“A Stroke of Genius”

Stroke Care at HDMH

Where we have been, where we are now, and where we are going.

Dr Carmen Baker, Amy Gargal, Dr Tim Lapp

May 21, 2025

Objectives

- Describe the evolution of stroke care planning at MAHC over the past generation
- List the new changes to stroke care within HDMH, and within the community
- Outline the current local deficits in stroke care, and chart the future course of stroke care in Muskoka

“Life can only be understood backwards, but it must be lived forwards”

- Soren Kierkegaard

HDMH 1995

When Roy was just a little boy…

- 3 internists
- 2 surgeons
- 1 OB-Gyn
- 1 full time on-site radiologist
- ER staffed by Family Medicine and General Practitioners and their pets
- 3 women on medical staff
- **No CT**
- Leafs had won the Cup only 28 years previously

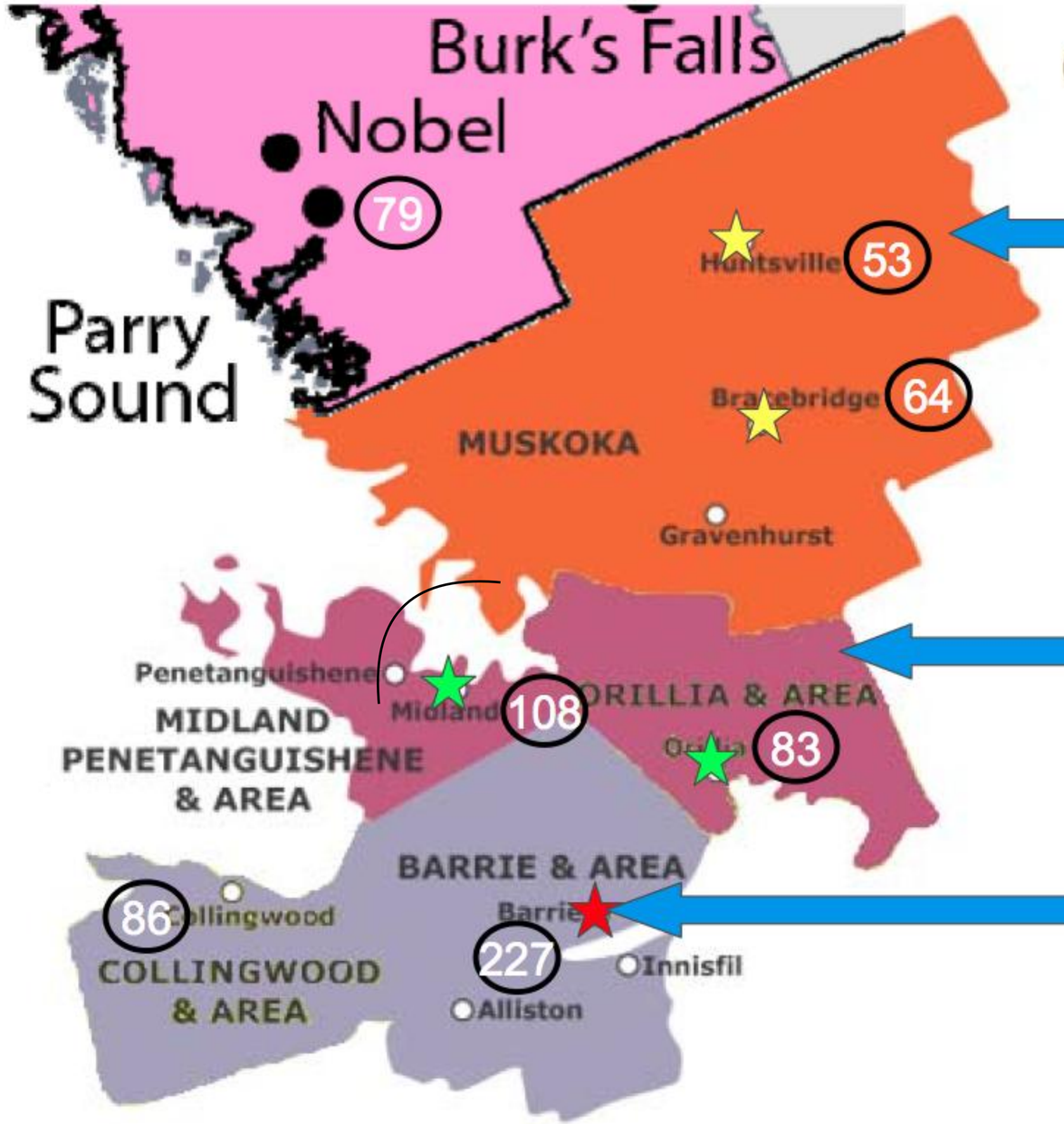
Past

Liberal Government's Ontario Stroke Strategy (1990's)

- 1996 - US FDA approved tPA
- Heart and Stroke Foundation lobbies Ontario government to improve the care of the "forgotten illness"
- 2000 - The Joint Stroke Strategy Working Group Report published, "Towards an Integrated Stoke Strategy for Ontario"
- 2001 - Pilot projects completed (London, Kingston, West Toronto), and then 6 Regional Stroke Centres established
- 2003 - Regional Centres 9, District Centres 15, Secondary Prevention Clinics 13
- 2006-07 - HDMH funded as a District Stroke Centre

Past

Central East Stroke Network



Option 1 revised

Areas clustered = Muskoka & Area + Parry Sound

Clustered stroke volume = 196* (53+64+79)

Minimum # ISU beds = 13.1 - 32.6*

travel time 30-75 minutes

Areas clustered = Midland/Penetang & Area + Orillia & Area

Clustered stroke volume = 191* (108+83)

