



Massachusetts Department of Public Health

Stroke Advisory Committee

July 2024

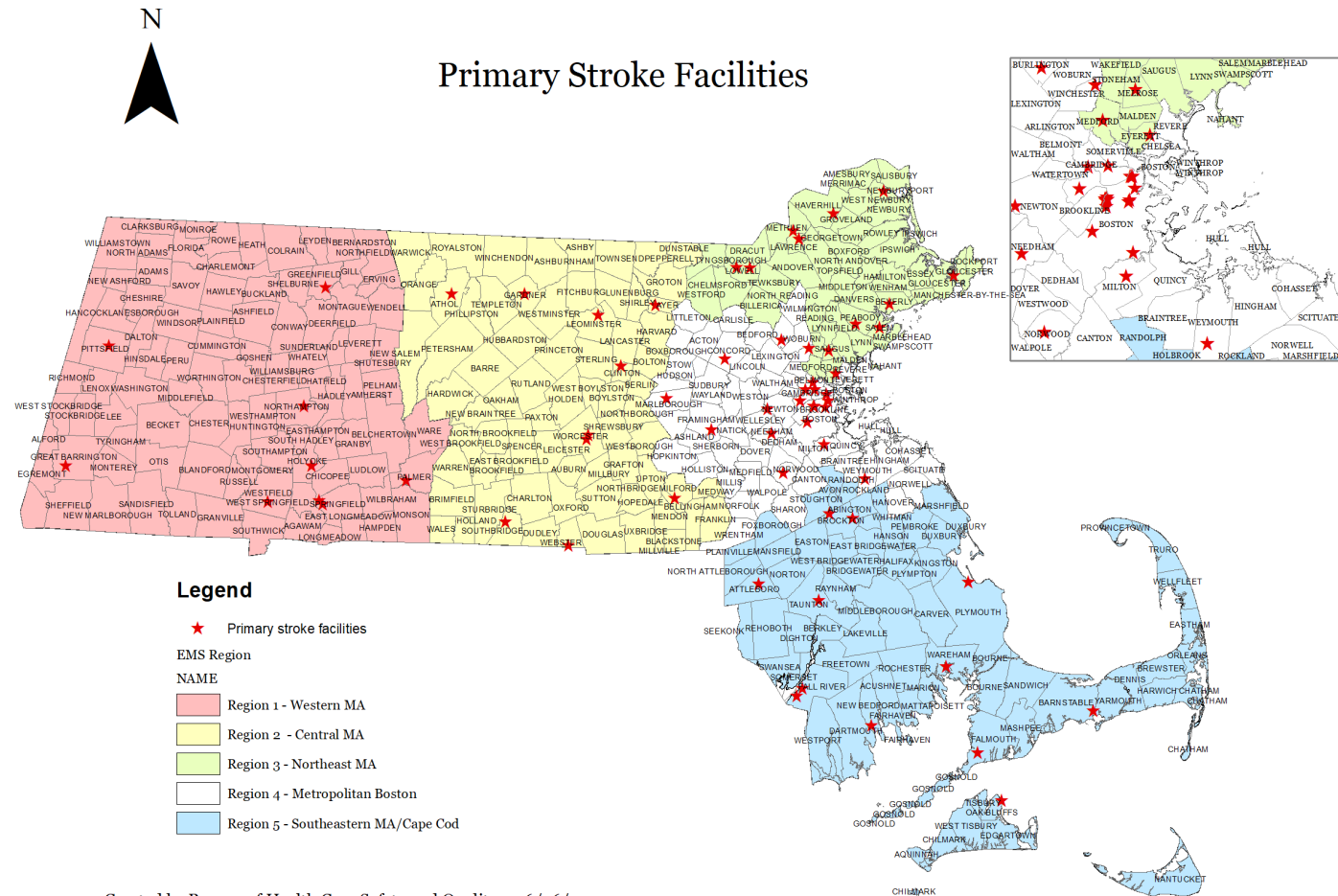
Bureau of Health Care Safety and Quality

Agenda

- Department Updates
- Approval of October Meeting Minutes
- Data Presentation
- Overview of Proposed Tiering Regulation

Map of PSS Facilities, CY 2023

- Massachusetts has 61 active primary stroke service hospitals or satellite emergency facilities spread across its 5 EMS regions, with each region having between 9-20 facilities.
- In CY 2023, 8 PSS facilities reported performing thrombectomies, also known as mechanical endovascular reperfusion (MER) therapies.
 - Of these facilities, 5 are located in the Metro Boston region, with 1 facility each in MetroWest, Western MA, and Central MA.
 - Northeast & Southeast did not have any facilities reporting MER procedures in CY 2023.



Created by Bureau of Health Care Safety and Quality on 6/26/24

Source:

- Massachusetts FMF licensure Data. Extracted 5/21/24
- MA EMS Regions-MassGIS

Note: Norwood Hospital and Signature Brockton are temporarily closed.

Current Primary Stroke Services in Massachusetts

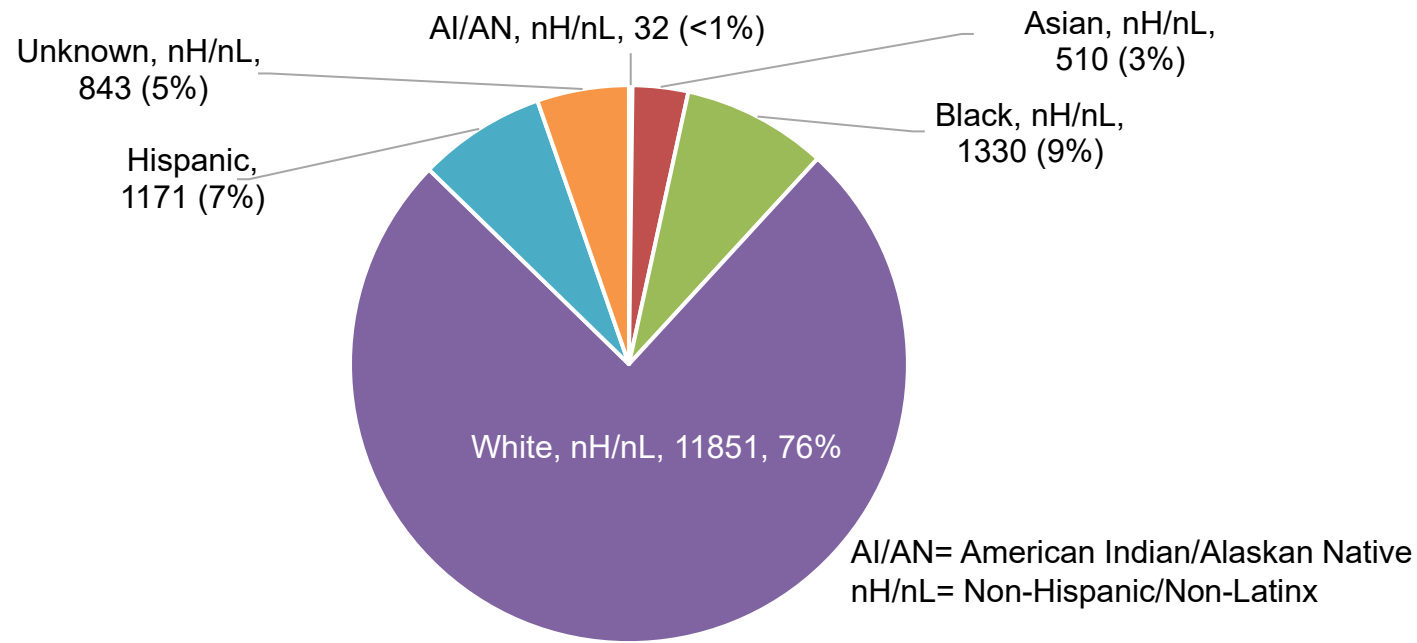
- Massachusetts has **one designation** for hospitals providing stroke services: **primary stroke service (PSS)** center.
- PSS hospitals are self-certified and independently designated by the DPH as part of the hospital licensure process.
- PSS designation requires a "readiness to provide timely acute stroke evaluation and treatment," including:
 - Emergency diagnostic and therapeutic services 24 hours a day/7days a week to patients presenting with symptoms of acute stroke;
 - A designated stroke service director or coordinator who is a licensed physician with acute stroke expertise; and
 - A transfer agreement that includes stroke specific requirements for the care of patients with a known or suspected acute stroke.
- PSS hospitals must provide formal staff education for health care providers, including EMS personnel, which should include acute stroke prevention, diagnosis and treatment. Community education to the public must be provided which should include prevention of stroke, recognition of stroke symptoms and/or treatment of stroke.
- PSS designated facilities must submit case data to MA PSS registry; quality metrics are made available through a public dashboard: mass.gov/info-details/primary-stroke-service-facilities-in-Massachusetts.

