TENNESSEE STROKE REGISTRY QUARTERLY REPORT

Volume 2, Issue 1 March 2019

This report is published quarterly using data from the Tennessee Stroke Registry.

Inside this report

- Data on diagnosis, gender distributions, age distribution, arrival modes, insurance status, last known well to arrival, and medical history
- Data from July 2018 to September 2018
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Background

The Tennessee Stroke Registry (TSR) was created in 2009 through the Tennessee Stroke Registry Act of 2008. In July 2017, the legislation was updated with Tennessee House Bill 123, requiring all certified comprehensive and primary stroke centers in Tennessee to share their data with the TSR in order to improve stroke care in the state. The bill requires data to be provided from hospitals on a quarterly basis. The data are uploaded to the American Heart/American Stroke Association's Get With the Guidelines (GWTG) data system, Quintiles.

This is the first quarterly report of the fiscal year, providing a summary of the TSR data for July to September 2018. The data are aggregate data from the 26 hospitals currently reporting to Quintiles. In this report, illustrations are made on similarities and differences between the quarters' data. In past, quarters have been labeled in terms of the fiscal year. However, in this report, data from July to September of 2018 will be referred to as Quarter 3 of 2018. Other quarters will also be labeled as annual quarters. Quarter 3 of 2017 includes data from July to September 2017, Quarter 4 of 2017 includes data from October through December 2017, Quarter 1 of 2018 represents January to March 2018, and Quarter 2 of 2018 consists of data from April to June 2018. The limitations of this report include that data reported are based on the data provided to the Tennessee Stroke Registry from reporting hospitals, and may not be inclusive of all strokes in the state of Tennessee

Variable Information*

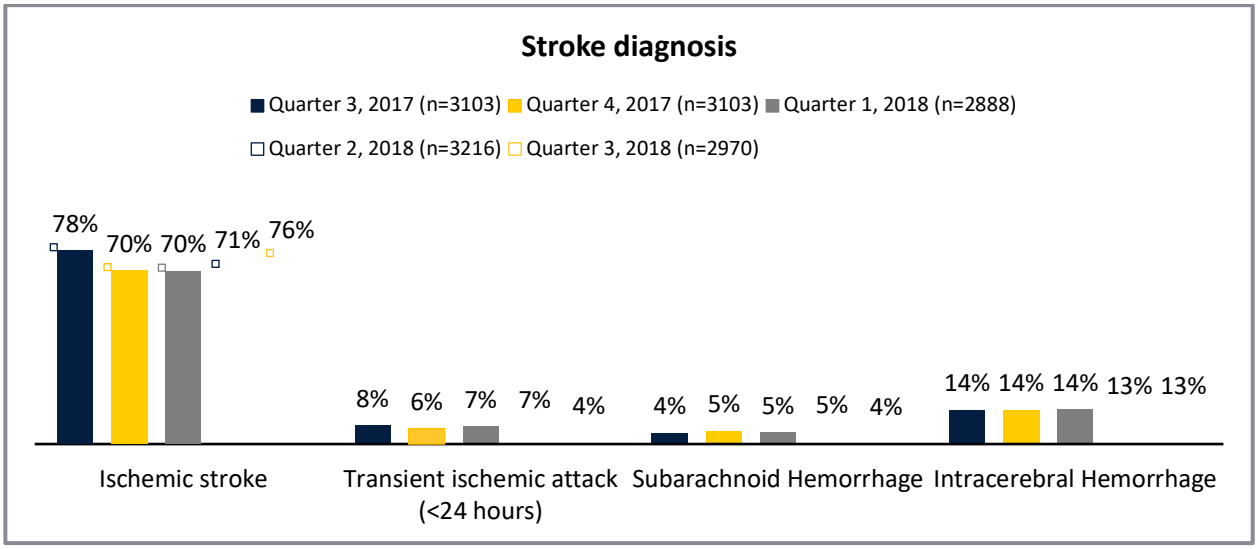
Measure	Numerator	Denominator
Age	Patients in specific age groups	Patients with a diagnosis of Ischemic stroke, TIA, Subarachnoid hemorrhage, or Intracerebral hemorrhage
Co-morbidities	Patients with co-morbidity	All patients
Transportation times	Patients arriving in time interval	Patients with a diagnosis of Ischemic stroke, TIA, Subarachnoid hemorrhage, Intracerebral hemorrhage, or Stroke not otherwise specified
NIHSS reported	NIH Stroke scale performed as part of initial evaluation AND Total Score is reported	Patients with a diagnosis of Ischemic stroke or Stroke not otherwise specified
Time to Intravenous Thrombolytic Therapy	Patients in time intervals based on time from patient arrival at the ED to time of administration of IV t-PA	Patients with a primary stroke diagnosis of ischemic stroke who received IV t-PA at my hospital
Reasons for no IV-rtPA	Patients in exclusion criteria group	Patients with a primary stroke diagnosis of ischemic stroke who arrived at the ED <270 minutes after the onset of stroke symptoms and had reason(s) why IV t-PA was not started at my hospital
Reasons for no IV-rtPA beyond 60 min	Patients grouped by reason	Patients with a primary stroke diagnosis of ischemic stroke in whom IV tPA was initiated greater than 60 minutes after hospital arrival
Modified Rankin Scale at discharge	Patients in each Modified Rankin Scale at discharge value	Patients with a diagnosis of Ischemic Stroke or Subarachnoid Hemorrhage or Intracerebral Hemorrhage or Stroke not otherwise specified
Complication types	Patients in each of the 4 combination groups (therapy received versus complication experienced)	Patients with a primary stroke diagnosis of ischemic stroke who received IV t-PA or intra-arterial thrombolytic therapy at my hospital
Initial exam findings	Patients grouped by exam finding	Patients with a diagnosis of Ischemic Stroke or TIA or Subarachnoid Hemorrhage or Intracerebral Hemorrhage or Stroke not otherwise specified
Length of stay	Patients grouped by stroke type	All patients

GWTG/PAA Defect Free	All patients which were included in the numerator for all of the measures that they were not excluded from	All patients which are included in the denominator for at least one of these measures: • IV rt-PA 2 Hour • Early Antithrombotics • VTE Prophylaxis (for patients discharged on or after 4/7/2012) • DVT Prophylaxis (GWTG Historic) (for patients discharged before 4/7/2012) • Antithrombotics* • Anticoag for AF* • LDL 100 or ND-Statin * • Smoking Cessation
CDC/COV Defect Free	All patients which were included in the numerator for all of the measures that they were not excluded from	All patients which are included in the denominator for at least one of these measures: • IV rt-PA 2 Hour • Early Antithrombotics • VTE Prophylaxis • Antithrombotics • Anticoag for AF • LDL 100 or ND • Smoking Cessation • Dysphagia Screen • Stroke Education • Rehabilitation Considered

*Percentages in graphs are based on the number of cases per quarter.

