38 hospitals overall. Among eligible ischemic stroke patients, the percent of patients who received IV tPA within 60 minutes of arriving at the hospital ranged from a low of 15.2% in 2008 to a high of 60.2% in 2014.

IV tPA ARRIVE BY 2 HOURS, TREAT BY 3 HOURS

A critical component when evaluating a stroke patient is identifying last known well (LKW), or the time at which a patient was last known to be without the signs and symptoms of a stroke. Ischemic stroke patients, who arrive at the hospital within two hours of LKW, should be treated within an hour of arrival, or three hours of LKW.⁴

Figure 10 on the following page displays the percent of acute ischemic stroke patients who arrived at the hospital within 2 hours of LKW and were treated with IV tPA within 3 hours of LKW.

Figure 10. Percent of patients who arrived by 2 hours of LKW and were treated by 3 hours of LKW



Among eligible patients who arrived within 2 hours of LKW (n=2,847), 94.3% (n=2,685) were treated within an hour of arrival to the hospital. **Figure 11** and **Table 10** below display the percent of acute ischemic stroke patients who arrived at the hospital within 2 hours of LKW and were treated with IV tPA within 3 hours of LKW by year.

Figure 11. IV tPA received within 3 hours of LKW among ischemic stroke patients who arrived within 2 hours of LKW by year

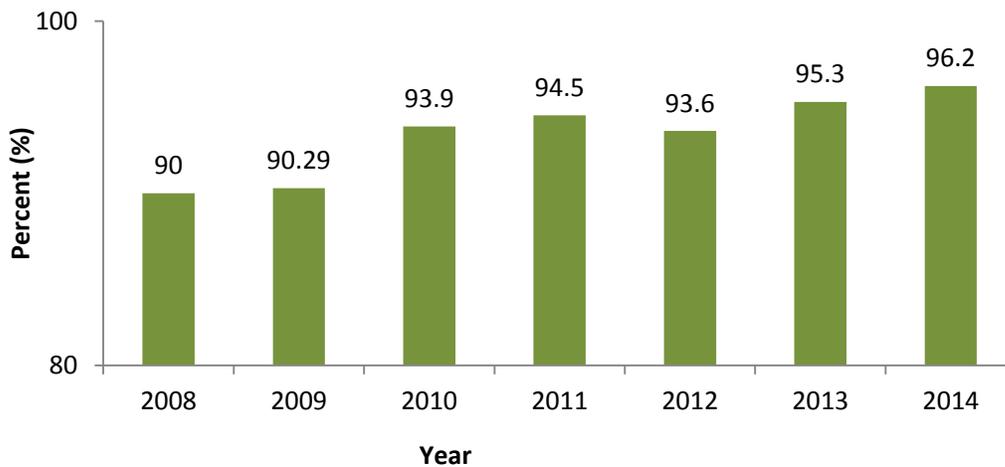


Table 10. IV tPA received within 3 hours of LKW among ischemic stroke patients who arrived within 2 hours of LKW by year

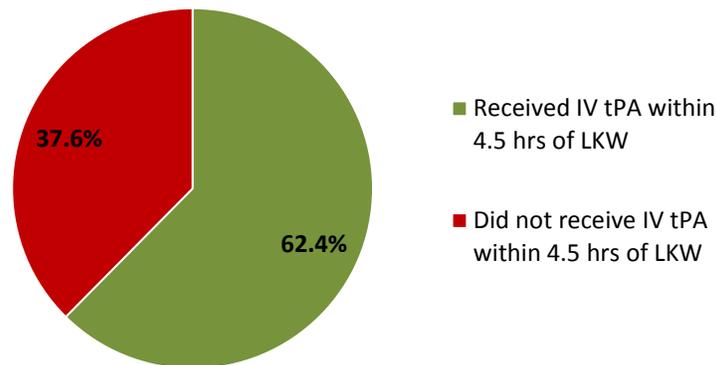
Year	Ischemic stroke cases (n)	Ischemic stroke cases arriving in 2 hours of LKW and receiving IV tPA within 3 hours LKW	% of Ischemic stroke cases arriving in 2 hours of LKW and receiving IV tPA within 3 hours LKW	Reporting hospitals (n)
2008	130	117	90.0	11
2009	206	186	90.3	16
2010	359	337	93.9	24
2011	456	431	94.5	28
2012	486	455	93.6	31
2013	574	547	95.3	34
2014	636	612	96.2	39