1. Marulanda E, Bustillo A, Gutierrez CM, Rose DZ, Jameson A, Gardener H, Alkhachroum A, Zhou L, Ying H, Dong C, et al. Nationally certified stroke centers outperform self-attested stroke centers in the Florida Stroke Registry. *Stroke*. 2023;54:840–847. doi: 10.1161/STROKEAHA.122.038869

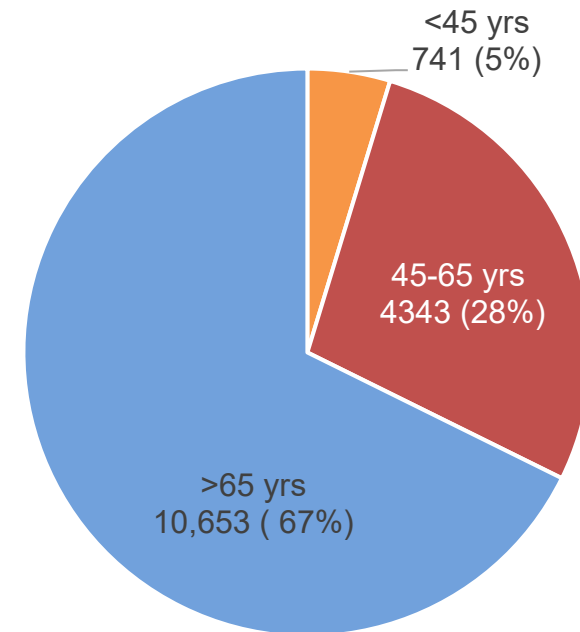
Characteristics of Stroke Patients Reported in PSS

- In CY 2023, Massachusetts PSS hospitals reported 15,737 confirmed stroke cases.
 - The most common stroke type is ischemic stroke accounting for 67% of all reported strokes.
 - The median age was 73 years old and of all strokes, 50% were female and 50% were male.
 - Whites accounted for 76% of all reported strokes, however, there is well-documented evidence of structural bias and inequities in stroke care among patients from historically underserved communities.¹

Strokes at Massachusetts PSS Facilities by Race & Ethnicity



Strokes at Massachusetts PSS facilities by Age



1. Churchwell K, Elkind MSV, Benjamin RM, et al. Call to Action: Structural racism as a fundamental driver of health disparities: A presidential advisory from the American Heart Association. *Circulation* 2020; 454-468.

Source: Massachusetts PSS Registry, extracted May 28, 2024

CDC Stroke System of Care: State Policy Interventions

- State and local stroke systems of care (SSOC) are approaches for coordinating stroke-related services to facilitate timely and effective care. SSOCs seek to address stroke patient care comprehensively and include efforts ranging from prevention, education, assessment, emergency transport, hospital care and treatment, and follow-up outpatient care.¹
- Massachusetts has implemented the highlighted items below:

Pre-Hospital Interventions		
SSOC Task Force	EMS Stroke Assessment protocols	Standardized EMS Stroke Assessment Tool Use
EMS Triage & Transport	Air medical transport	Inter-Facility transfer
Stroke pre-notification	Continuing education for EMS providers	CQI for EMS for stroke

In-Hospital/Post-Hospital Interventions		
Tiered stroke center approach	Tele-stroke to initiate treatment	Statewide CQI data system & reporting
Nationally certified PSCs	Nationally certified CSCs	Nationally certified ASRHs
State certified PSCs	State certified CSCs	State certified ASRHs

[1] cdc.gov/coverdell/php/report/stroke-pear.html

Current State-wide EMS Treatment Protocol for Stroke



Say "Stroke Alert" in Hospital Entry Note if patient meets the Stroke Criteria, even if symptoms have resolved.

EMT/ADVANCED EMT/PARAMEDIC STANDING ORDERS

E
/
A
/
P

- 1.0 Routine Patient Care
- Perform FAST-ED Stroke Scale.
- Clearly determine last time known well.
- If the patient wakes from sleep or is found with symptoms of stroke, the time is defined as the last time the patient was observed to be normal. Notify the emergency department as soon as possible.
- If any one of the signs of the stroke scale is abnormal and onset of symptoms are less than **24 hours**, notify receiving hospital of a "Stroke Alert".
- Elevate the head of the stretcher 30 degrees.
- Do not delay transport for ALS intercept.
- Consider transporting a witness, family member, or caregiver with the patient to verify the time of the onset of stroke symptoms.
- If the onset of signs and symptoms PLUS transport time is < 24 hours, consider transport to the most appropriate facility in accordance with local guidelines/agreements.
- Transport to a Department approved Stroke Point-of-Entry (POE) hospital.



Avoid hyperoxygenation; Oxygen administration should be titrated to patient condition, and withheld unless evidence of hypoxemia, dyspnea, or an SpO2 <94%, especially in the presence of a suspected CVA/TIA or ACS.