Data and Distributions

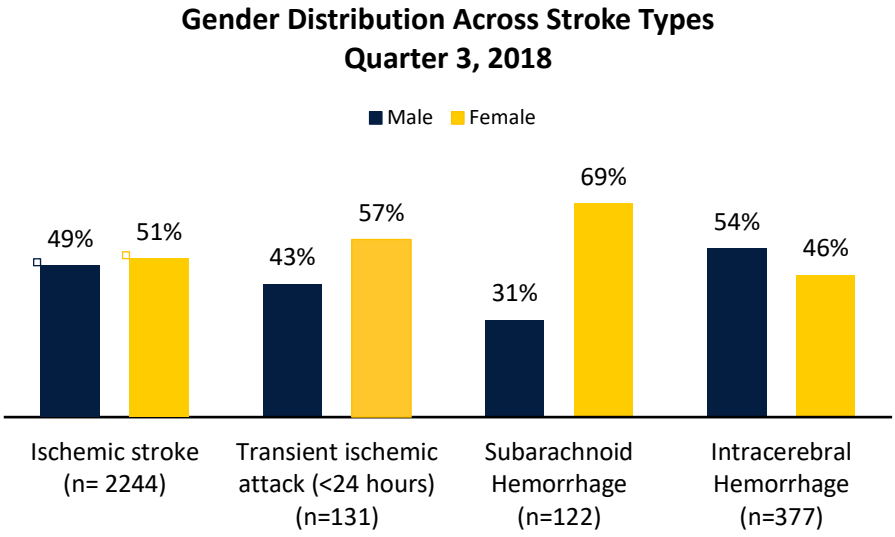
Diagnosis

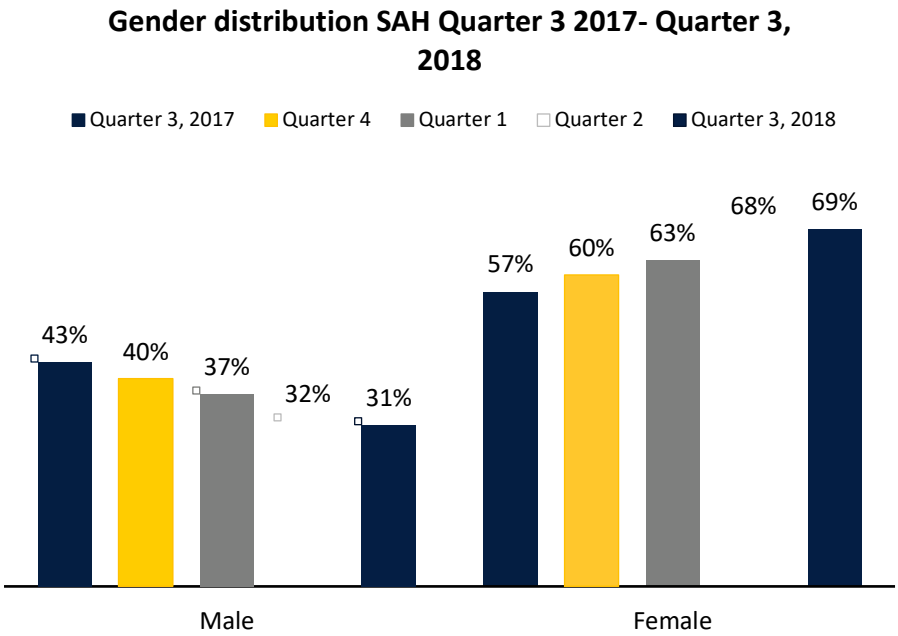


Overall, the patterns and distributions for the third quarter of 2018 are similar to what was shown in past TSR quarterly reports. There were 2,244 ischemic strokes, 131 transient ischemic attacks (TIA), 122 subarachnoid hemorrhages (SAH), and 377 intracerebral hemorrhages (ICH). The most common cases were ischemic strokes at 76% of strokes reported to the registry. In Quarter 3 of 2017 and Quarter 3 of 2018, there was a greater proportion of ischemic strokes than in the other quarters. The difference was significant between Quarter 3 and Quarter 4 of 2017 ($z=7.068$, $p<.01$). There was also a significant difference between Quarter 2 of 2018 and Quarter 3 of 2018 ($z=-3.755$, $p=.0002$). The data seems to suggest that in July, August, and September, there may be a tendency towards higher numbers of ischemic strokes. One study indicated that levels of air pollution may be linked to higher rates of stroke, this may be a potential area to look into to explain why we see higher levels of ischemic stroke in the summer.[1] Air quality is known to be worse in the summer, and particulate pollution can affect the development of atherosclerosis in adults.[2] However, other studies have found no link between seasonality and stroke occurrence, so any conclusions require further observations of trends.[3]

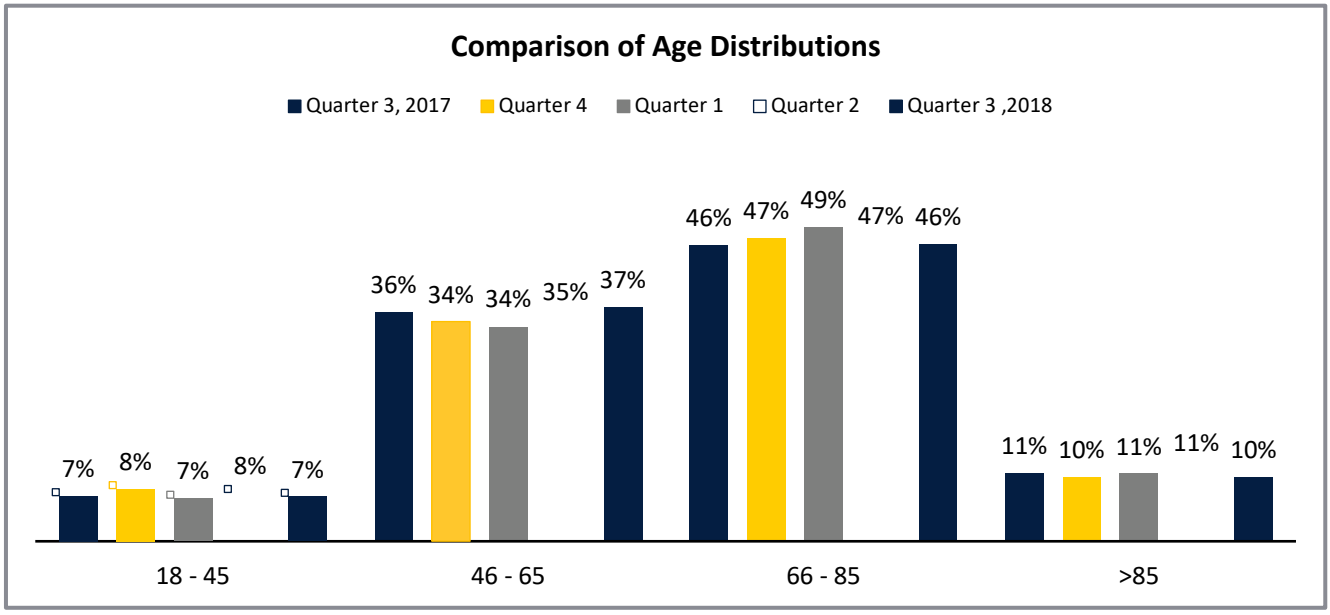
Gender Distributions

There were similar percentages of male and female cases for ischemic strokes. In past quarters, the trend of female transient ischemic attacks (TIA) being higher than male cases has been observed. From Quarter 3 of 2017, gender differences in strokes have become more pronounced for subarachnoid hemorrhage (SAH). The percentage of female cases in Quarter 3 of 2018 was greater than the percentage of female cases in all previous quarters. The difference between Quarter 3 of 2018 and Quarter 3 of 2017 was significant (z=2.005, p=.0455).

