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**Overview – Calendar Year 2021**

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, 2021**

**Changes in stroke rates in 2021 compared to 2015-2019**

* In Massachusetts, Asian Americans/Pacific Islanders (AAPI), Hispanic/Latinx, and Blacks had significantly higher rates of stroke in 2021 compared to their rates in 2015-2019. This shows us that these groups had a higher rate of strokes in 2021 compared to 2015-2019.
* American Indian/Alaska Natives had a higher rate of stroke in 2021 compared to 2015-2019, but this was not statistically significant.
* 4.2% of patients do not have a race or ethnicity reported by facilities in 2021 and therefore are not included in the rates presented. This may lead to an undercounting in groups.

The rate ratio represented is calculated from rate of strokes in each race and Hispanic ethnicity group in 2021 compared to that group’s rate in 2015-2019. The rates for each year are calculated using stroke counts and the UMass Donohue Institute Population Estimates.

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

* The median time from last known well (LKW) to emergency department (ED) arrival was **277 minutes**, with times ranging from 30 to 2,354 minutes.
  + 5,770 (37%) patients had no LKW or arrival time documented
* The median time from ED arrival to CT scan initiation was **40 minutes**, ranging from 4 to 404 minutes.
  + 2,697 (17%) patients did not have a CT scan time documented
* The median time from CT scan to antithrombolytics administration was **42 minutes**, with times ranging from 13 to 103 minutes.
* Overall, for patients with antithrombolyticadministration, the median LKW to treatment was **136 minutes**, ranging from 67 to 265 minutes.

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

**Other notable findings:**

* The median age of patients was 73 years and ranged\* from 32 to 97 years.
* The NIH Stroke Scale (NIHSS) measures the overall severity of stroke, ranging from 0-42. The mean score in MA was 5.3.

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

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| Table 1. Massachusetts PSS Facility Reported Stroke Characteristics,  2021 (n=15,570) | | |
| Stroke Type | **N (%)** | **Rate (per 100,000)** |
| Ischemic | 10,619 (68.2) | 151.0 |
| Transient Ischemic Attack | 2,541 (16.3) | 36.2 |
| Intracranial Hemorrhage | 1,756 (11.3) | 25.0 |
| Subarachnoid Hemorrhage | 573 (3.7) | 8.2 |
| Not otherwise specified | 81 (0.5) | 1.2 |
| Female | 7,730 (49.7) | 202.9 |
| Race and Ethnicity |  |  |
| White, nH/nL | 12,056 (77.4) | 249.8 |
| Black/African American, nH/nL | 1,202 (7.7) | 251.6 |
| AAPI, nH/nL | 556 (3.6) | 108.6 |
| AI/AN, nH/nL | 21 (0.1) | 211.3 |
| Hispanic/Latinx | 1,076 (6.5) | 122.3 |
| Unable to be determined, nH/nL | 650 (4.2) | N/A |
| Two or more races, nH/nL | 9 (0.1) | 2.8 |
| Patient Means of Arrival |  |  |
| EMS | 8,183 (52.6) | N/A |
| Private Transport | 4,650 (29.9) | N/A |
| Transfer from another hospital | 2,579 (16.6) | N/A |
| Not documented or unknown | 154 (1.0) | N/A |
| *Data Sources: PSS Stroke Registry, extracted November 18, 2022;*  *Rate denominator based on UMass Donahue Institute 2020 Massachusetts Population Estimate4*  *nH/nL= Non-Hispanic/Non-Latinx*  *AAPI=Asian American Pacific Islander*  *AI/AN= American Indian/Alaska Native* | | |

\*2021 rate significantly higher than 2015-2019 rate; \*\*2021 rate significantly lower than 2015-2019 rate; Significance level at p<0.05

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**Primary Stroke Service, 2021**

**Notable findings among ischemic stroke patients:**

* Of the 10,615 ischemic strokes reported, 4,244 (40%) had no documented last known well (LKW)
* Of those with documented LKW, 2,522 (40%) arrived at the ED within 3.5 hours, allowing sufficient time for patient evaluation and treatment.
* 117 patients that arrived within 3.5 hours of LKW did not receive a CT scan within 4.5 hours of LKW, 441 patients that arrived within 3.5 hours had a documented alteplase contraindications, and 972 patients had a documented provider discretion warning.
* 963 (38%) patients that arrived within 3.5 hours received treatment with antithrombolytics. A total of 29 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, 2021 N=6,375**

6,375 patients with ischemic stroke and a documented LKW

3,853 patients arrived at the facility after 3.5 hours from LKW

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

441 patients with documented antithrombolytic contraindications

2,522 patients with ischemic stroke and arrived at facility within 3.5 hours from LKW

972 patients with physician discretion warnings against antithrombolytic administration

992 patients with no documented alteplase contraindications or physician discretion warnings

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

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

963 patients treated with antithrombolytics within 4.5 hours of LKW

*Methods: Data were extracted from the MA PSS IQVIA module on November 18, 2022, completed patients records discharged between January 1, 2021 and December 31, 2021 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. 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

Summary & Recommendations

There continue to be patients who are eligible for treatment with antithrombolytics that do not receive treatment. Facilities should continue to educate providers regarding treatment eligibility. Continuing and expanding training and education for patients and caregivers regarding recognizing stroke symptoms and the importance of treatment will ensure patients arrive more quickly and are appropriately treated.

In December 2021, the Massachusetts Coverdell Stroke Program initiated a pilot to expand Stroke Systems of Care to include 5 community health centers, providing collaboration opportunities between EMS, PSS hospitals, rehab, home care, and community health centers (CHCs). Health centers were selected with a health equity approach to reach the residents with the highest risk of experiencing a stroke. Collaborations include health center staff, Community Health Workers, and patient education on stroke prevention and stroke signs and symptoms.  Protocols are being developed for frontline CHC staff to identify patients presenting with stroke symptoms for timely activation of EMS.  In 2023, the Coverdell Program will host learning sessions for the awareness of systemic and historic racism that impact health outcomes for people of color.