2.18

Stroke

This checklist is included as a resource for EMTs and receiving hospitals. If used, please leave a copy with the patient and document all elements on Patient Care Report

Date: Amb #: Pt. Age: ☐ M ☐ F
Patient's Name: DOB:

Time last known well (TLKW) < 24 hours? YES ☐ NO ☐ Unknown ☐
Any abnormal finding not attributable to head trauma? ☐ ☐ ☐
Blood Glucose >60? ☐ ☐ ☐

TIME LAST KNOWN WELL:

: AM/PM

BLOOD GLUCOSE LEVEL:

mg/dL

FAST-ED Stroke Scale

Item	Score
Facial Palsy	
Normal or minor paralysis	0
Partial or complete paralysis	1
Arm weakness	
No drift	0
Drift or some effort against gravity	1
No effort against gravity or no movement	2
Speech changes	
Absent	0
Mild to moderate	1
Severe, global aphasia or mute	2
Eye deviation	
Absent	0
Partial	1
Forced deviation	2
Denial/Neglect	
Absent	0
Extinction to bilateral simultaneous stimulation in only 1 sensory modality	1
Does not recognize own hand or orients only to one side of the body	2

History:

Conditions:

- ☐ Head Trauma/Seizures
- ☐ Cardiac Arrhythmias
- ☐ Recent/current bleeding, trauma, surgery or invasive procedure
- ☐ Bleeding disorder
- ☐ Pregnancy

Medications:

- ☐ Coumadin/warfarin
- ☐ Pradaxa/dabigatran
- ☐ Xarelto/rivaroxaban
- ☐ Eliquis/apixaban
- ☐ aspirin

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



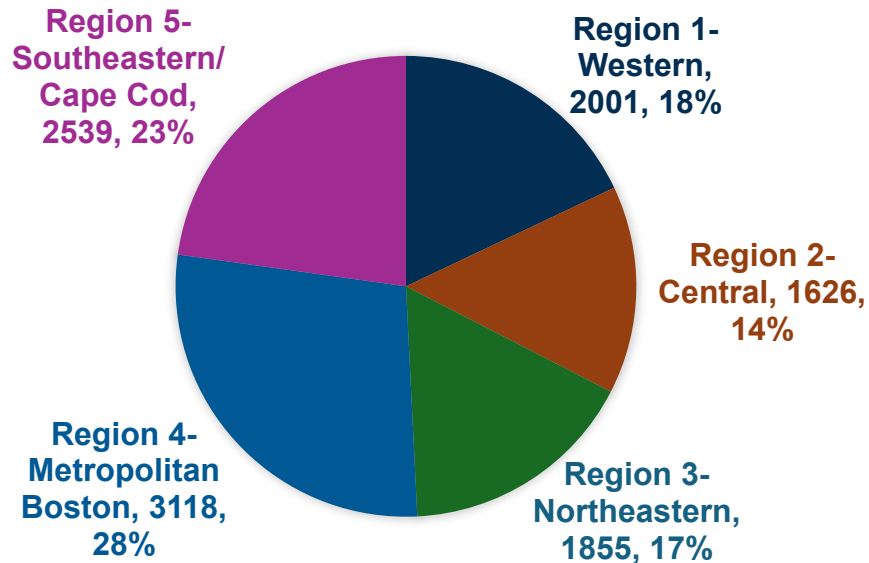
Say "Stroke Alert" in Hospital Entry Note if patient meets the Stroke Criteria, even if symptoms have resolved.

Massachusetts Department of Public Health Office of Emergency Medical Services
Statewide Treatment Protocols version 2024.1

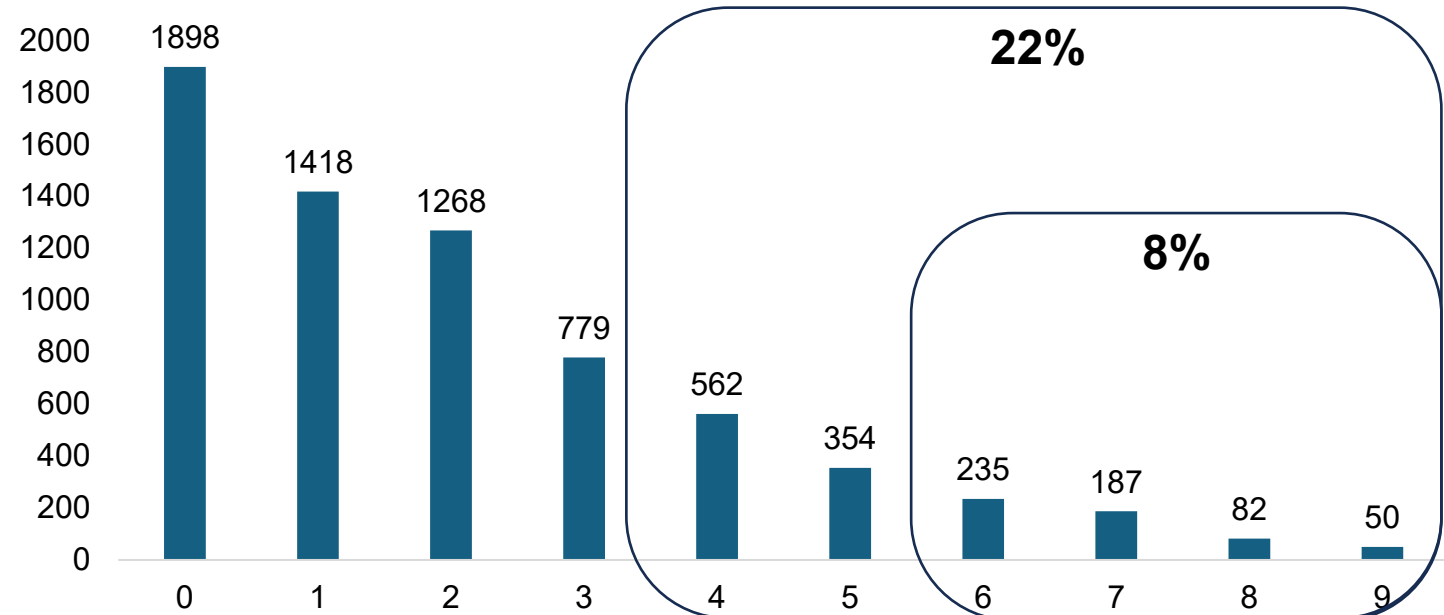
Suspected Strokes in EMS, CY 2023

- In CY 2023, there were 11,139 suspected stroke EMS runs reported in the Massachusetts Ambulance Trip Record Information System (MATRIS).
 - PSS hospitals reported 8,468 confirmed strokes arriving via EMS in CY 2023.
- Among CY 2023 EMS runs with known FAST-ED scores, 22% had a score of 4 or higher and 8% had a score of 6 or higher.
 - 39% of the suspected stroke had missing FAST-ED scores though missingness is improving over time.
 - DPH began to require ambulances submit numeric values for FAST-ED scores in November 2022.

Number of Suspected Stroke Runs



No. of Suspected Strokes by Fast-ED scores, CY 2023 (N=6,833)



Source: Massachusetts Department of Public Health, MATRIS V3, Extracted May 23, 2024

Suspected Stroke in EMS, CY 2023

- EMS personnel are required to collect time last known well (LKW) for all suspected stroke runs.
- In CY 2023, the median time from last known well to EMS arrival was about 2.1 hours
 - 59% of the suspected strokes with LKW less than 3 hours
 - LKW times were missing for 4,916 (44%) suspected stroke runs

Last Known Well of Stroke Patient to EMS Arrival in MATRIS, CY 2023

LKW to Arrival	No. of Suspected Strokes	% of Suspected Strokes
≤ 3 hours	3,687	59.3
3 hours - 24 hours	1,956	31.4
≥ 24 hours	580	9.3

Current MA Treatment Protocol/Stroke Point of Entry Plan: If LKW < 24 hours, then EMS are directed to the closest PSS hospital.