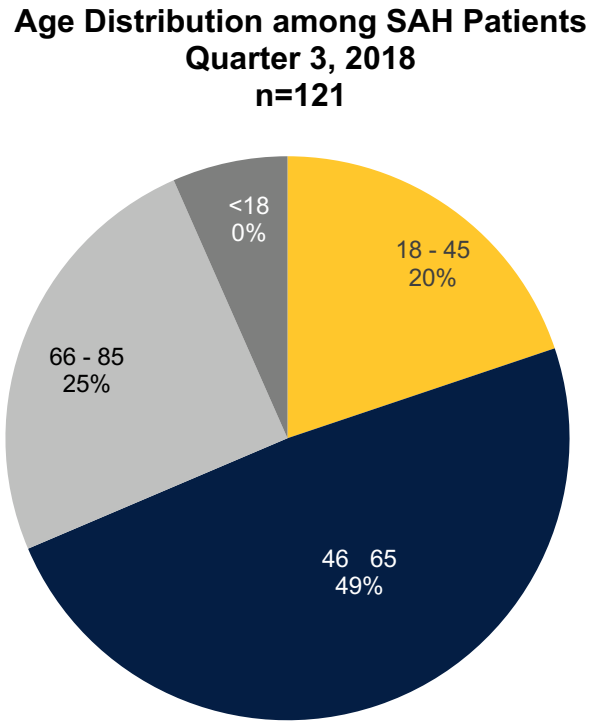




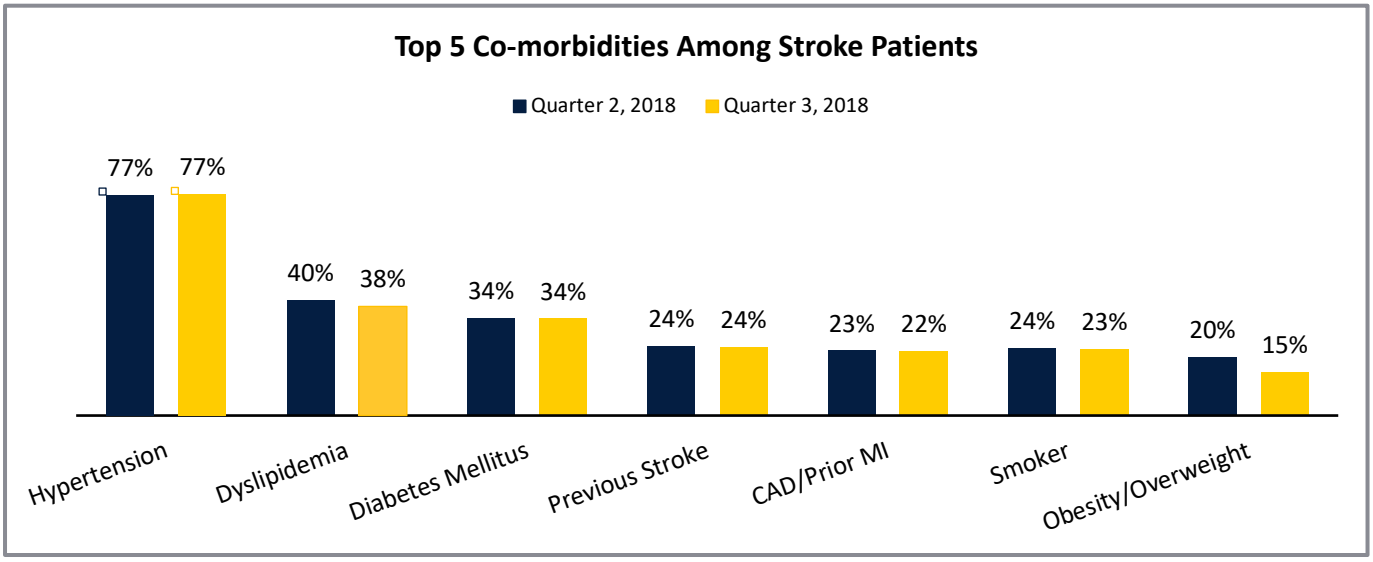
Age distributions



The most common age group experiencing strokes were those from ages 66-85, with 46% of all cases in this bracket. The prevalence of stroke overall increased by age, with only 7% of cases occurring in those aged 18-45. In the 46-65 age group, there were higher proportions of stroke in Quarter 3 of 2017 and 2018 compared the other quarters. The difference between Quarter 3 of 2018 and Quarter 1 was significant (z=2.421, p=.0155). SAH differed from other stroke types in age distributions, where 49% of cases occurred in those ages 46-65.