Between 2008 and 2014, the number of hospitals reporting on this measure increased each year, increasing from 11 to 39 hospitals overall. The percent of eligible patients who arrived within 2 hours of LKW and were treated within an hour of arrival to the hospital ranged from a low of 90.0% in 2008 to 96.2% in 2014.

IV tPA ARRIVE BY 3.5 HOURS, TREAT BY 4.5 HOURS

Patients who arrive within 3.5 hours of LKW should be treated with IV tPA within an hour of arrival, or 4.5 hours of LKW.⁴ **Figure 12** below represents the percent of acute ischemic stroke patients who arrived at the hospital within 3.5 hours of LKW and were treated with IV tPA within 4.5 hours of LKW.

Figure 12. Percent of patients who arrived by 3.5 hours of LKW and were treated by 4.5 hours of LKW



Among eligible patients who arrived within 3.5 hours of LKW (n=5,363), 37.6% (n=2,019) did not receive treatment within an hour of arrival to the hospital. Treatment with IV tPA was initiated within an hour of arrival for 62.4% (n=3,344) of patients who arrived within 3.5 hours of LKW. There is a significant decline in treatment within an hour of arrival for patients who arrive within 3.5 hours of LKW (62.4%) as compared to those who arrive within 2 hours of LKW (94.3%). An opportunity exists to standardize care for ischemic stroke patients who arrive after 2 hours of LKW, as they have already lost crucial time which can have adverse effects on health outcomes. **Figure 13**, below, and **Table 11** on the following page represent the percent of acute ischemic stroke patients who arrived at the hospital within 3.5 hours of LKW and were treated with IV tPA within 4.5 hours of LKW by year.

Figure 13. IV tPA received within 4.5 hours of LKW among ischemic stroke patients who arrived within 3.5 hours of LKW by year

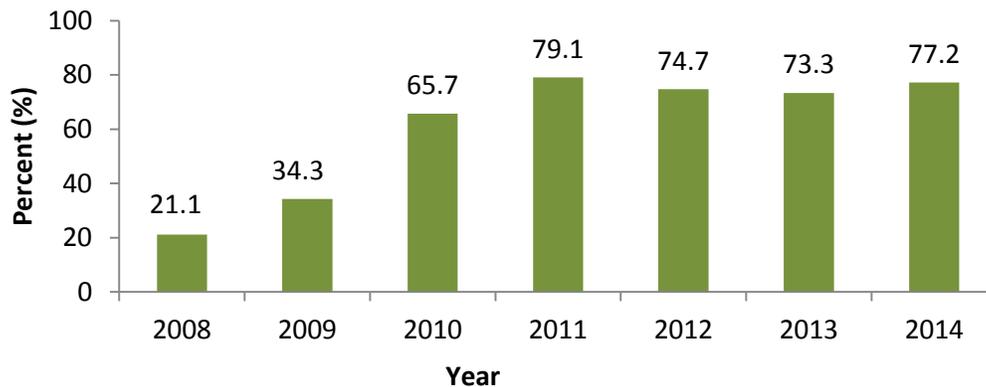


Table 11. IV tPA received within 4.5 hours of LKW among ischemic stroke patients who arrived within 3.5 hours of LKW by year

Year	Ischemic stroke cases (n)	Ischemic stroke cases arriving in 3.5 hours of LKW and receiving IV tPA within 4.5 hours LKW	% of Ischemic stroke cases arriving in 3.5 hours of LKW and receiving IV tPA within 4.5 hours LKW	Reporting hospitals (n)
2008	638	134	21.1	12
2009	671	230	34.3	20
2010	636	418	65.7	26
2011	719	533	74.1	28
2012	754	563	74.7	33
2013	939	688	73.3	36
2014	1008	778	77.2	39

Between 2008 and 2014, the number of hospitals reporting on this measure increased each year, increasing from 12 to 39 hospitals overall. The percent of eligible patients who arrived within 3.5 hours of LKW and received treatment within an hour of arrival to the hospital ranged from a low of 21.1% in 2008 to a high of 77.2% in 2014.

