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**Overview – Calendar Year 2020**

The Primary Stroke Service (PSS) designation in Massachusetts indicates health care facility readiness to evaluate and treat acute stroke patients 24 hours a day. Massachusetts PSS facilities have a regulatory requirement to submit data to the Bureau of Health Care Safety and Quality (BHCSQ). After clinical evaluation, eligible patients with acute ischemic strokes may be treated with antithrombolytics, a type of drug that dissolves stroke-causing clots, improving patient recovery and outcome.1 Evaluation for treatment involves ruling out medical contraindications and computerized tomography scan (CT). Current recommendations encourage prompt evaluation and treatment of eligible patients, specifically facilities should perform a CT scan and administer alteplase treatment within 60 minutes of facility arrival.2 Research shows an expanded window of 4.5 hours from patient last known well to treatment is effective at reducing morbidity and mortality.3

**Primary Stroke Service, 2020**

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| Table 1. Massachusetts PSS Facility Reported Stroke Characteristics,  2020 (n=14,912) | | |
| Stroke Type | **N (%)** | **Rate (per 100,000)** |
| Ischemic | 10,058 (67.5) | 143.1 |
| Transient Ischemic Attack | 2,425 (16.3) | 34.5 |
| Intracranial Hemorrhage | 1,787 (12.0) | 25.4 |
| Subarachnoid Hemorrhage | 603 (4.0) | 8.6 |
| Not otherwise specified | 39 (0.3) | 0.6 |
| Female | 7,343 (49.2) | 202.9 |
| Race and Ethnicity |  |  |
| White, nH/nL | 11,661 (78.2) | 241.6 |
| Black/African American, nH/nL | 1,192 (8.0) | 249.9 |
| Asian American/Pacific Islander, nH/nL | 469 (3.2) | 91.6 |
| American Indian/Alaskan Native, nH/nL | 16 (0.1) | 161.0 |
| Hispanic/Latinx | 954 (6.4) | 108.5 |
| Unable to be determined, nH/nL | 609 (4.1) | N/A |
| Two or more races, nH/nL | 11 (0.1) | 3.4 |
| Patient Means of Arrival |  |  |
| EMS | 7,603 (51.0) | N/A |
| Private Transport | 4,372 (29.3) | N/A |
| Transfer from another hospital | 2,766 (18.6) | N/A |
| Not documented or unknown | 171 (1.2) | N/A |
| *Data Sources: PSS Stroke Registry, extracted June 15, 2022;*  *Rate denominator based on UMass Donahue Institute 2020 Massachusetts Population Estimates5*  *nH/nL= Non-Hispanic/Non-Latinx* | | |

**Stroke-Care Quality Findings\*:**

* The median time from last known well (LKW) to emergency department (ED) arrival was **262 minutes**, with times ranging from 30 to 2,329 minutes.
  + 5,542 (37%) patients had no LKW or arrival time documented
* The median time from ED arrival to CT scan initiation was **42 minutes**, ranging from 5 to 324 minutes.
  + 2,767 (19%) patients did not have a CT scan time documented
* The median time from CT scan to antithrombolytics administration was **45 minutes**, with times ranging from 13 to 108 minutes.
* Overall, for patients with antithrombolyticadministration, the median LKW to treatment was **139.5 minutes**, ranging from 67 to 273 minutes.

*\*All values not within 5-95% of median excluded*

**Other notable findings:**

* The median age of patients was 72 years and ranged\* from 30 to 97 years.
* 4.1% of stroke patients did not have race or ethnicity documented

*\*Values not within 1-99% range excluded*

**Acute Stroke in the COVID-19 Pandemic in Massachusetts**

* The COVID-19 pandemic and lockdowns in March, April, and May created disruptions to the healthcare system and contributed to healthcare avoidance even for life threatening conditions, including stroke.4
* In Massachusetts, there was a significant decrease (p-value < 0.01) in the rate of stroke events in April and May 2020, during the first wave of COVID-19, compared to 2015-2019.
* The rate of stroke was also significantly lower in August 2020 but returned to expected levels in September 2020 based on historic data.