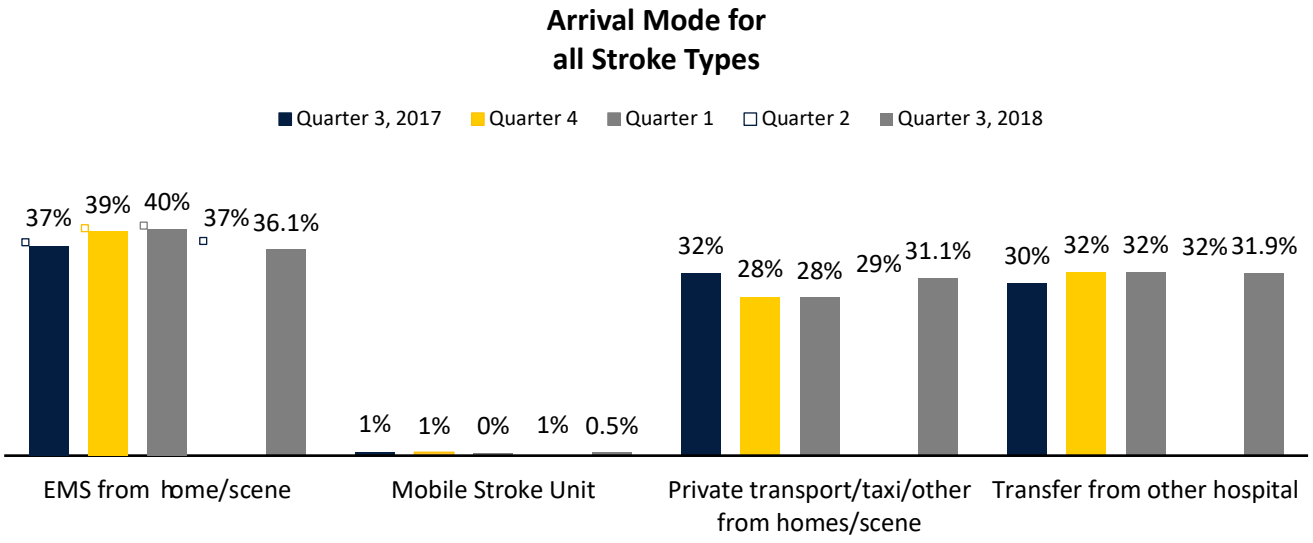


Co-morbidities



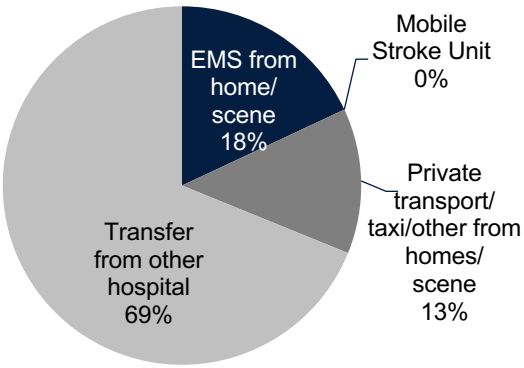
The top three co-morbidities among stroke patients in Quarter 3 of 2018, as seen in past quarters' data, were hypertension with 77% of cases, dyslipidemia at 38%, and diabetes mellitus at 34%.

Arrival mode

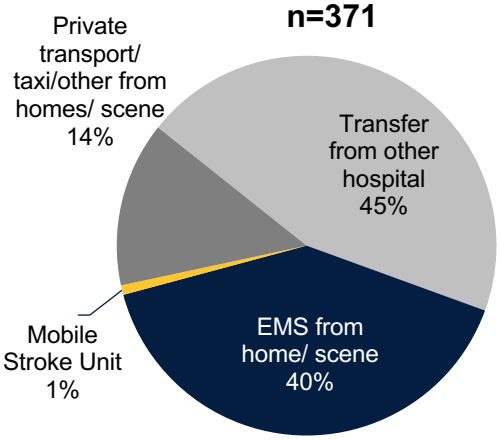


For all stroke types, most patients arrived via EMS services, with 36% of patients in the third quarter of 2018 using this method of transportation. Less patients seemed to arrive via EMS in the third quarters than in other quarters, with the diffrerence between proportions of the first quarter of 2018 and the third quarter of 2018 EMS arrivals being significant (z=2.421, p=.01552). Most TIA patients arrived via private transport (69%). Most ICH (45%) and SAH (69%) patients predominantly arrived via transfer from another hospital.

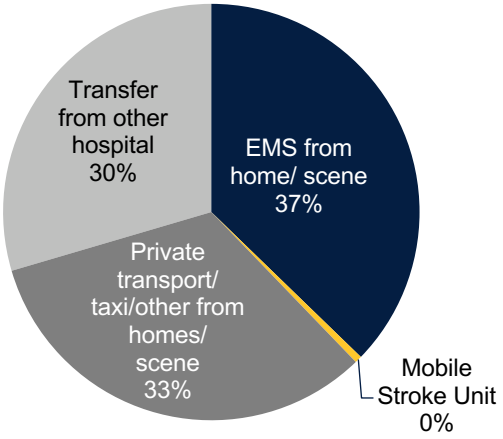
Arrival Mode Among SAH Stroke Patients Quarter 3, 2018 n=122



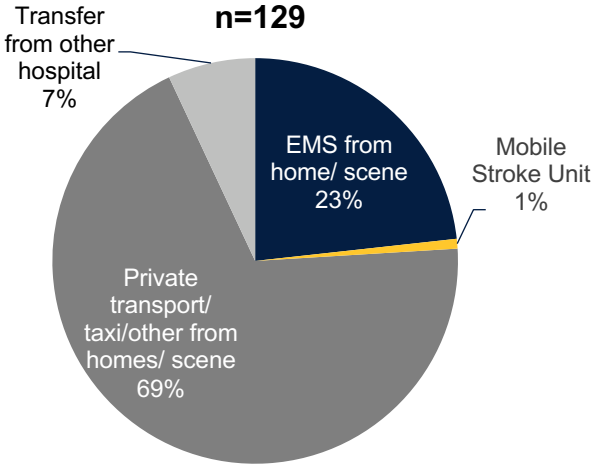
Arrival Mode Among ICH Stroke Patients Quarter 3, 2018 n=371