DRIP AND SHIP THERAPY

Drip and ship denotes ischemic stroke patients where IV tPA was initiated in an emergency department (ED) of a community hospital, followed by transfer to a comprehensive stroke center (**Table 12**).

Table 12. Number of patients who received IV tPA at a community hospital

Number of ischemic stroke patients	Number who received IV tPA at a community hospital (%)
34,751	442 (1.3%)

Among 34,751 patients with ischemic stroke, 442 patients (1.3%) had received IV tPA which was initiated at a community hospital. **Figure 14**, below, and **Table 13** on the following page display the percent of ischemic stroke patients where IV tPA was initiated in an emergency department (ED) of a community hospital, followed by transfer to a comprehensive stroke center by year.

Figure 14. Drip and ship therapy among ischemic stroke patients by year

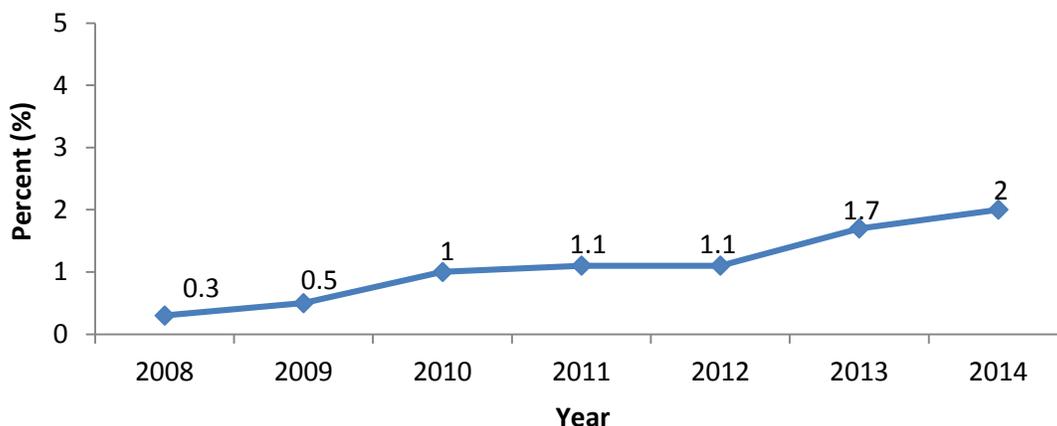


Table 13. Drip and ship therapy among ischemic stroke patients by year

Year	Ischemic stroke cases (n)	Ischemic stroke cases receiving IV tPA at a community hospital and transferred to a comprehensive stroke center	% of Ischemic stroke cases receiving IV tPA at a community hospital and transferred to a comprehensive stroke center	Reporting hospitals (n)
2008	2715	8	0.3	13
2009	3092	17	0.5	21
2010	4446	44	1	26
2011	4787	51	1.1	28
2012	5844	64	1.1	32
2013	6515	110	1.7	34
2014	7352	148	2	38

Between 2008 and 2014, the number of hospitals reporting on this measure increased each year, increasing from 13 to 38 hospitals overall. The percent of ischemic stroke patients receiving IV tPA in the ED of a community hospital prior to being transferred to a comprehensive stroke center ranged from a low of 0.3% in 2008 to a high of 2% in 2014.

ENDOVASCULAR THERAPY

Endovascular therapy includes patients with a clinical diagnosis of ischemic stroke that received IA catheter-based treatment either at the ED, as an inpatient, or at an outside hospital (Table 14).