Minimum # ISU beds = 12.8 – 33*

travel time 55 minutes

Areas clustered = Collingwood & Area + Barrie & Area

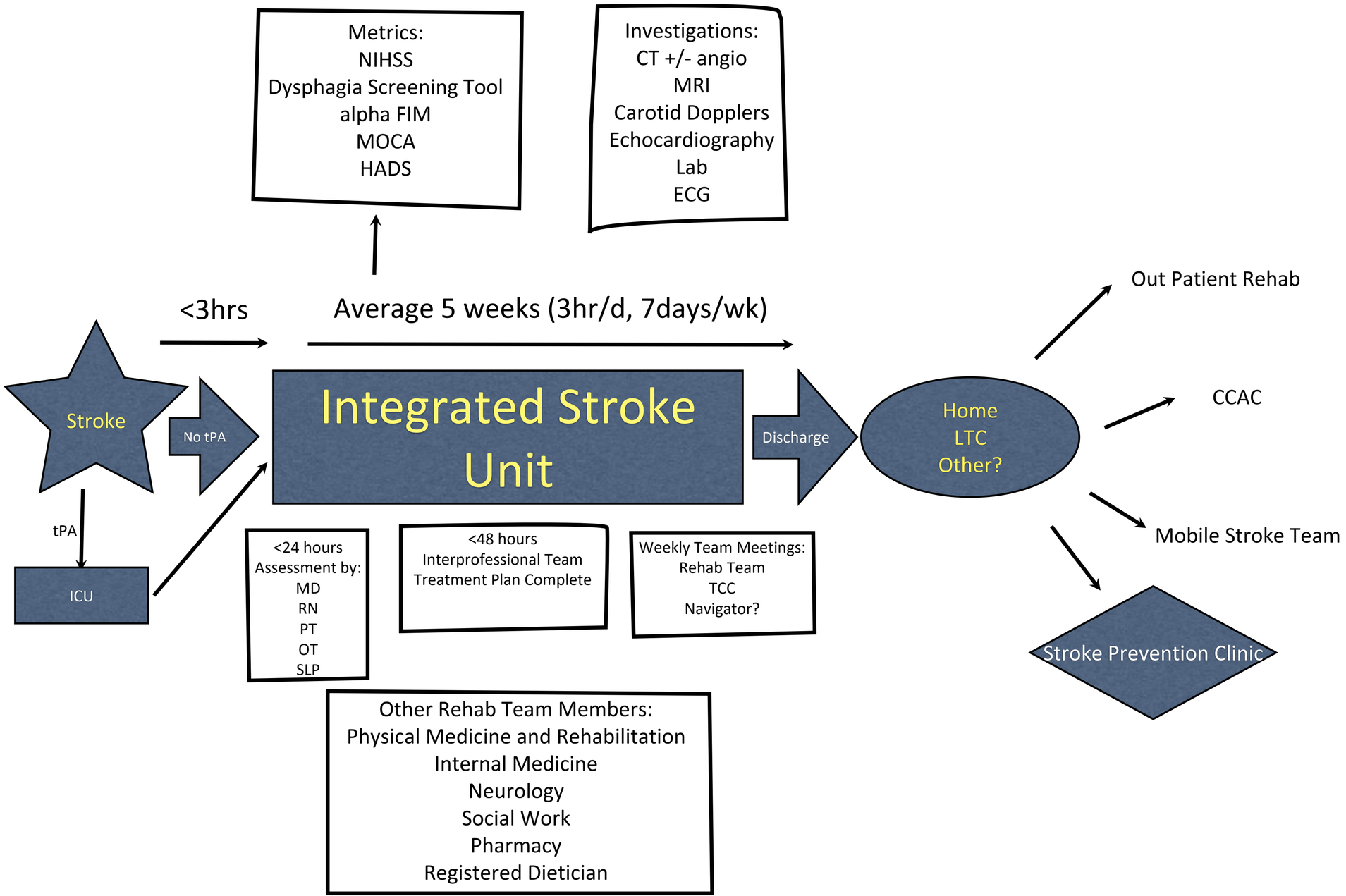
Clustered stroke volume = 313 (86+227)

Minimum # ISU beds = 21 – 66.2*

travel time 55 minutes

Integrated Stroke Unit System Design, June 2013

Dr T. Lapp MD MSc FRCPC



Past


CorHealth
Ontario
Advancing cardiac, stroke
and vascular care
Ontario Stroke Report FY 2019-20
Release Date: June 2021

Ontario 2019-2020

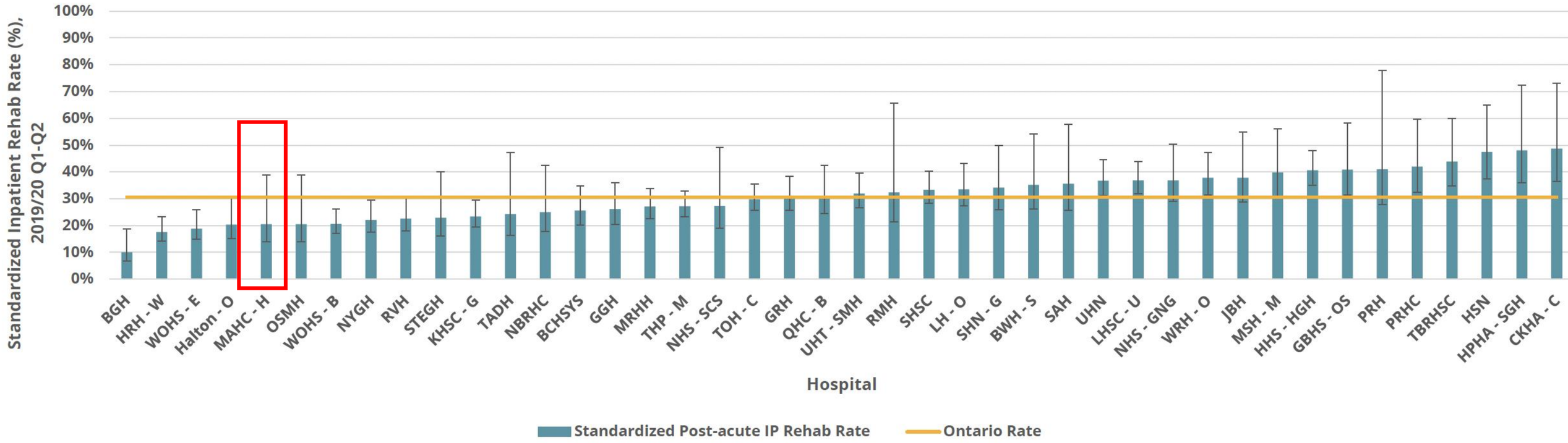
Overall Performance
Hyperacute and Acute Care

Patients who receive stroke unit care are more likely to survive, return home and regain independence compared to patients who receive generalized care.[2] In 2019/20, only 54% of Ontario's stroke patients received care on a stroke unit, and there is a wide range across LHINs (16% - 81%) in the proportion of patients that received care on a stroke unit. Access to stroke unit care has also been found to influence access to other stroke best practices such as timely and appropriate stroke rehabilitation and applicable diagnostics such as carotid imaging. Further system planning is required to optimize the benefits of stroke unit care and meet the target of 75% access.[3]

Chapter 4: Post-Acute Stroke Rehabilitation Access and Timeliness
Indicator 4.1.2: Standardized Rate of Access to Post-Acute Inpatient Rehabilitation, FY 2019/20 Q1-Q2

Indicator Description:

Proportion of stroke patients discharged alive who went to inpatient stroke rehabilitation



CorHealth

Background

In 2021, Ontario Health-CorHealth Ontario, in collaboration with key stroke system stakeholders, set out to better understand and improve the state of stroke unit access and quality in Ontario. This initiative aims to address the longstanding poor stroke unit access rates and inequities that exist across Ontario's geography. In addition, this initiative aims to provide a renewed clarity to the definition of a stroke unit and the components to support consistent delivery and operationalization of this service. These components apply to acute stroke units and the acute portion of integrated[6] stroke units (refer to Provincial Stroke Unit Definition and Components).