Arrival Mode among Ischemic Stroke Patients Quarter 3, 2018 n=2203

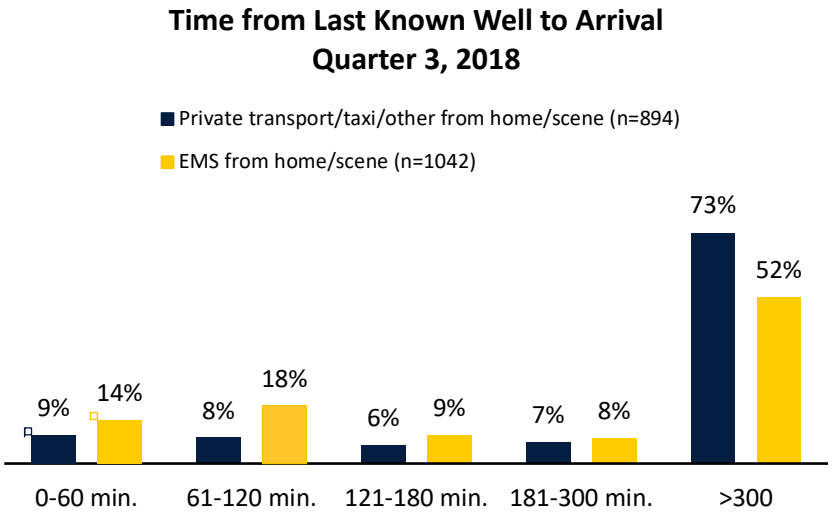


Arrival Mode Among TIA Patients Quarter 3, 2018 n=129



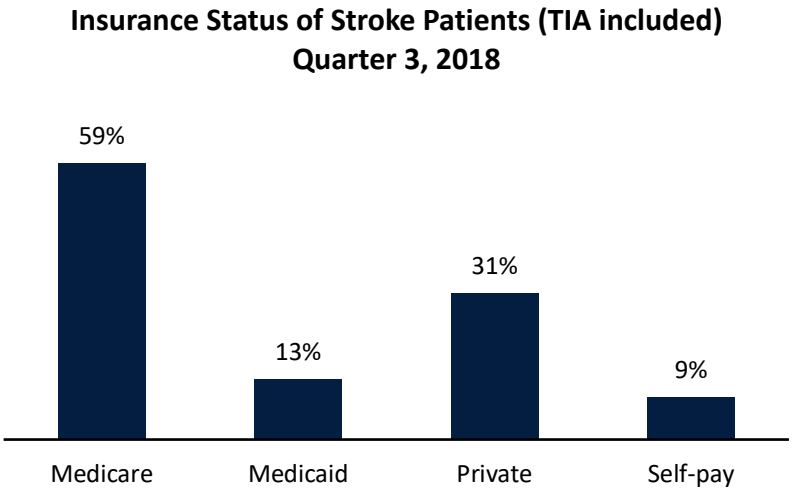
Transportation times

Similar transport times for the various types of transportation were reported in the first quarter of 2018 in comparison to previous quarters, with private transport experiencing longer transportation times on average from home/scene in comparison to Emergency Medical Services (EMS) transport. Most patients arrived at the hospital in over 300 minutes via private transportation (84%) while only 52% of patients via EMS services arrived in that time frame (z=9.249, p<.001). Meanwhile, 14% of patients arrived to the hospital via EMS services in less than 60 minutes, compared to 9% in private transport (z=-3.40, p=.001).



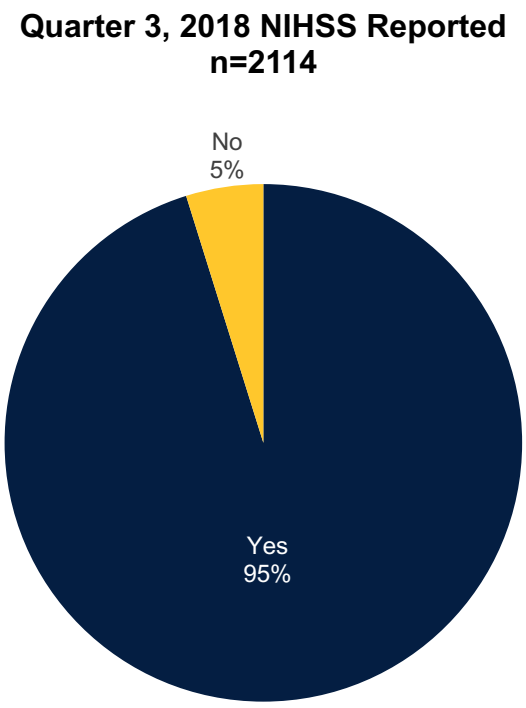
Insurance status

The majority of stroke patients had Medicare (59%). This reflects that the most common age group experiencing strokes are those from ages 66-85.

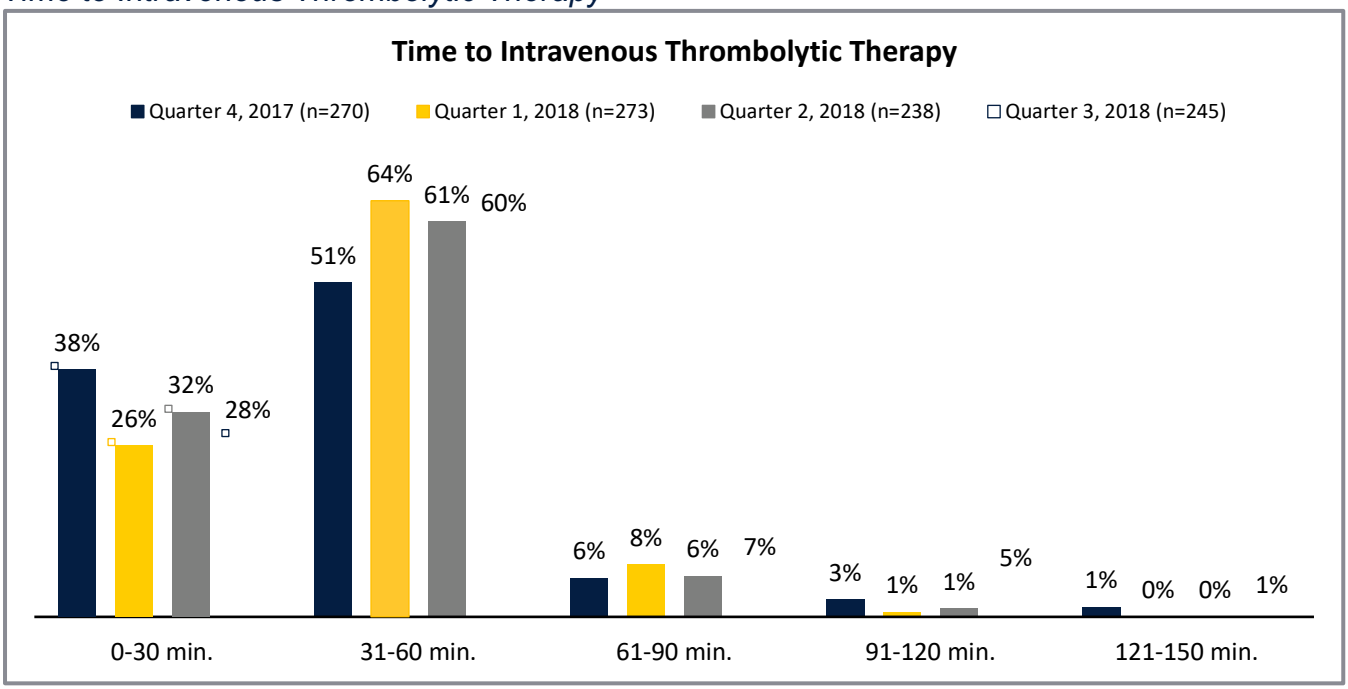


NIHSS Reported

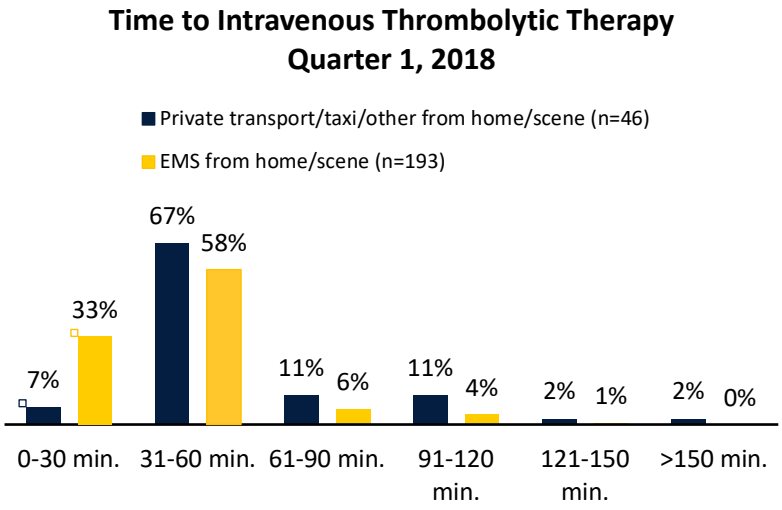
The majority of patients with a diagnosis of ischemic stroke or stroke not otherwise specified, 95%, had a score reported for the National Institute of Health Stroke Scale (NIHSS). The NIHSS is a 15-item examination used to evaluate the effect of acute cerebral infarction on the levels of consciousness, language, neglect, visual-field loss, extraocular movement, motor strength, ataxia, dysarthria, and sensory loss.