Table 14. Number of patients who received endovascular therapy

Number of ischemic stroke patients	Number who received IA-catheter based reperfusion* (%)
34,751	342 (0.98%)

*either at the ED, as an inpatient, or at an outside hospital

Among 34,751 patients with ischemic stroke, 342 patients (0.98%) received IA-catheter based reperfusion either at ED, as an inpatient or outside the hospital. **Figure 15**, below, and **Table 15** on the following page display the percent of endovascular therapy among ischemic stroke patients by year.

Figure 15. Endovascular therapy among ischemic stroke patients by year

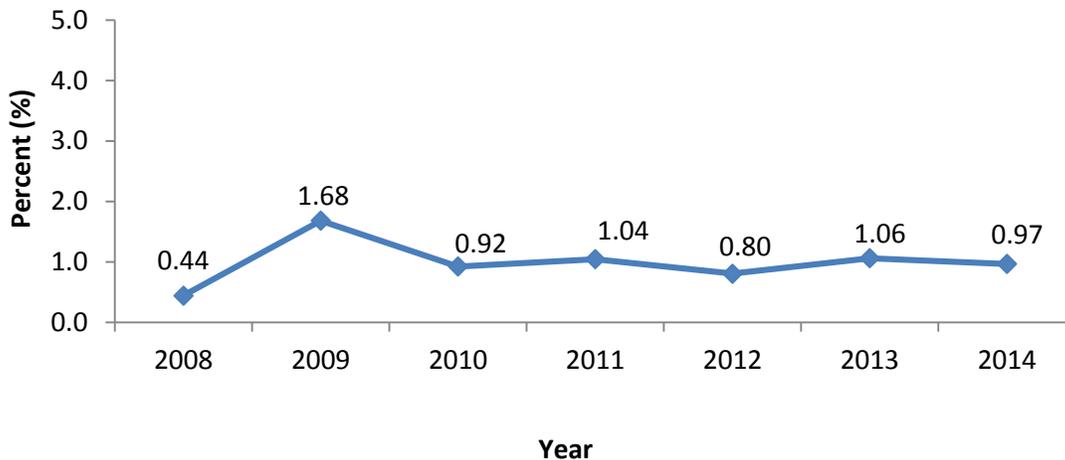


Table 15. Endovascular therapy among ischemic stroke patients by year

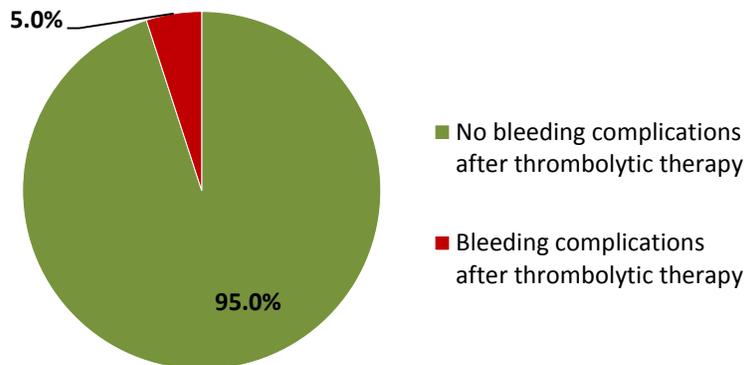
Year	Ischemic stroke cases (n)	Ischemic stroke cases receiving IA-catheter based reperfusion	% of Ischemic stroke cases receiving IA-catheter based reperfusion	Reporting hospitals (n)
2008	2715	12	0.4	13
2009	3092	52	1.7	21
2010	4446	41	0.9	26
2011	4787	50	1.0	28
2012	5844	47	0.8	32
2013	6515	69	1.1	34
2014	7352	71	0.9	38

Between 2008 and 2014, the number of hospitals reporting on this measure increased each year, increasing from 13 to 38 hospitals overall. The percent of ischemic stroke patients who received endovascular therapy ranged from a low of 0.4% in 2008 to a high of 1.7% in 2009.

THROMBOLYTIC COMPLICATIONS

Thrombolytic complications describe the percent of ischemic stroke patients with bleeding complications after thrombolytic therapy was received at the hospital. **Figure 16** below shows the percent of ischemic stroke patients with bleeding complications after thrombolytic therapy was received.