CorHealth

Stroke Unit Types

ONTARIO STROKE UNIT DEFINITION

A **stroke unit** is a specialized unit dedicated to the care of persons with stroke and staffed by an experienced, interprofessional stroke team. The unit has designated stroke unit beds that are co-located and in physical proximity to each other. These beds are used to provide care for stroke patients most of the time.

There are three types of stroke units – acute stroke units, integrated stroke units[7] and inpatient stroke rehabilitation units. The Ontario Stroke Unit Components have been developed to address care within acute stroke units, and the acute portion of integrated stroke units. These 2 types of units are defined below:

1. **Acute Stroke Unit:** A stroke unit that provides only acute care to patients with stroke.
2. **Integrated Stroke Unit[7]:** A stroke unit that provides both acute and rehabilitation care to patients with stroke.

Past

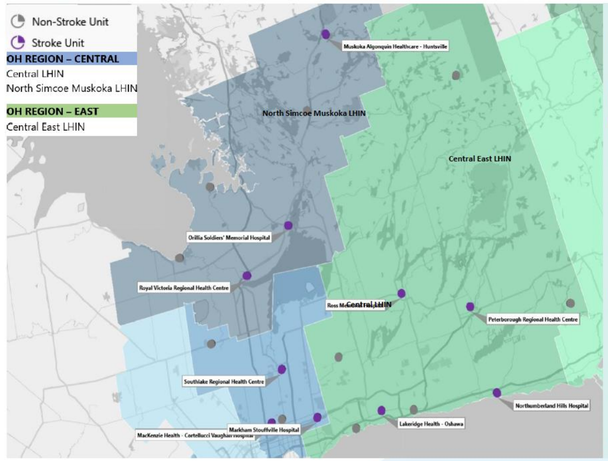
Stroke Unit Access Regional Engagement

Central East Stroke Network
(Muskoka, Simcoe and York Districts in Ontario Health Region Central)

DATE TBD

Ontario Health
CorHealth Ontario

Central East Stroke Region



About the Districts of Muskoka, Simcoe and York

The stroke districts of Muskoka, Simcoe and York are part of the Central East Stroke Network within OH Region Central

The Regional Stroke Network team is located at **Royal Victoria Regional Health Centre** which is an Enhanced District Stroke Centre- System

District of Muskoka

- 1 Stroke Unit Hospital (MAH-Huntsville*)- Acute Stroke Unit
- 1 Non-Stroke Unit Hospital (MAH- Bracebridge)

District of Simcoe

- 2 Stroke Unit Hospitals (Royal Victoria Hospital and Orillia Soldiers' Memorial Hospital)- both Integrated Stroke Units
- 3 Non-Stroke Unit Hospitals (Georgian Bay General Hospital, Collingwood General and Marine Hospital, Stevenson Memorial Hospital)

District of York

- 3 Stroke Unit Hospitals (Mackenzie Health-Cortellucci Vaughan Hospital Site*, Oak Valley Health-Markham Stouffville Hospital, Southlake Regional Health Centre)- All Integrated Stroke Units
- 1 Non-Stroke Unit Hospital (Mackenzie Health-Richmond Hill Site)
- Oak Valley Health – Uxbridge Site (in Durham Region/OH East) is a Non-Stroke Unit Hospital

*District Stroke Centre

Stroke Unit Access & Quality Initiative

Goal: To enable better outcomes for patients in Ontario who experience a stroke by ensuring they have equitable access to evidence-based stroke unit care (3–4-year framework)

A multi-year, priority initiative established within Ontario Health's Annual Business Plan

Phase 1: Establishing Best Practice & Understanding Current State

- Set the foundation for best practice stroke unit care in Ontario through a renewed definition and clearly defined components
- Assess current state of stroke units and access to these units, including barriers and opportunities to improve local and regional access

2022-2023

Phase 2: Driving Adoption of Best Practice & Improving Stroke Unit Access

- Strengthen partnerships and collaboratively support stroke unit hospitals in gap identification and building towards meeting the new stroke unit definition and best practice components
- Work with system partners to explore and initiate key opportunities to improve access to stroke unit care

2023-2024

Phase 3: Enhancing Quality of Care & System Performance

- Develop a measurement framework to understand and drive quality improvement (i.e., quality of care on stroke units)
- Advance and sustain regional system supports and changes identified as opportunities to promote equitable access to high quality stroke unit care

2024-2026+

Ontario Health
CorHealth Ontario

Ontario Stroke Unit Definition

A best practice standard for stroke units in Ontario

JUNE 2023

ONTARIO STROKE UNIT DEFINITION .....

COMPONENTS .....

Component 1 – Minimum Volumes .....

Component 2 – Interprofessional Team Composition .....

Component 3 – Interprofessional Team Availability .....

Component 4 – Stroke Care Training and Expertise among Staff .....

Component 5 – Co-Location of Stroke Unit Beds .....

Component 6 – Prioritization of Stroke Unit Beds for Stroke Care .....

Component 7 – Pathways to Transition out of Acute Stroke Care .....

Component 8 – Performance Measurement, Monitoring and Reporting ....

Component 9 – On-Site Availability of Diagnostic Resources .....

Component 10 – Patient, Family and Caregiver Education .....