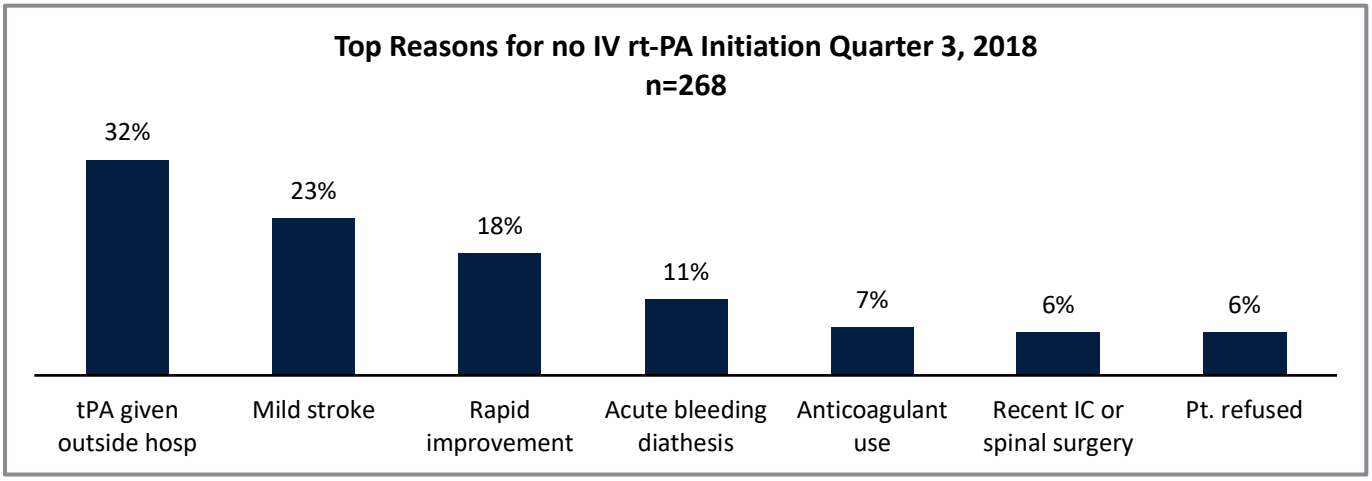
Time to Intravenous Thrombolytic Therapy



IV t-PA was initiated within 60 minutes for most patients in Quarter 3 of 2018, at 87%. Compared to transport via EMS services, arriving via private transport experience slightly slower times with 74% of patients receiving treatment in an hour versus 90% who arrived via EMS (z=-2.946, p=.003).



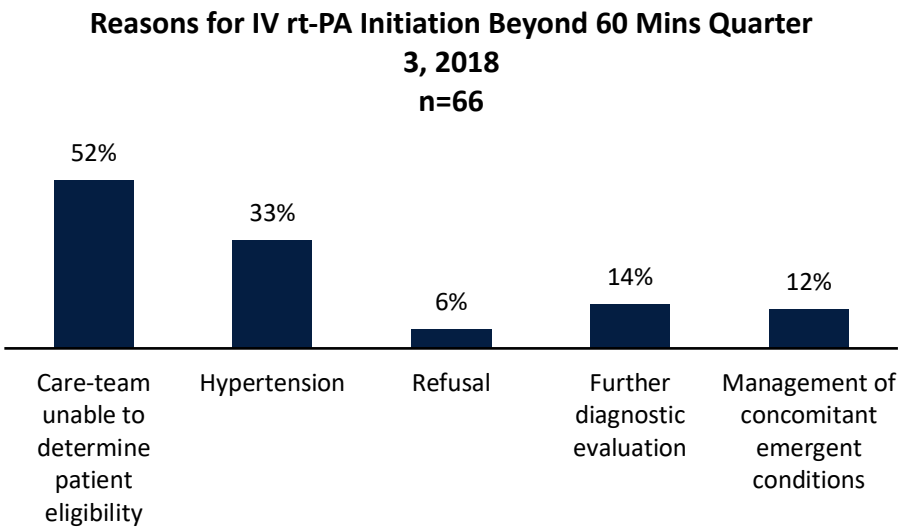
Reasons for no IV rt-PA



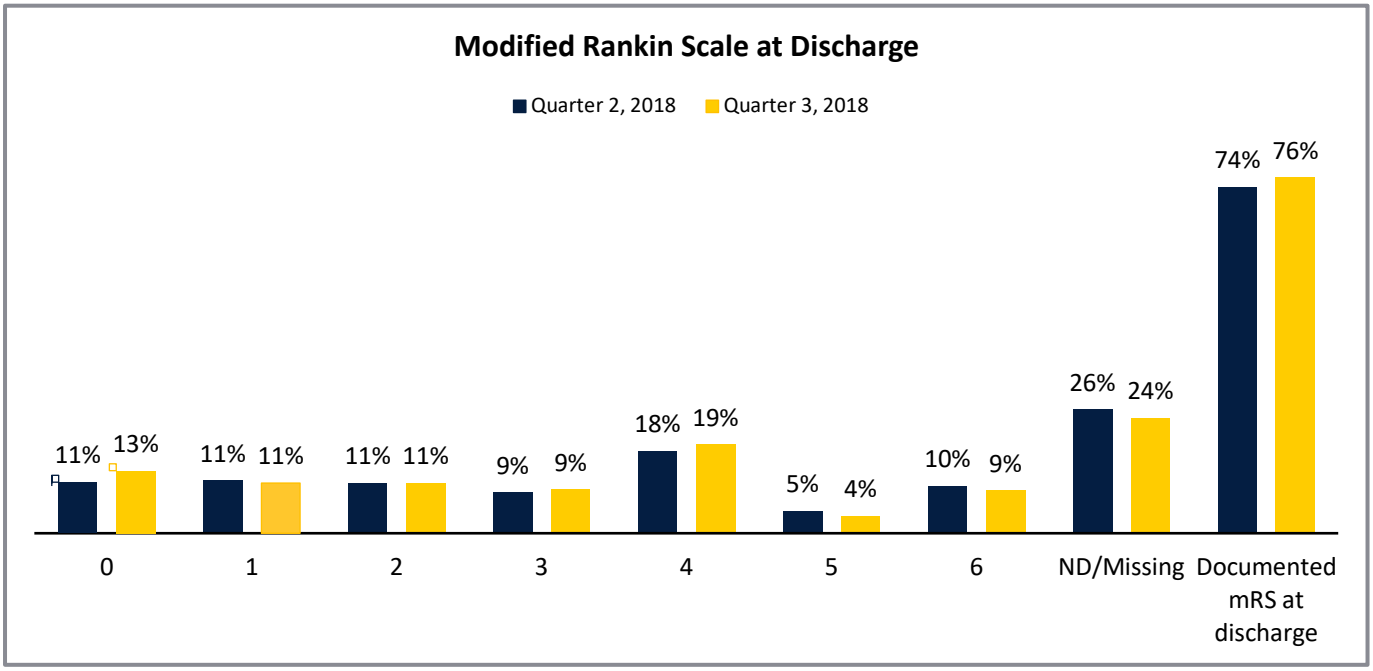
The percentages in the chart above represent the number of times the reason was listed as to why IV rt-PA was not initiated. The top five reasons for no IV rt-PA initiation in Quarter 3 of 2018, in order of highest proportion of patients to lowest, were because IV or IA tPA was given outside the hospital, the patient showed rapid improvement, acute bleeding diathesis, or anticoagulant use.