Figure 16. Percent of ischemic stroke patients with thrombolytic complications



Approximately 9.7% (n=3,395) of the ischemic cases (34,751) received IV tPA or IA catheter based treatment at the hospital. Among ischemic stroke case patients who received IV tPA or IA catheter-based treatment, 5% of cases (n=170) had bleeding complications after receiving thrombolytic therapy. **Figure 17** and **Table 16** on the following page show the percent of ischemic stroke patients with bleeding complications after receiving thrombolytic therapy by year.

Figure 17. Thrombolytic complications after receiving thrombolytic therapy among ischemic stroke patients by year

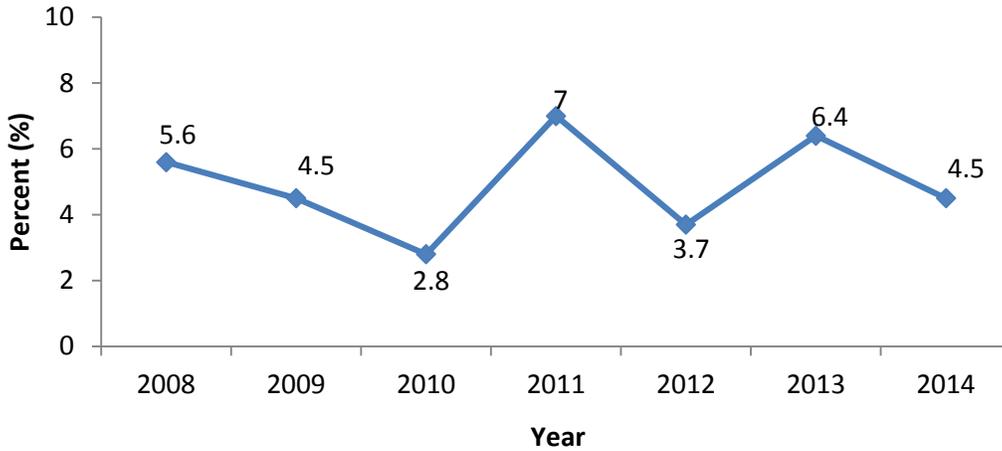


Table 16. Thrombolytic complications after receiving thrombolytic therapy among ischemic stroke patients by year

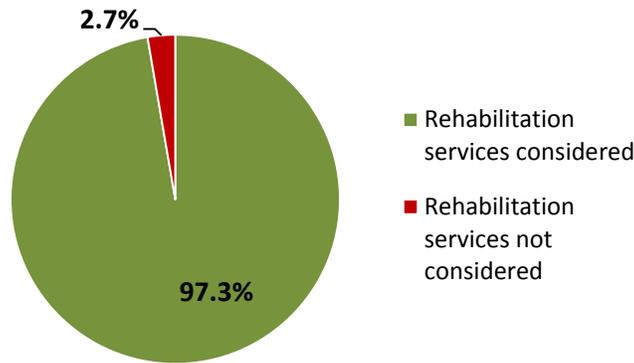
Year	Ischemic stroke cases (n)	Ischemic stroke cases with bleeding complications after thrombolytic therapy	% of Ischemic stroke cases with bleeding complications after thrombolytic therapy	Reporting hospitals (n)
2008	143	8	5.6	11
2009	269	12	4.5	19
2010	471	13	2.8	24
2011	575	40	7.0	26
2012	592	22	3.7	31
2013	762	49	6.4	34
2014	893	40	4.5	37

Between 2008 and 2014, the number of hospitals reporting on this measure increased each year, increasing from 13 to 38 hospitals overall. The percent of ischemic stroke patients who received endovascular therapy ranged from a low of 0.4% in 2008 to a high of 1.7% in 2009.

REHABILITATION CONSIDERED

Several factors, including severity of the stroke and timely treatment, can affect health outcomes and recovery for stroke patients, including a stroke survivor’s functionality in terms of speech, language, and physical ability.² In order to achieve the best results, clinicians should consider all stroke patients for rehabilitative services.⁵ **Figure 18** on the following page displays the percent of patients with stroke who were assessed for rehabilitation services.