Impact of Stroke Unit Care

Compared to general medical care, stroke unit care,

significantly increases chances of surviving the stroke

+

significantly increases chances of regaining function to return home

+

decreases the chances of subsequent strokes

+

provides patients with access to stroke expertise

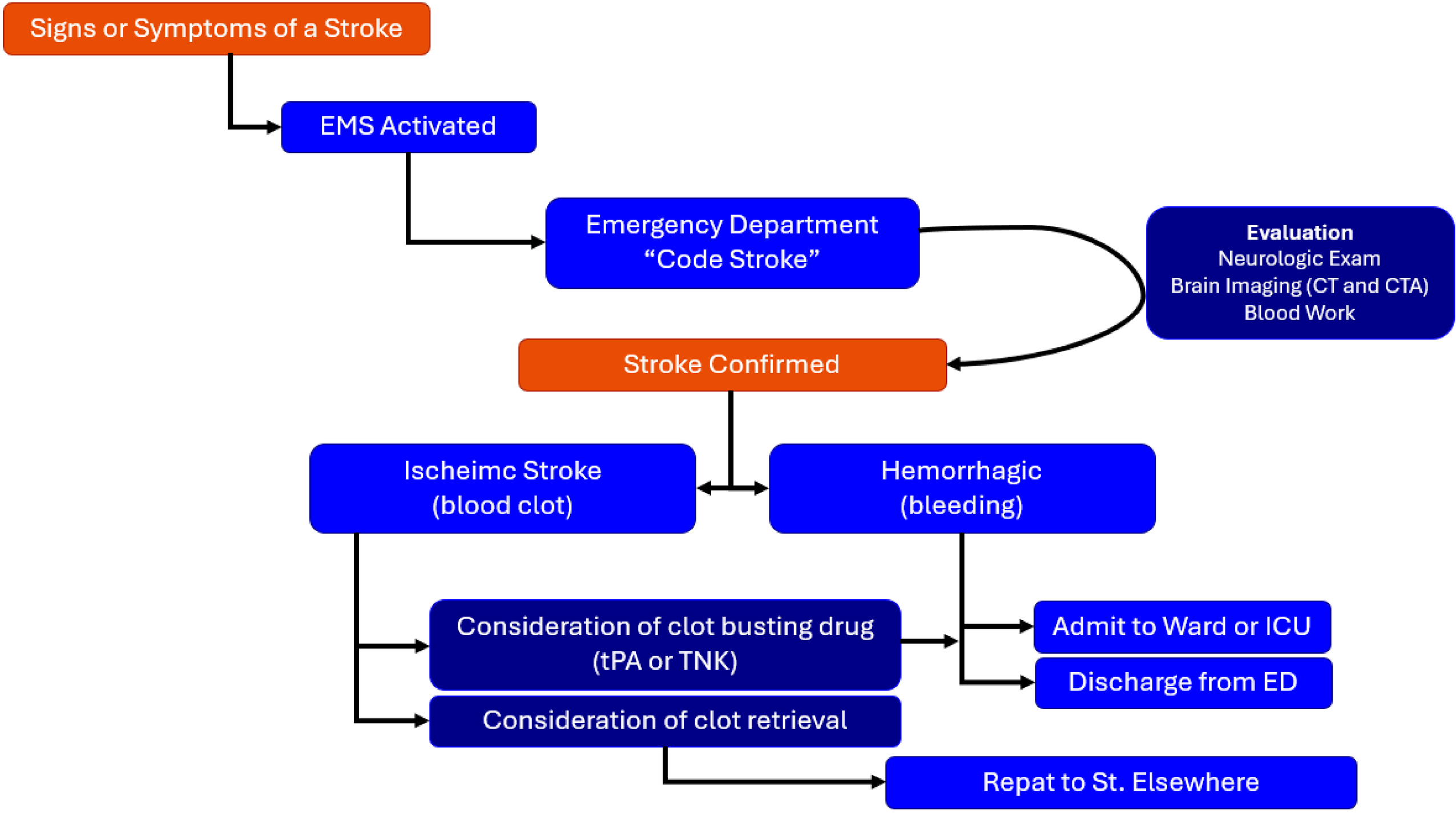
→ better patient outcomes

Stroke expertise is critical to:

- medically stabilize patients
- identify stroke etiology
- manage stroke related deficits such as aphasia and paralysis
- reduce post-stroke complications
- support early mobilization
- provide appropriate emotional support to patients and families
- facilitate access and flow to rehabilitative care.

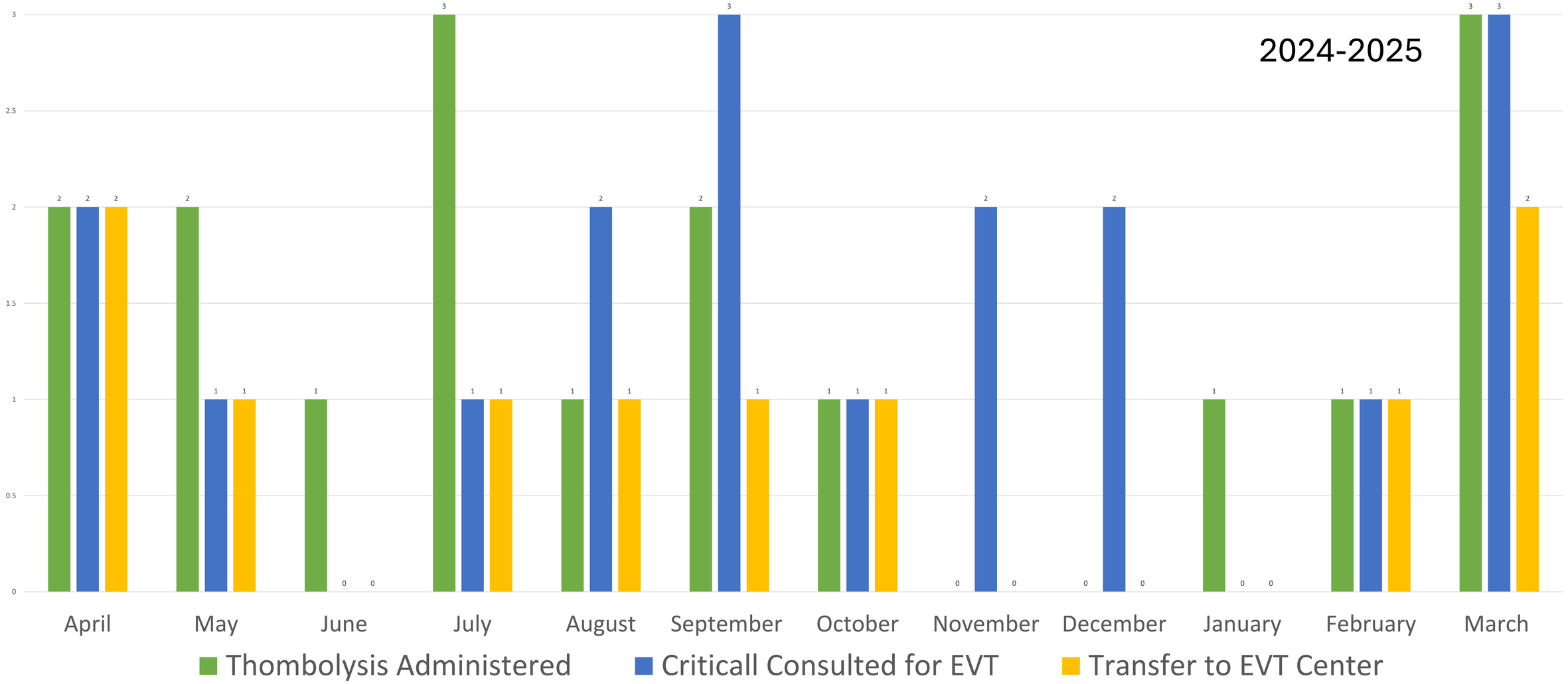
"Stroke unit care is the single most effective intervention of stroke care across the continuum."