Reasons for delay, IV rt-PA beyond 60 minutes

The most common reason for delay in IV rt-PA beyond 60 minutes was that care-team was unable to determine the eligibility of the patient, composing 52% of cases in Quarter 3 of 2018.



Modified Rankin Scale at discharge



76% of patients had their Modified Rankin Scale at discharge documented in Quarter 3 of 2018.

The Modified Rankin Scale ranges from 0-6, with the following designations for values:

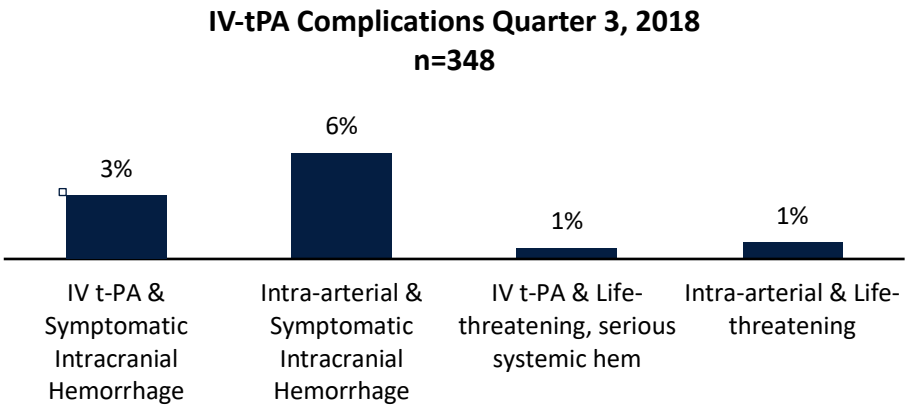
- 0 - No symptoms at all
- 1 - No significant disability despite symptoms: Able to carry out all usual activities
- 2 - Slight disability
- 3 - Moderate disability: Requiring some help but able to walk without assistance
- 4 - Moderate to severe disability: Unable to walk without assistance and unable to attend to own bodily needs without assistance
- 5 - Severe disability: Bedridden, incontinent and requiring constant nursing care and attention
- 6 - Death

There was a significant increase in patients who were discharged with no symptoms from

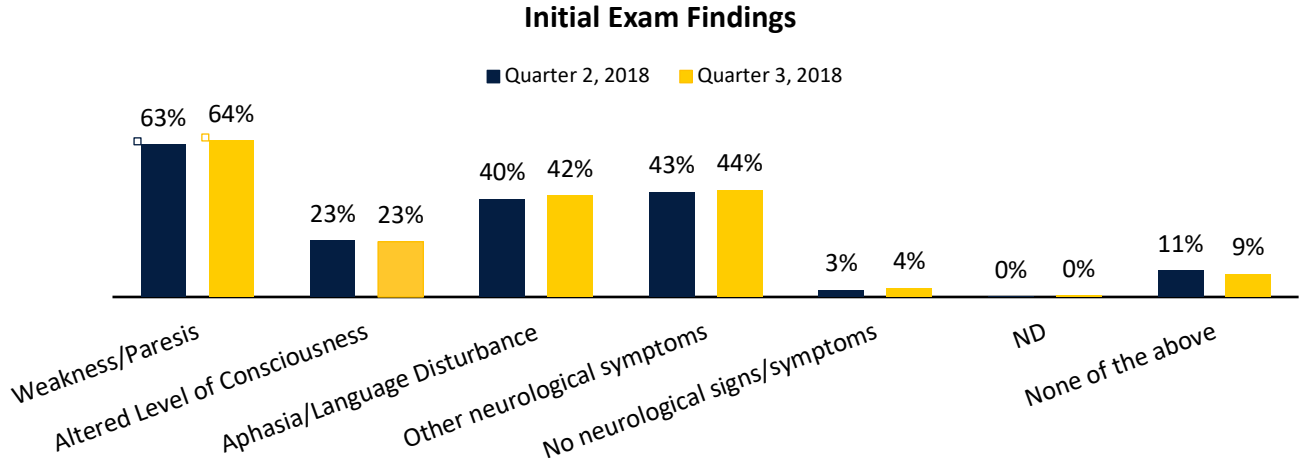
Quarter 2 of 2018 to Quarter 3 of 2018 (z=2.66, p=.008).

Complication types

The most common type of complication for IV-tPA in Quarter 3 of 2018 was Intra-arterial and Symptomatic Intracranial Hemorrhage at 6%. This means that out of all patients with a primary stroke diagnosis of ischemic stroke who received IV t-PA or intra-arterial thrombolytic therapy, most complications were an Intra-arterial and Symptomatic Intracranial Hemorrhage.