Figure 18. Percent of patients who were assessed for rehabilitative services



Among ischemic stroke patients eligible for stroke rehabilitation (n= 32,486), 97.3% (n=31,602) were assessed for rehabilitation services. **Figure 19** and **Table 17** below display the percent of patients with stroke who were assessed for rehabilitation services by year.

Figure 19. Rehabilitation considered for stroke patients by year

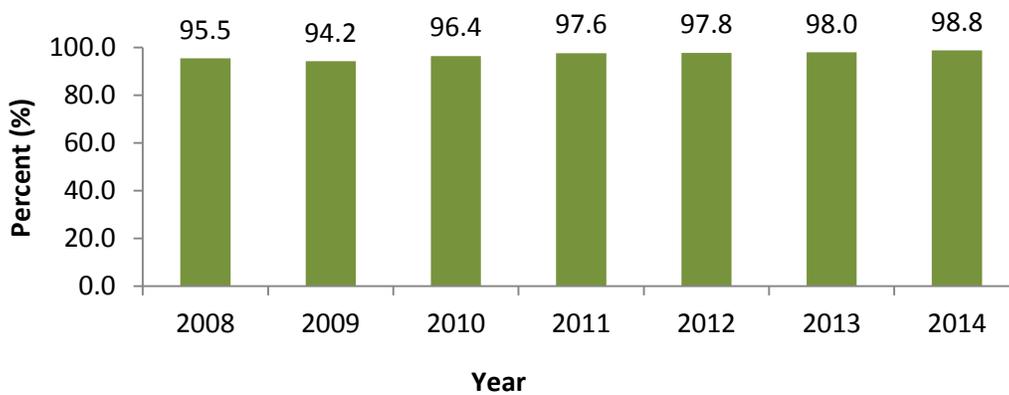


Table 17. Rehabilitation considered for stroke patients by year

Year	Ischemic stroke cases (n)	Ischemic stroke cases considered for rehabilitation	% of Ischemic stroke cases considered for rehabilitation	Reporting hospitals (n)
2008	2852	2723	95.5	16
2009	3336	3143	94.2	22
2010	4591	4425	96.4	27
2011	5044	4925	97.6	29
2012	5748	5620	97.8	34
2013	6584	6452	98.0	37
2014	7446	7355	98.8	40

Between 2008 and 2014, the number of hospitals reporting on this measure increased each year, increasing from 16 to 40 hospitals overall. The percent of stroke patients who were assessed for rehabilitative services ranged from a low of 94.2% in 2009 to a high of 98.8% in 2014.

DISCHARGE DISPOSITION

The discharge disposition, or the plan for healthcare after discharge from the hospital, can provide an indication of the severity and extent of disability of a stroke patient.

Figure 20 below shows the patient's discharge disposition on the day of discharge. The figure only includes patients who were discharged on or after April 1, 2011, as this was not a reportable field in the stroke database until 2011. If the patient was transferred to other health care facility, **Figure 21** below shows the type of health care facility to which the patient was transferred.

Figure 20. Discharge disposition of stroke patients, discharged on or after April 1, 2011