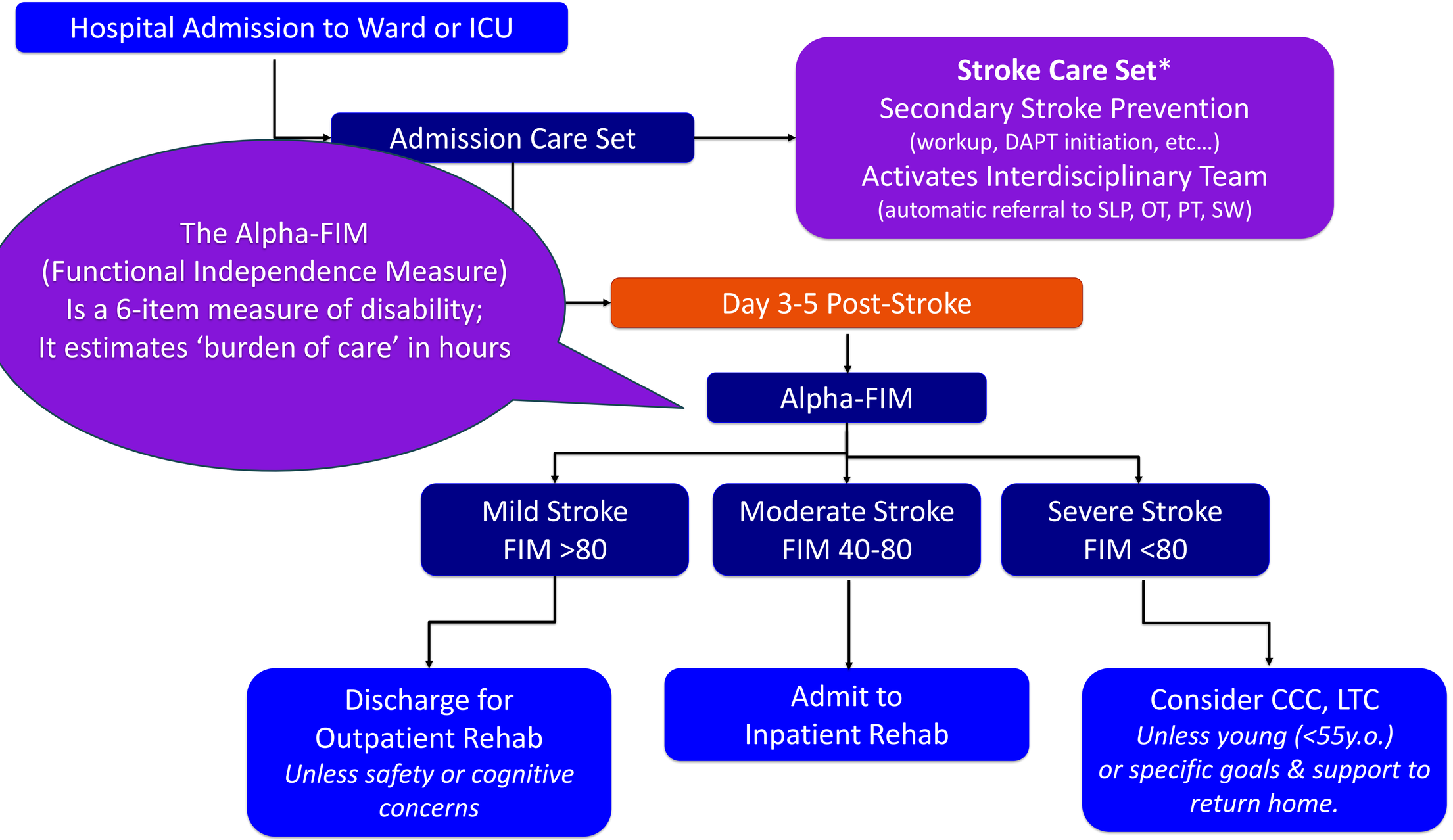
WHERE ARE WE NOW?


Signs or Symptoms of a Stroke
EMS Activated
Emergency Department
"Code Stroke"
Evaluation
Neurologic Exam
Brain Imaging (CT and CTA)
Blood Work
Stroke Confirmed
Ischeimc Stroke
(blood clot)
Hemorrhagic
(bleeding)
Consideration of clot busting drug
(tPA or TNK)
Consideration of clot retrieval
Admit to Ward or ICU
Discharge from ED
Repat to St. Elsewhere

Hyperacute Care

HDMH is a designated stroke site, delivering **thrombolysis** for acute ischemic stroke for all patients in the District
EVT eligibility screening up to 24 hrs – access through 3 Toronto sites





*Needs work – part of QI initiative this summer. Let us know if you want to help!

Inpatient Care

Admit Date

	Fiscal Year				
Institution	FY 19/20	FY 20/21	FY 21/22	FY 22/23	FY 23/24
54616 - MUSKOKA ALGONQUIN HEALTHCARE-HUNTSVILLE	121	115	95	90	100
54619 - MUSKOKA ALGONQUIN HEALTHCARE-BRACEBRIDGE	87	58	66	65	76
Grand Total	208	173	161	155	176

Inclusive of Hemorrhagic, Ischemic and TIA Stroke admissions.

- Consolidating Patients – 4 beds on East (Acute) 4-6 on South (Rehab)
- Increasing Staff Competency
- Creating Standardized Tools
- Ordersets flag staff involvement / initiate standard workflows

Case Example

54y.o. RHD man presents with right facial, upper and lower limb weakness and sensory dysfunction. Had been working as a carpenter, enjoys playing guitar.

1. Presents to ED assessed → Code Stroke → Left MCA infarct.
2. Not a candidate for tPA, not a candidate for EVT.
3. Admitted to MAHC-H inpatient unit.
4. Assessed by interdisciplinary care team and determined to be a moderately severe stroke.
5. Admitted to stroke rehabilitation inpatient unit.