Maine EMS Protocols:

- If LKW ≤ 3 hours and FAST-ED ≥ 4 then transfer to nearest hospital for IV- tPA
- If LKW > 3 hours and FAST-ED ≥ 4, then divert to higher level of care for MER if facility is within 30 minutes

Pennsylvania EMS Protocols:

- If LKW ≤ 3 hours and LVO suspected or contraindications to IV-tPA, then transport to closest CSC/TSC if within 45 minutes
- If LKW between 3 and 24 hours, then transport to closest CSC/TSC if within 45 minutes.

Rhode Island EMS Protocols:

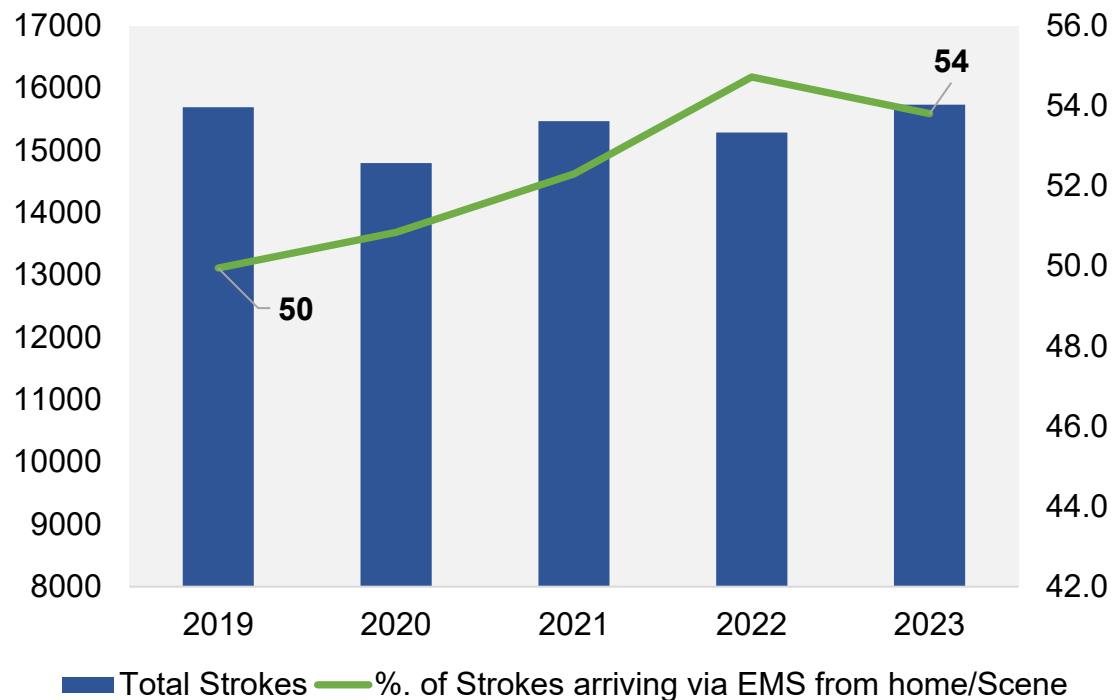
- If LAMS ≥ 4 and LKW <24 hours, then transport to the nearest CSC.

Source: Massachusetts Department of Public Health, MATRIS V3, Extracted May 23, 2024

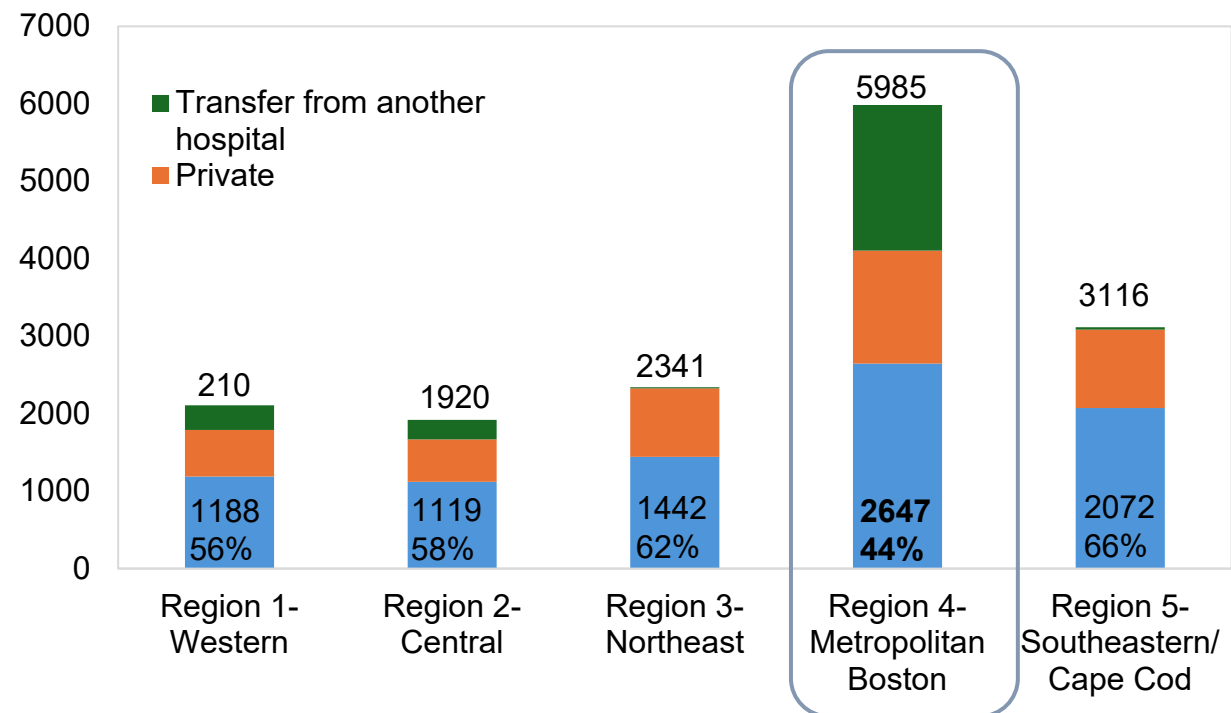
Stroke Patient Mode of Arrival

- The proportion of stroke patients arriving via EMS from home increased slightly from 50% in 2019 to 54% in 2023.
- Region 4- Metropolitan Boston has the smallest proportion of stroke patients transported by EMS (44% vs 66% highest).
 - Note, the highest volume of transfers patients from other hospitals may account for the lower proportion.