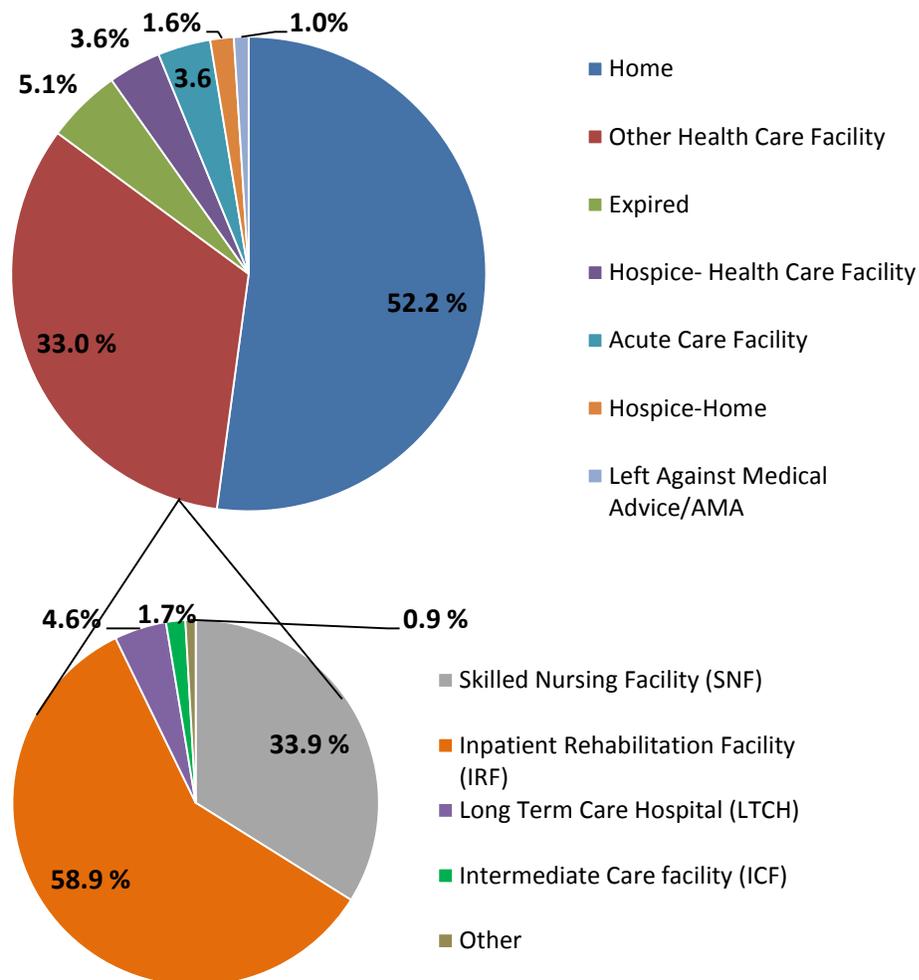
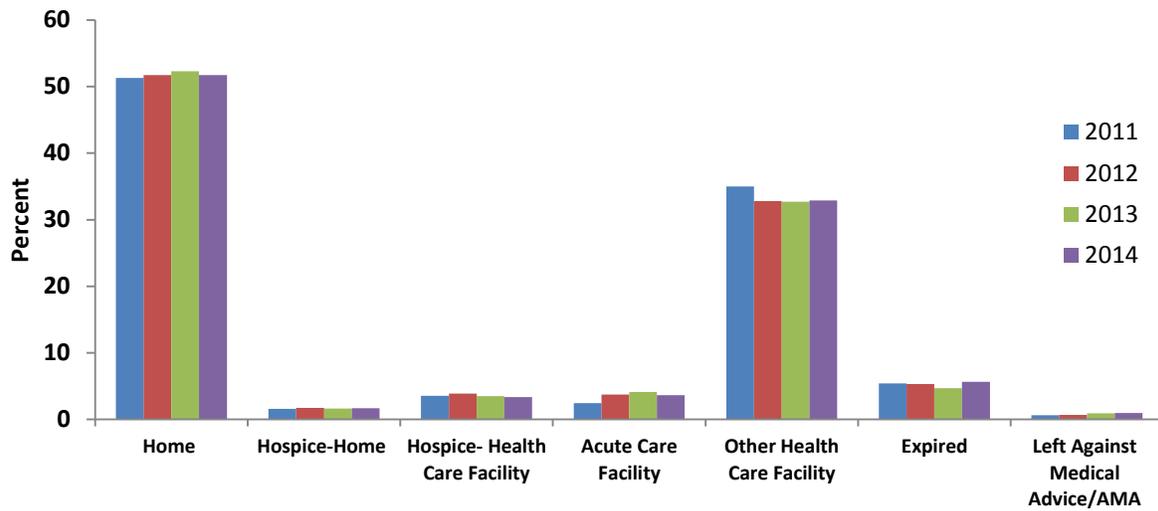


Figure 21. Discharge dispositions for stroke patients transferred to other health care facility

Approximately half of the patients (52.2%) were discharged to home and approximately a third (33%) were transferred to "other health care facility." Among patients transferred to "other health care facility", more than half (58.9%) were discharged to an inpatient rehabilitation facility and approximately a third (33.9%) were transferred to a skilled nursing facility.