Case Example

6. Began intensive inpatient rehabilitation with PT, OT, SLP, SW, RD.
   - Goals identified: 1) Return to work as carpenter, 2) return to guitar, 3) return to community ambulation, 4) return to independence for ADLs
7. Progressing well from mobility perspective.
   PT and OT noted 2 issues affecting right arm recovery: spasticity and chronic wrist pain.
8. Physiatry assessment created formal plan for MSK issue & spasticity addressed.
9. Progressed to independence with ADLs. Discharged home.
10. Admitted to outpatient rehabilitation. Ongoing work with PT, OT and PMR for RUL function → increased efficiency ADLs, return to work and return to guitar playing.

What *IS* Stroke Rehabilitation?

"A progressive, dynamic, **goal oriented process** aimed at enabling a person with stroke-related impairment **to optimize** their optimal physical, cognitive, emotional, communicative, and social **Function**

Rehabilitation is NOT a setting, rather, it is a process that includes a set of activities that begins soon after the initial event, once the patient is medically stable to participate and can identify goals for rehabilitation, recovery and participation."

Canadian Stroke Best Practices 2025

The MAHC-H Rehab Team

- Physiotherapist
- Occupational Therapist
- Speech Language Pathologist
- Registered Dietician
- Social Worker
- Stroke Nurse
- You! (MRP or PCP)
- Me!

Why a Stroke Rehab Unit?

Formally Coordinated Care leads to better outcomes

Defined team

INTERPROFESSIONAL

Collaborative

Process-Based

Multiple Settings (defined)

Canadian Stroke Best Practices Guidelines

What is the role of the MRP?

- Ensure medical stability
  - Enhances patient participation
- Evaluate and work to Mitigate Secondary Stroke Risk Factors
  - Can be done over duration of stay
- Discharge plan for secondary stroke risk factor management
  - Early Discharge Prescriptions
  - Holter Monitor

How Can I Help?

- Does the stroke match the deficits?
- Monitoring for post-stroke complications (acute and chronic)
- Monitor motor recovery/ spasticity
- Diagnose & Treat post-stroke shoulder pain and other painful conditions including CRPS, neuropathic pain, etc…
- Address Energy, Mood, Sleep or other issues that may impede recovery or participation.
- Assess ability to drive, work, and help with supportive discharge (home situation)
- Ensure patient flow to optimal location
- Ensure outpatient follow-up

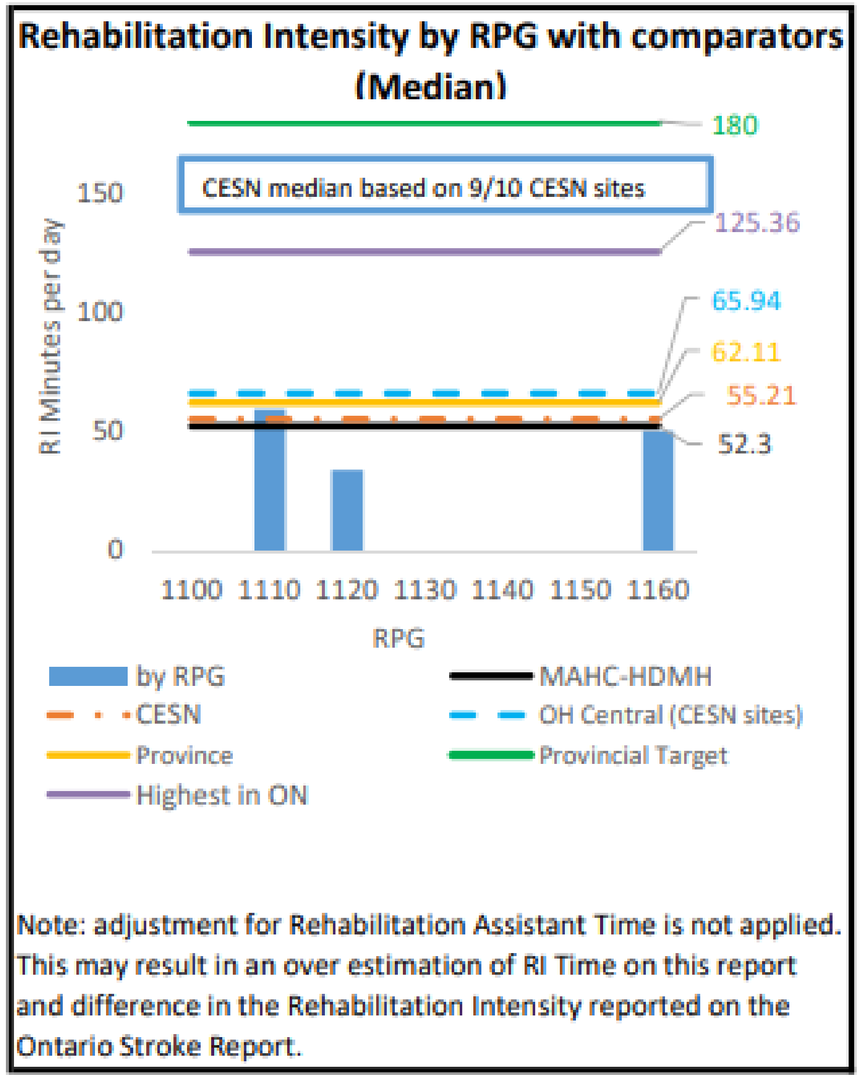
Stroke Rehab Rounds

- Interdisciplinary discussion to optimize rehabilitation
  - Discussion focuses on factors that may be impeding the rate and reducing the potential maximum recovery.
- Approximate 5-minute discussion on every patient with a stroke.

Every Wednesday morning at 11am

Please join us for your patients!!!