Total strokes and % arriving via EMS from home by year, 2019-2023

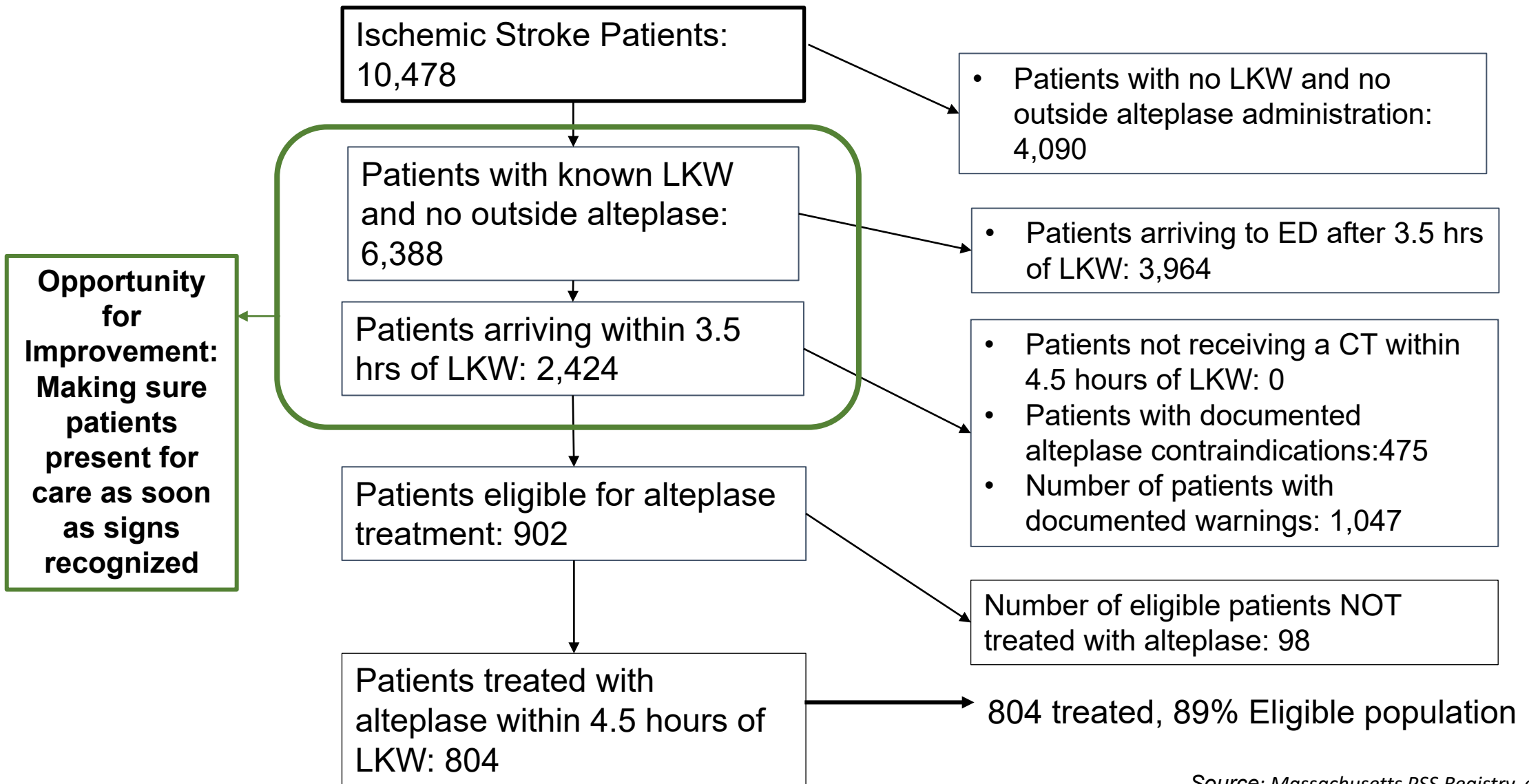


Arrival modes of Stroke patients by region, CY2023



Source: Massachusetts PSS Registry, extracted May 28, 2024

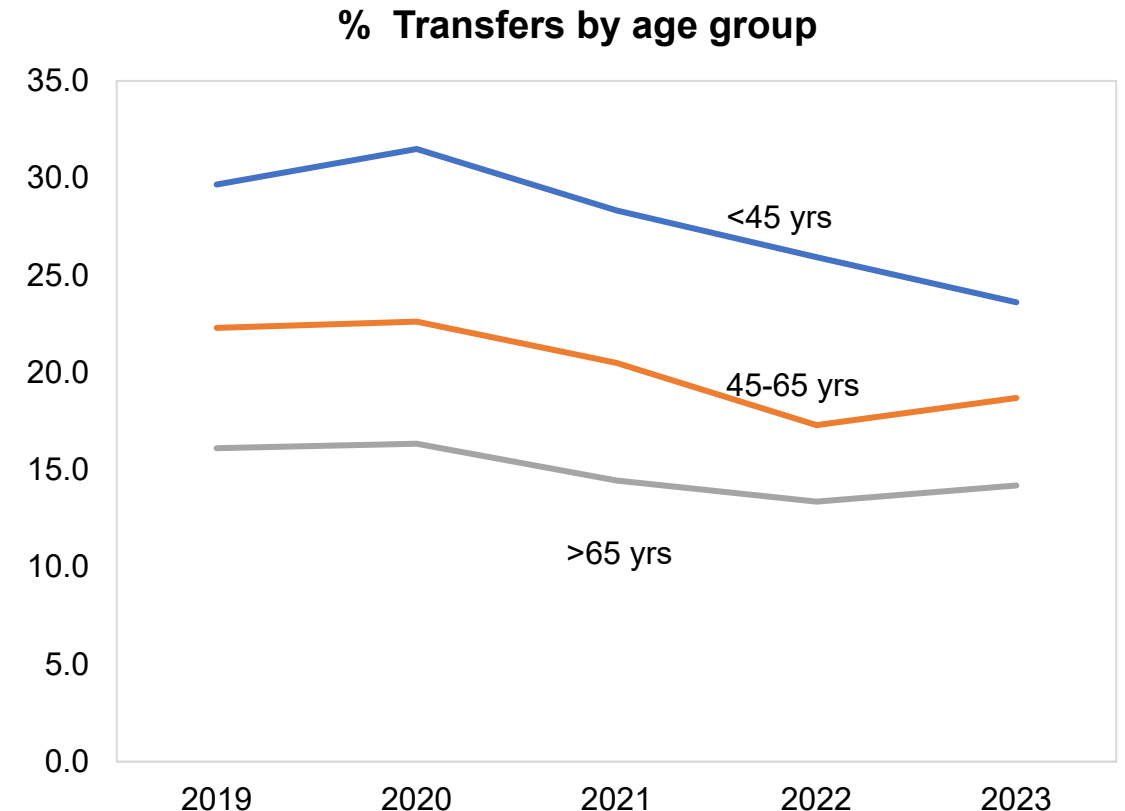
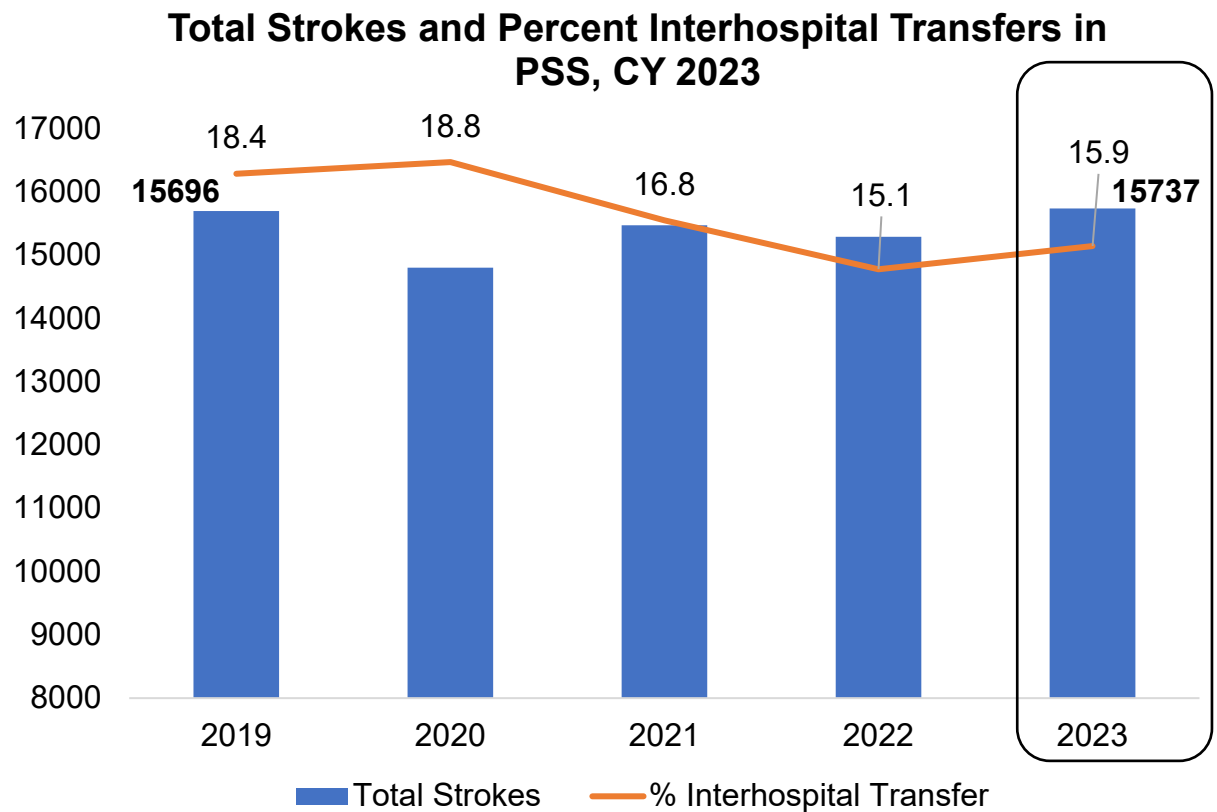
Flowchart of Patient Evaluation and Alteplase Treatment in Ischemic Stroke Patients in Massachusetts at PSS-licensed facilities, CY 2023