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**Primary Stroke Service, 2020**

**Notable findings among ischemic stroke patients:**

* Of the 10,058 ischemic strokes reported, 4,042 (40%) had no documented last known well (LKW)
* Of those with documented LKW, 2,385 (40%) arrived at the ED within 3.5 hours, allowing sufficient time for patient evaluation and treatment.
* 84 patients that arrived within 3.5 hours of LKW did not receive a CT scan within 4.5 hours of LKW, 409 patients that arrived within 3.5 hours had a documented alteplase contraindications, and 917 patients had a documented provider discretion warning.
* 899 (38%) patients that arrived within 3.5 hours received treatment with antithrombolytics. A total of 76 patients arrived within 3.5 hours, had no documented drug contraindications or warnings, and did not receive treatment. Further patient evaluation and provider education is recommended to ensure treatment of all eligible patients.

**Massachusetts Ischemic Stroke Patient Evaluation and Treatment with Antithrombolytics, 2020 N=6,016**

3,631 patients arrived at the facility after 3.5 hours from LKW

6,016 patients with ischemic stroke and a documented LKW

84 patients did not receive a CT scan within 4.5 hours of LKW

2,385 patients with ischemic stroke and arrived at facility within 3.5 hours from LKW

409 patients with documented alteplase contraindications

975 patients with no documented alteplase contraindications or physician discretion warnings

917 patients with physician discretion warnings against alteplase administration

|  |  |
| --- | --- |
| 5 Most Common Provider Discretion Warnings | |
| * Stroke severity too mild | * Rapid improvement of symptoms |
| * Care team unable to determine eligibility | * Taking an oral anticoagulant regardless of INR |
| * Patient or family refusal | |

Summary & Recommendations

Not all patients eligible receive treatment within the recommended time frame. Patients should continue to be educated on stroke symptoms, and to seek prompt emergency medical attention, including calling emergency medical services. Healthcare avoidance due to the COVID-19 pandemic is a possible reason behind the temporary decline in stroke rates. Media campaigns and awareness from DPH are ongoing to educate the public of stroke symptoms and when to seek medical attention. DPH also continues to provide technical assistance to hospitals to ensure that patients are being evaluated and treated promptly.

Find additional information regarding the signs and symptoms of stroke [here.](https://www.mass.gov/service-details/stroke-signs-and-symptoms-act-fast)

*Methods: Data were extracted from the MA PSS IQVIA module on June 15, 2022, completed patients records discharged between January 1, 2020 and December 31, 2020 were included. Patients already admitted to an acute care facility or admitted for elective carotid procedures or no stroke diagnosis were excluded. Patient evaluation and treatment for antithrombolytic treatment was limited to completed patients’ records diagnosed with ischemic stroke with a documented last known well date and time.*

Citations

1. Wardlaw JM, et al. Recombinant tissue plasminogen activator for acute ischemic stroke. Lancet. 2012;370(9834):2364-2372.

2. American Heart Association/American Stroke Association. Stroke Fact Sheet. Retrieved from https://www.heart.org/-/media/Files/Professional/Quality-Improvement/Get-With-the-Guidelines/Get-With-The-Guidelines-Stroke/Stroke-Fact-Sheet\_-FINAL\_UCM\_501842.pdf (2022, Mar 31).

3. Hacke, W., Kaste, M., et al. (2008). Thrombolysis with Alteplase 3 to 4.5 Hours after Acute Ischemic Stroke. The New England Journal of Medicine, 359, 1317-1329.

4. Rinkel, L. A., et al. “Impact of the COVID-19 Outbreak on Acute Stroke Care.” *Journal of Neurology*, vol. 268, no. 2, 2020, pp. 403–408., https://doi.org/10.1007/s00415-020-10069-1.

5. Strate, S., Renski, H., Peake, T., Murphy, J.J., Zaldonis, P. (2016). Small area population estimates for 2011 through 2020. [White Paper]. Population Estimates Program, Economic and Public Policy Research, University of Massachusetts Donahue Institute

76 patients were not treated and had no antithrombolytics contraindications or documented physician discretion warnings

899 patients treated with antithrombolytics within 4.5 hours of LKW