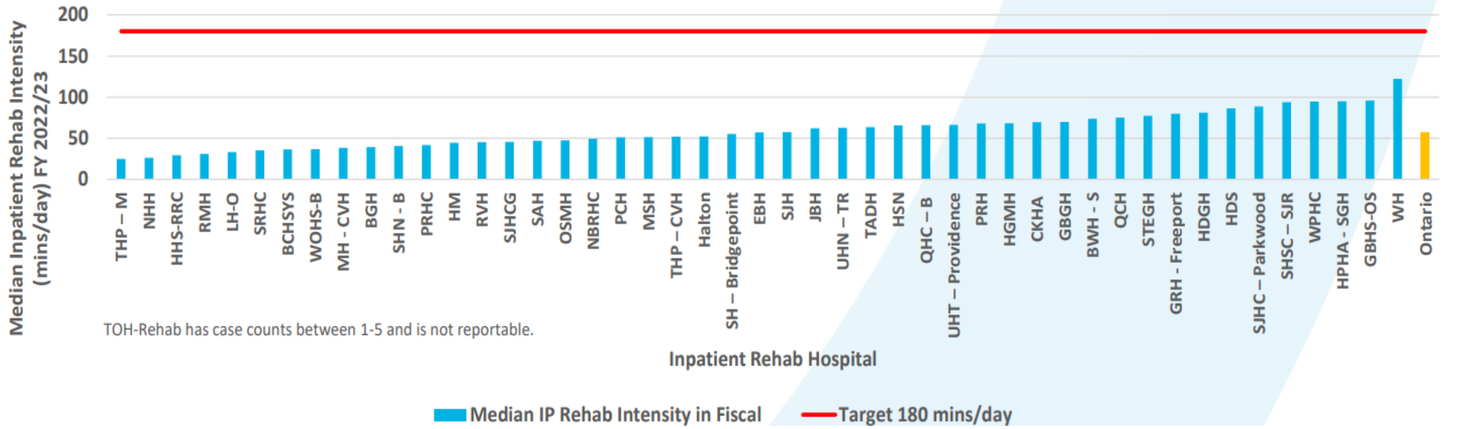
Specialized Rehab Needs – Meeting Rehab Intensity



Chapter 4: Post-Acute Stroke Rehabilitation Access and Timeliness
Indicator 4.5: Median Minutes per Day of Direct Inpatient Rehabilitation Therapy, FY 2022/23 – *Hospital Level*

Indicator Description:

This indicator measures number of minutes per day of direct therapy (OT, PT, SLP) received by patient with stroke during their active inpatient rehab stay. Target is 180 minutes/day[4]



CESN: MAHC –HDMH Stroke Inpatient Rehabilitation Report 2024-25 Q3;
Ontario Stroke Report FY 2022-2023

Outpatient Stroke Rehabilitation

New Service To Muskoka Since Sept 2024, Delivered at HDMH

Services Include:

- Assessed by interdisciplinary team to meet their stroke rehabilitation goals.
- Up to 3 visits per week with each core profession (PT/OT/ SLP/SW) for maximum 12 weeks
- Our team has regular contact and collaboration with physiatry

Eligibility Criteria:

- diagnosis of stroke within the past 3 months
- are medically stable
- require one of the following services: OT, PT, SLP, SW,
- are willing to participate in programming,
- do not use a mechanical lift

To Refer :

- Available on MAHC's Webpage or Sharepoint
- Forms can be emailed or scanned to:
  OutpatientStrokeRehab@mahc.ca

Outpatient Stroke Rehabilitation

What we've done to date

Services Offered September- April 1 2025

- 32 patients enrolled
- 21 patients completed program/goals
- AVG LOS 10 weeks in program

Where we're going

- Grow team- Expertise / Number of Personnel/ SPACE!
- Community Visits- Rec Center, Shopping Centers, Workplace Visits
- Future- Satellite clinic locations

Current Local Stroke Care Deficits

- Dispersed care within HDMH (acute vs rehab)
- Implementing and Maintaining Caregiver/Therapist expertise
- Absence of local Stroke Secondary Prevention Clinics
- Lack of sufficient physical space to meet need for out-patient therapy
- Insufficient in-patient therapy intensity/duration/frequency
- Lack of full Rehabilitation mandate (ie an ISU)
- Absence of community integration with therapists
- Unavailability of regional EVT

Future HDMH Stroke Care

(Near)

- MRI
- CT perfusion with Rapid AI (assist with EVT eligibility)
- Full complement of fully trained nurses/therapists within current model
- Robust regional stroke care
  - Enhanced community-based services
  - Integrated Stroke Unit
  - Local stroke data analytics and research
  - Improved access to secondary stroke prevention
  - Partnerships with community-based services (March of Dimes, The Friends)

Future of MAHC Stroke Care

Muskoka Algonquin Healthcare |

1.3 Functional Program

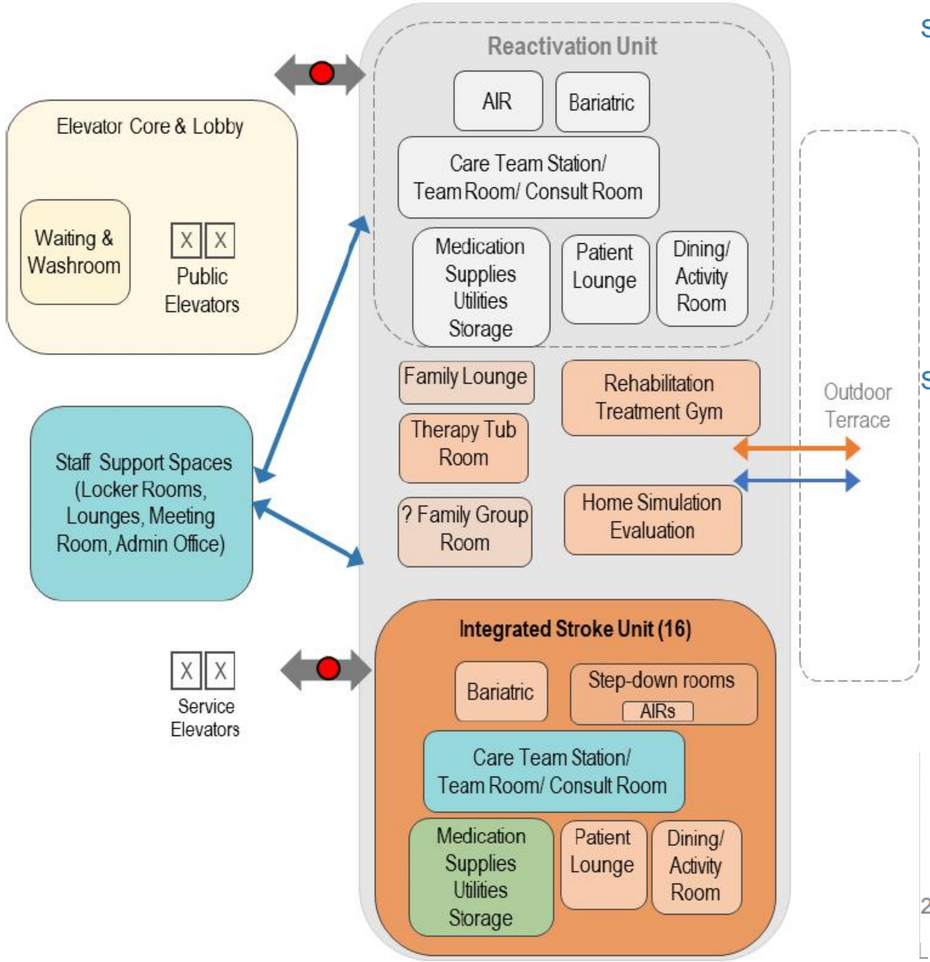
Huntsville District Memorial Hospital Redevelopment

Group #2 | Muskoka Algonquin Healthcare - Stage 1.3 Space Planning Workshop Round 4

Resource Planning Group Inc.
4-14-2023

Future

Figure 2. Functional Relationship – Integrated Stroke Unit



10. Integrated Stroke Unit

This represents the first draft of the Functional Program for the Integrated Stroke Unit.