Source: Massachusetts PSS Registry, extracted May 28, 2024

Stroke Transfers in PSS Hospitals, CY 2023

- In CY 2023, there were 15,737 stroke cases reported by PSS hospitals which is approaching levels in 2019.
 - 2,498 (15.9%) were interhospital transfers.
- There is higher percent transfers among younger age groups.
 - During COVID-19, all the age groups had the same decreased transfer trend.

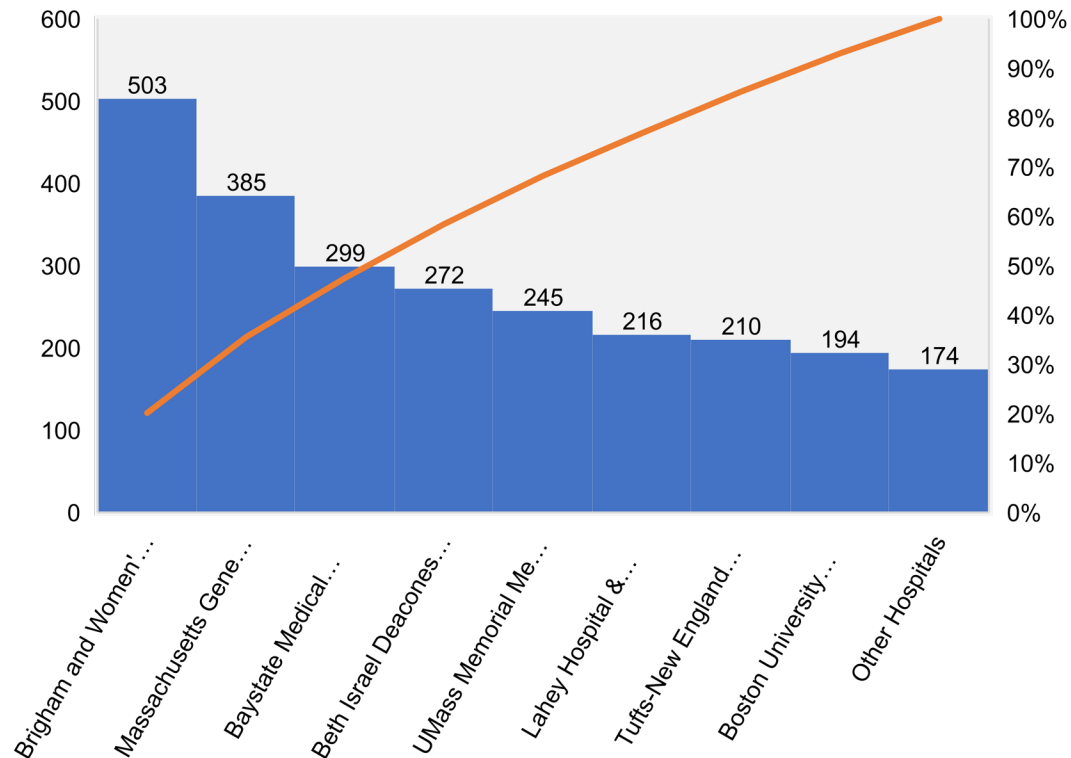


Source: Massachusetts PSS Registry, extracted May 28, 2024

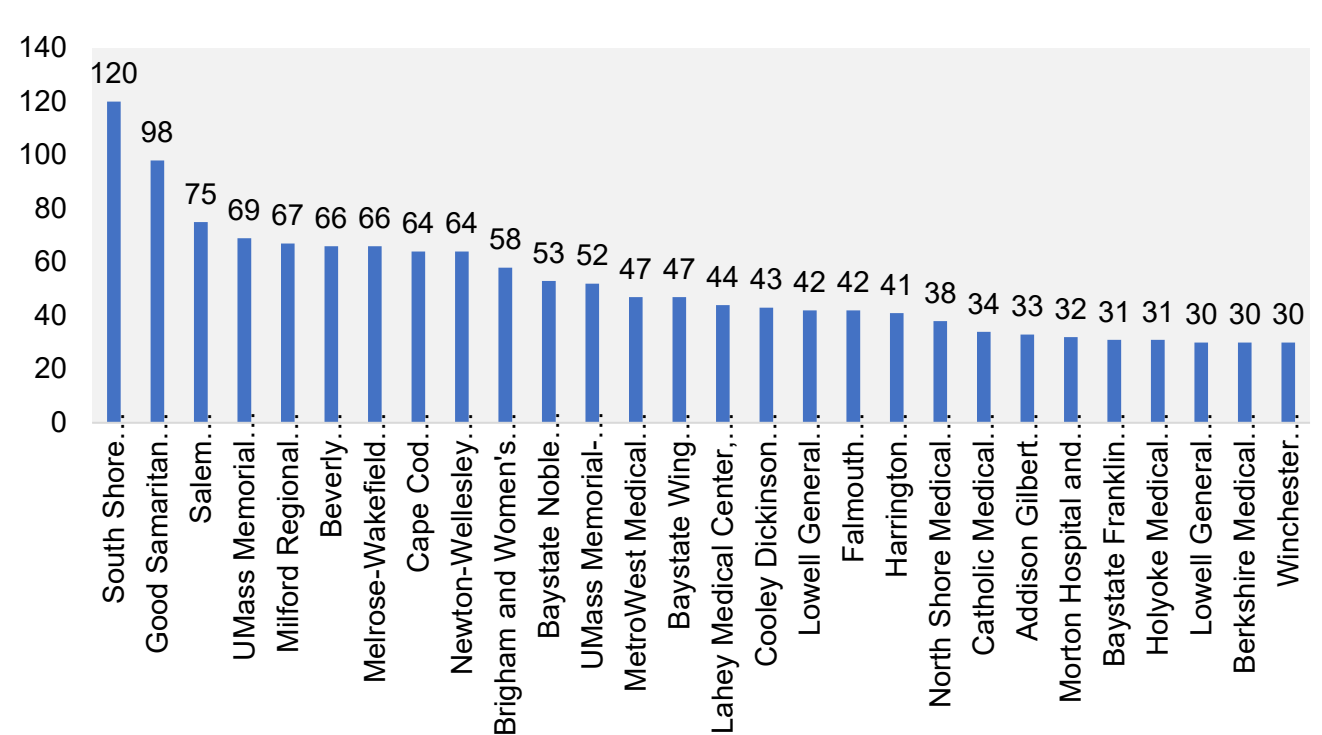
Interhospital Transfers in PSS Facilities