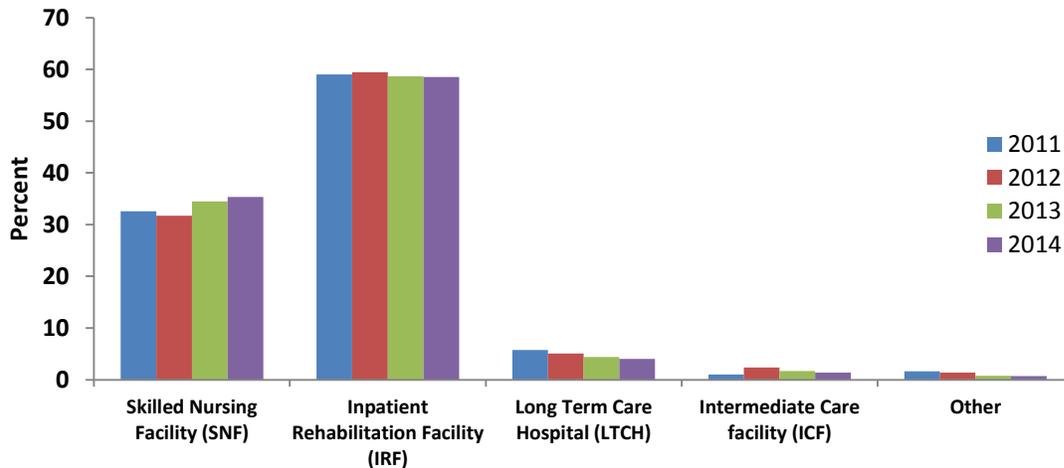
Figure 22 below displays the discharge disposition of stroke patients between 2011 and 2014.

Figure 22. Discharge disposition among stroke patients by year



Between 2011 and 2014, the number of hospitals reporting on this measure increased each year, increasing from 30 to 40 hospitals overall. Approximately half of the patients were discharged to home and approximately a third were transferred to “other health care facility”. Figure 23 below displays the percent of patient’s discharged to “other health care facility” between 2011 and 2014.

Figure 23. Percent of stroke patients discharged to “other health care facility” by year



Between 2011 and 2014, among patients transferred to another health care facility, more than half (approximately 59%) of the patients were discharged to an inpatient rehabilitation facility. The percent of patients discharged to a skilled nursing facility ranged from a low of 31.7% in 2011 to a high of 35.3% in 2014.

APPENDIX I-DATA SOURCES AND DEFINITIONS

Table 1 (pg. 7)

Data source: Texas Behavioral Risk Factor Surveillance System (2011, 2012, 2013).

Table 2 (pg. 7)

Data source: 2012 Texas Vital Statistics, Population Data; (2) 2012 Texas Vital Statistics, Mortality Data.

Tables 3-17 (pgs. 9-23)

Data Source: This Get With The Guidelines® Aggregate Data report was generated using the Quintiles PMT® system. Copy or distribution of the Get With The Guidelines® Aggregate Data is prohibited without the prior written consent of the American Heart Association and Quintiles.

Figure 1 (pg. 8)

Age-adjusted average annual number of deaths due to stroke per 100,000 people of all ages during 2008-2012, by county, in Texas.

Data source: County-level mortality data, 2008-2012, and County –level population data, 2008-2012; Texas Department of State Health Services, Center for Health Statistics, Austin, Texas.

Figures 2-23 (pgs. 11-25)

Data Source: This Get With The Guidelines® Aggregate Data report was generated using the Quintiles PMT® system. Copy or distribution of the Get With The Guidelines® Aggregate Data is prohibited without the prior written consent of the American Heart Association and Quintiles.

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