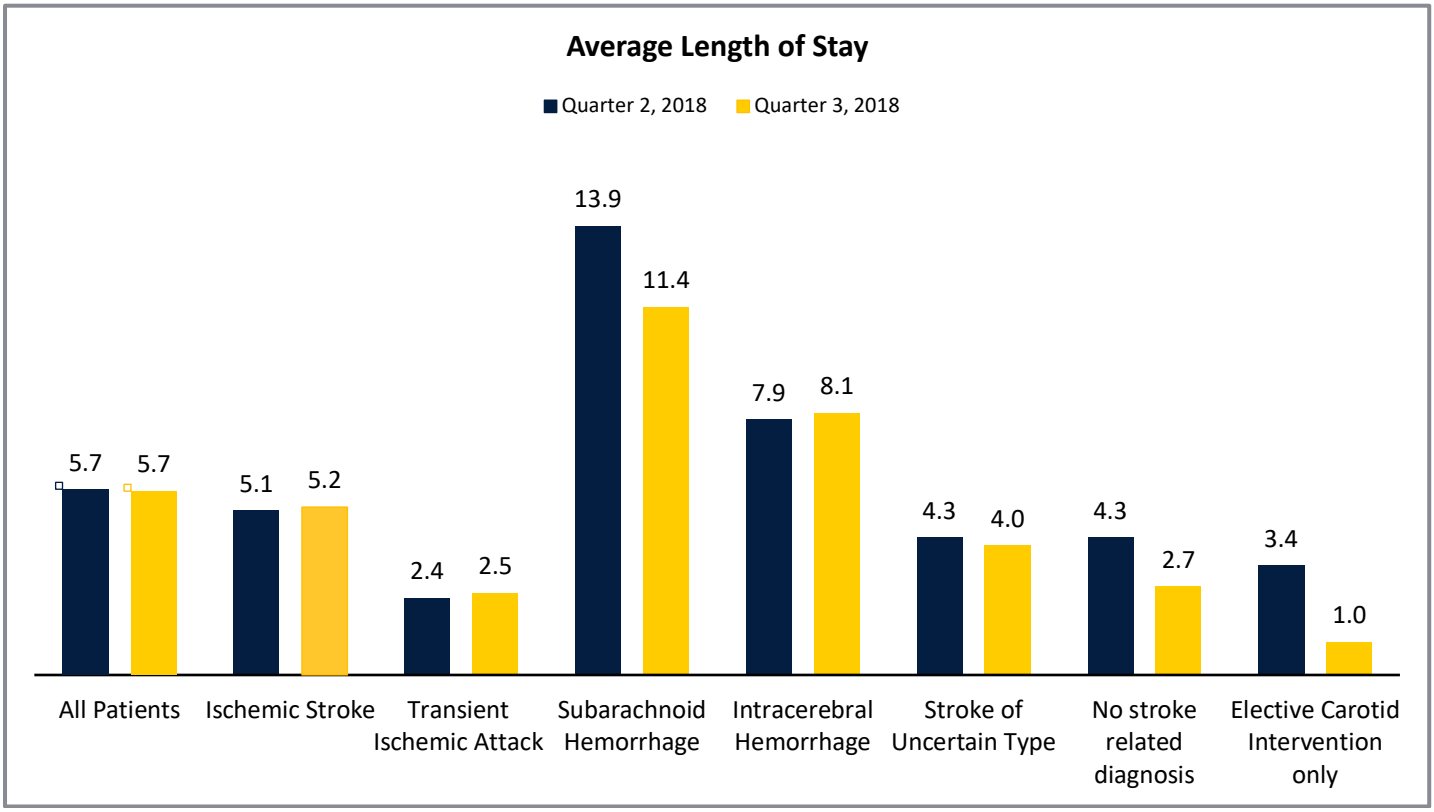


Initial exam findings



The two most common findings in initial exam of patients in Quarter 3 of 2018 were weakness/paresis (64%) and neurological other than altered level of consciousness and aphasia (44%).

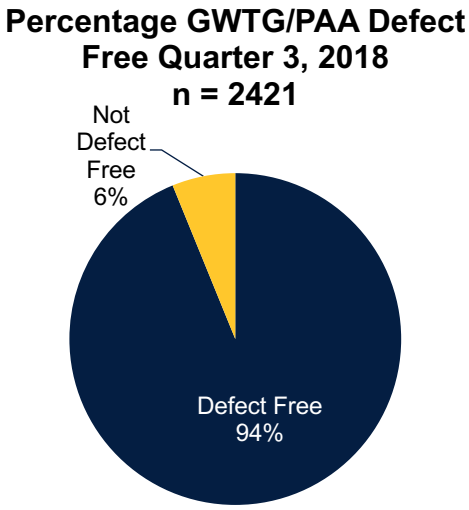
Length of Stay



The type of stroke with the longest length of hospital stay (LOS) was SAH at about 11 days, and the shortest LOS was TIA at about 2 days.

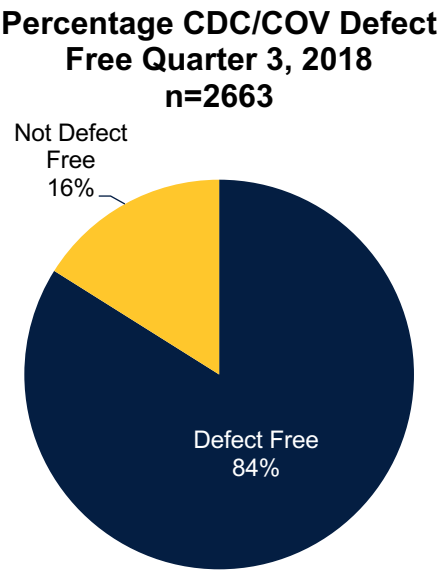
GWTG/PAA Defect Free

94% of patients received defect free care according to GWTG standards. This was a significant difference from Quarter 2 of 2018, where 92% of patients received Defect-Free Care (z=2.197, p=.0278).



CDC/COV Defect Free

84% of patients received defect free care according to the Center for Disease Control (CDC) standards.



Contact Information

For more information about the Tennessee Stroke Registry and how to participate, contact:

Megan Quinn, TSR manager, or Natalie Stanley, TSR graduate assistant.
Email (preferred): strokeregistry@etsu.edu or stanleyn1@etsu.edu
Phone: (423) 439-4427

Local GWTG Representative:
Julia Mora, MSHSA, BSN, NREMT
Regional Vice-President, Quality & Systems Improvement
American Heart Association
Greater Southeast Affiliate
julia.mora@heart.org

We look forward to working with you to improve stroke care in Tennessee.

References

1. Ho AF, Zheng H, De Silva, DA, Wah W, et al. The relationship between ambient air pollution and acute ischemic stroke: A time-stratified case-crossover study in a city-state with seasonal exposure to the Southeast Asian Haze Problem. *Annals of Emergency Medicine.* 2018;72(5): 591-601. https://www.sciencedirect.com/science/article/pii/S0196064418305687. Accessed January 21, 2019

2. Künzli N, Jerrett M, Mack WJ, Beckerman et al. Ambient air pollution and atherosclerosis in Los Angeles. *Environmental Health Perspectives*. 2004; 113(2), 201-206. https://ehp.niehs.nih.gov/doi/abs/10.1289/ehp.7523. Accessed January 21, 2019

3. Skajaa N, Horváth-Puhó E, Sundbøll, J, et al. Forty-year seasonality trends in occurrence of myocardial infarction, ischemic stroke, and hemorrhagic stroke. *Epidemiology*. 2018; 29(6), 777-783. https://journals.lww.com/epidem/Abstract/2018/11000/Forty_year_Seasonality_Trends_in_Occurrence_of.5.aspx. Accessed January 21, 2019.