- In CY 2023, PSS facilities reported 2,498 interhospital stroke transfers. The top 8 receiving hospitals account for 93% of the total transfers.
 - 467 interhospital transfers (19%) were missing the name of the sending facility
 - 220 interhospital transfers (9%) of the transfers came from hospitals from outside of Massachusetts

Interhospital Stroke Transfers by Receiving Facility

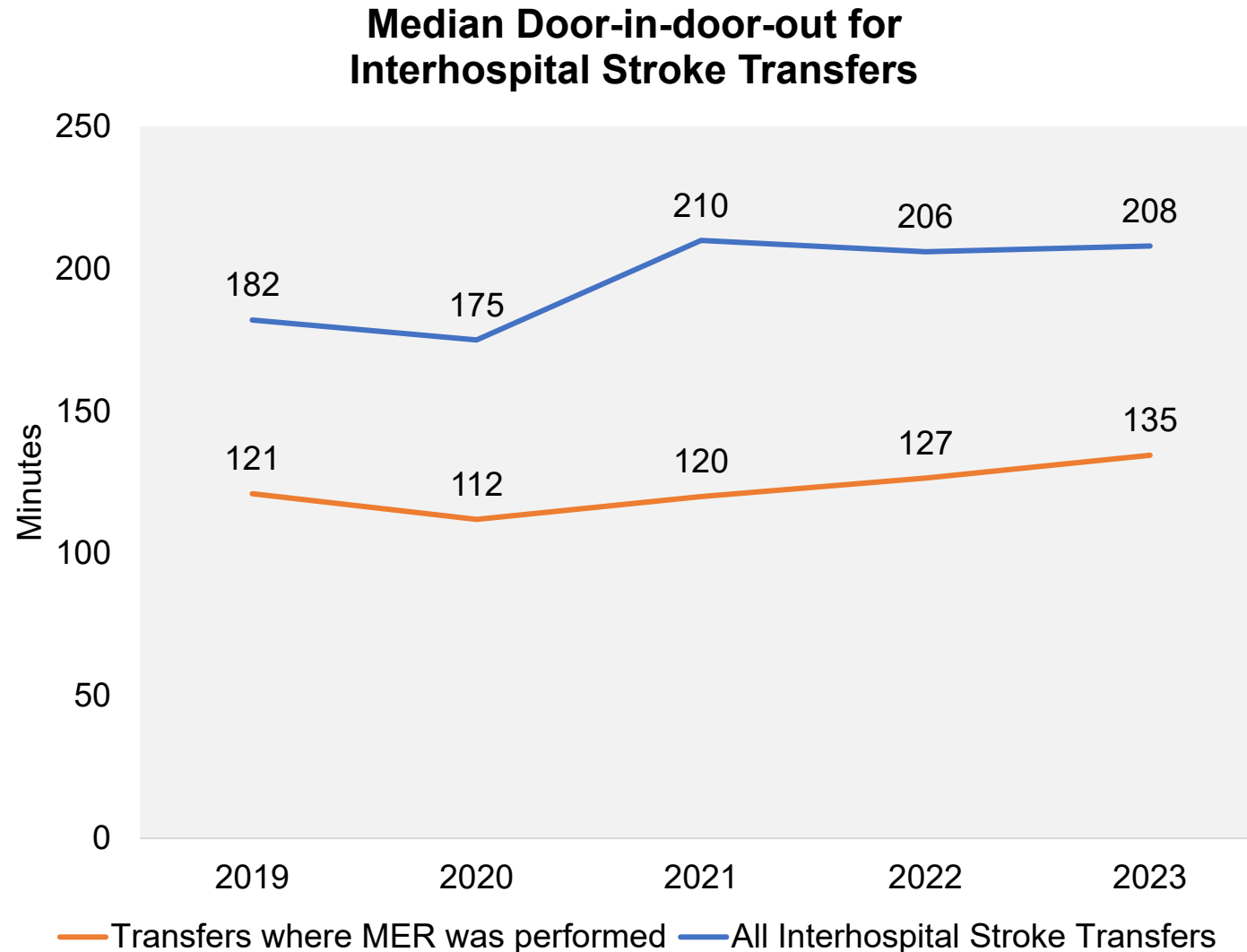


Interhospital Stroke Transfers by Sending Facility



Source: Massachusetts PSS Registry, extracted May 28, 2024

Median Door-In-Door-Out Time for Interhospital Transfers



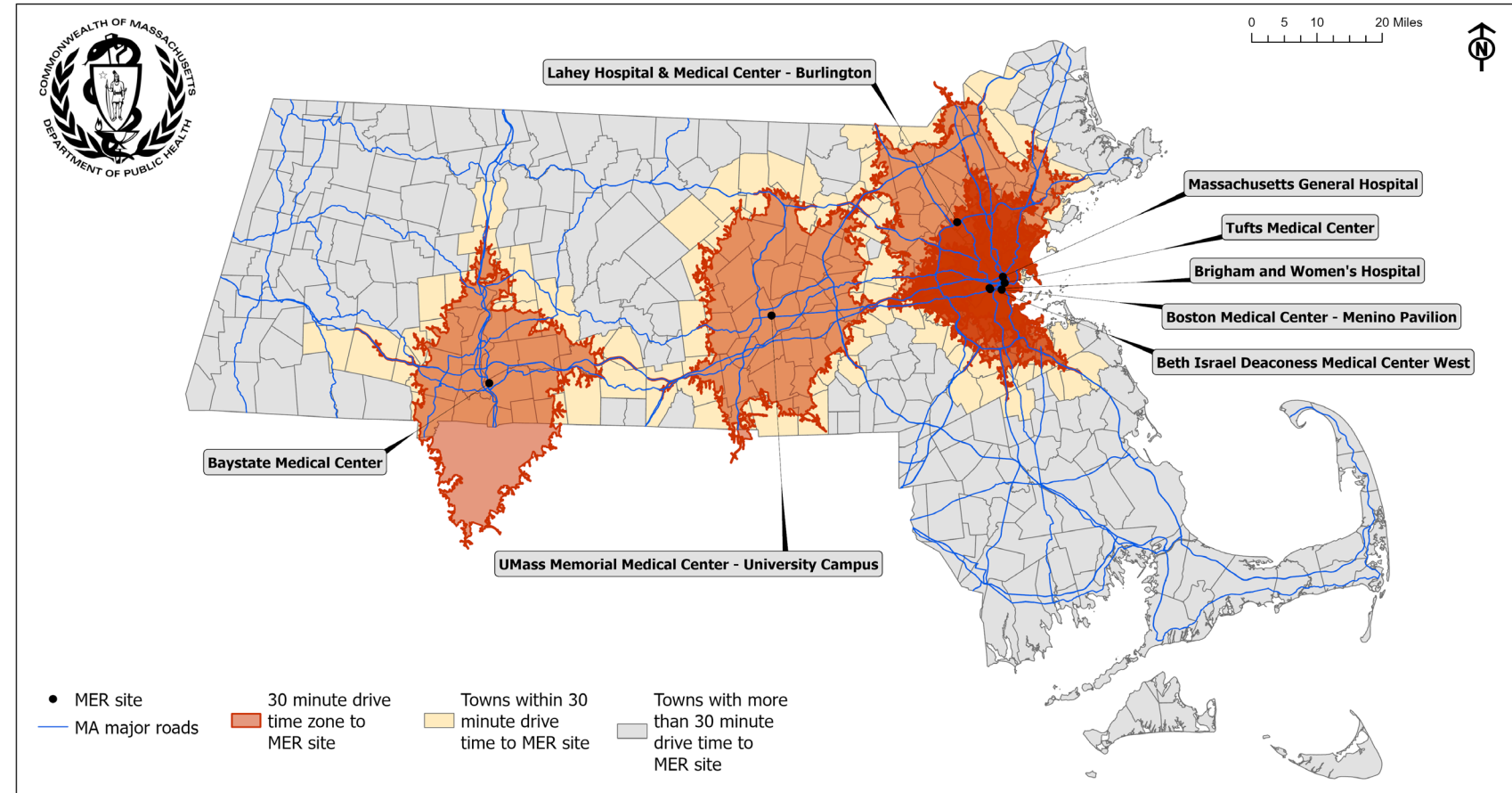
- The median door-in-door-out (DIDO) time for all interhospital stroke transports **increased 14%** from 2019 to 2023.
- For interhospital transports where an MER was performed, the median DIDO **increased 12%** from 2019 to 2023.
 - the percent of stroke patients arriving via EMS increased to 54% in 2023 (was 50% in 2019)

Source: Massachusetts PSS Registry, extracted May 28, 2024

Proximity to PSS Hospitals that Report MER Capabilities

- 72% (N=5,047,045) of MA residents live in the 158 towns within a 30-minute drive time of any MER site.
- Among residents over 65 years old, 66% (N=793,138) live in towns that are within 30 minutes of any MER site.

Massachusetts towns within a 30 minute drive time to MER site



*Based on MA population estimates from the UMass Donahue Center based on 2020 US Census Data

Hospitals that Reported Performing Mechanical Endovascular Reperfusion, CY 2023

- There were 763 reported mechanical endovascular reperfusion (MER) procedures performed in CY 2023.
- Of patients that received these procedures, 64% arrived via interhospital transfer.

Facility Name	No. of MER performed	No. of Ischemic Strokes Treated	Percent of All Ischemic Strokes where MER was performed
UMass Memorial Med. Ctr. - University	158	599	26.38
Boston Medical Center	108	458	23.58
Beth Israel Deaconess Medical Ctr	102	458	22.27
Massachusetts General Hospital	99	609	16.26
Brigham and Women's Hospital - Boston	95	461	20.61
Baystate Medical Center	84	644	13.04
Tufts Medical Center	65	258	25.19
Lahey Hospital & Medical Center	52	522	9.96

Source: Massachusetts PSS Registry, extracted May 28, 2024

PHIT Dashboard: PSS Facility Data

- DPH offers comprehensive data on strokes in PSS facilities and locations of PSS-designated facilities in an interactive dashboard on the mass.gov webpage
- The dashboard tracks stroke performance metrics and stroke patient care with a special emphasis on health equity



Dashboard can be found here: mass.gov/info-details/primary-stroke-service-facilities-in-massachusetts

Designating Hospitals In a Tiered System: Legislative Mandate

Section 90 of Chapter 28 of the Acts of 2023

Notwithstanding any general or special law to the contrary and not later than 180 days after the effective date of this act, the department of public health shall promulgate regulations that create:

- (i) a statewide standard pre-hospital care protocol related to the assessment, treatment and transport of stroke patients by emergency medical services providers to a hospital designated by the department to care for stroke patients; provided, however, that the protocol shall be based on national evidence-based guidelines for transport of stroke patients, consider transport that crosses state lines and include plans for the triage and transport of suspected stroke patients, including, but not limited to, those who may have an emergent large vessel occlusion, to an appropriate facility within a specified timeframe following the onset of symptoms and additional criteria to determine which level of care is the most appropriate destination;
- (ii) statewide criteria for designating hospitals in a tiered system, featuring advanced designations in addition to primary stroke services, to treat stroke patients based on patient acuity; provided, however, that the tiers shall be based on criteria from at least 1 nationally-recognized program and shall not permit self-designation; provided further, that in developing such criteria, the department shall consider:
 - (a) designation models and criteria developed by the Joint Commission, DNV GL Healthcare USA, Inc. or another national certifying body recognized by the Centers for Medicare and Medicaid Services;
 - (b) designation models and criteria adopted by other states and the differences in geography and health care resources of such other states;
 - (c) the clinical and operational capability of a facility to provide stroke services, including emergency and ancillary stroke services;
 - (d) limiting the routing of stroke patients to thrombectomy-capable facilities whenever a comprehensive stroke center is within a recommended timeframe to maximize technical competency and patient outcomes; and
 - (e) procedures to suspend or revoke a facility's designation if the department determines that the facility is not in compliance with designation requirements and procedures to notify emergency medical services providers of any such suspension or revocation; and
- (iii) recommended national evidence-based quality and utilization measure sets for stroke care for use by the center for health information and analysis pursuant to [section 14 of chapter 12C](#) of the General Laws; provided, however, that the department shall consider measures in current use in national quality improvement programs, including, but not limited to, the Centers for Medicare and Medicaid Services, the National Quality Forum, the Paul Coverdell National Acute Stroke Program or other nationally recognized data platforms.

Overview of Tiering Regulation

Proposed Revisions to Hospital Licensure Regulation, 105 CMR 130:

- Set specific licensure requirements for **hospitals with emergency departments and satellite emergency facilities** (SEFs) to be "**acute stroke ready**."
- **Define higher acuity capability levels in the regulation. Allow hospitals demonstrating capability to care for higher acuity patients to seek certification through nationally recognized accreditation entity.**
- Maintain current requirements for data collection and reporting.

Proposed Updates to EMS Protocols (sub-regulatory):

- Maintain FAST-ED as required tool for assessment by EMS personnel
- Update EMS Stroke Point of Entry Plan to **allow for transport to mechanical endovascular reperfusion (MER) site** if the following criteria are met:
 - FAST-ED score is 6 or higher
 - Last Known Well is 4.5 hours or less
 - MER site is no more than 30 minutes farther travel than closest stroke ready hospital