Questions or areas for further discussion have been shown in pink, however this is a preliminary draft and therefore all information is subject to review and editing, as may be required.

Functional Description (Current and Projected)

Summary

In the new HDMH build, the Integrated Stroke Unit (ISU) will support the delivery of both acute care and rehabilitation for stroke patients from admission to discharge in 16 beds. The ISU will provide assessment, treatment, follow-up, and education to support patients and families along the continuum of stroke care. Supportive spaces (Rehabilitation Gym, ADL assessment areas) will be shared with an adjacent Reactivation Unit.

The creation of a purpose-built environment with a dedicated interprofessional team for the ISU will allow for the further refinement of a coordinated, organized, best-practice model of stroke care and will help improve patient outcomes, reduce overall health care expenditure, and promote an accessible, equitable and efficient stroke system. It is anticipated that the ISU will enable more stroke patients to be cared for closer to home and avoid transfer to other Stroke Centres.

Service Overview

The Integrated Stroke Unit service model includes:

- Initial acute care stabilization (usual several days)
- Rehabilitation to regain function through a gradual increase of activity (usual weeks)
- Outpatient rehabilitation?

In future, the care will be delivered in:

- Medical/Surgical Inpatient rooms
- Rehabilitation Treatment Gym
- ADL Assessment Area (includes a bedroom, 4-piece washroom (with tub), laundry station (washer/dryer) and kitchenette (including stove))

Future HDMH Stroke Care

(Far)

- Improved pre-hospital stroke triage technology
- Enhanced neuroprotective medications
- Longer window for safe recanalization therapies
- Wearable sensors and home-based technology for optimal rehabilitation
- Rehab robotics

Future

Canadian Stroke Best Practices guidelines

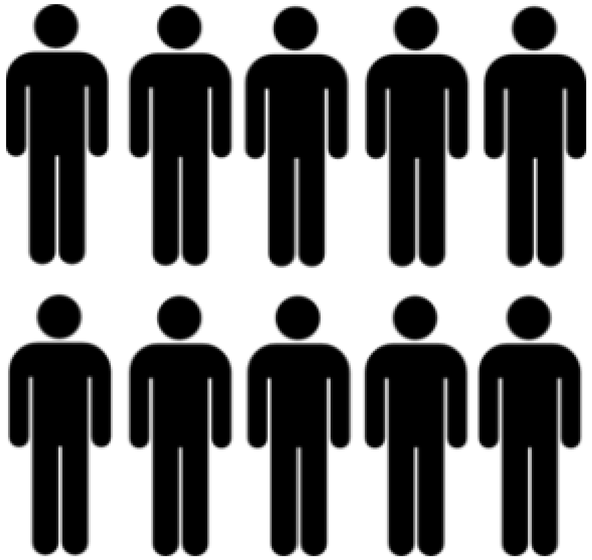
- strokebestpractices.ca

Research 2025-2027

- “Analyses of Thrombolytic Use and Outcomes in a Rural Northern Community Hospital”
- NOAMA funded - Lapp, Allen, Baker, Foell, Gargal, Johnstone, Simpson
- Stay tuned…

Data and Patient Characteristics

- 71 patients received tPA
- Time range: 2019-2024



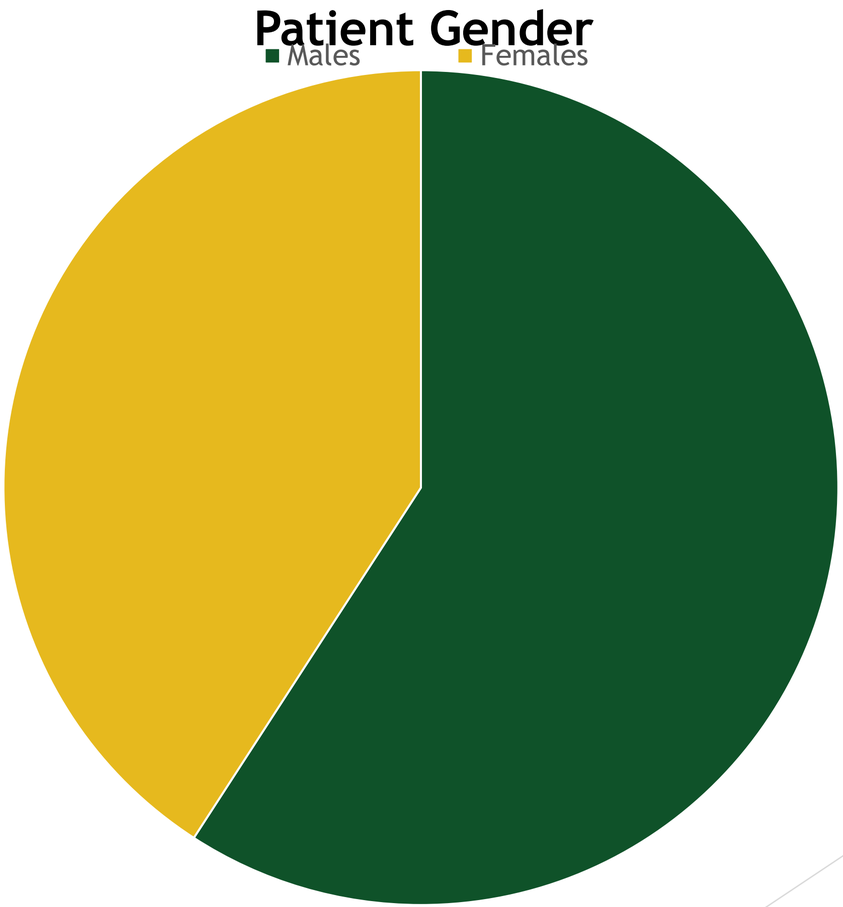
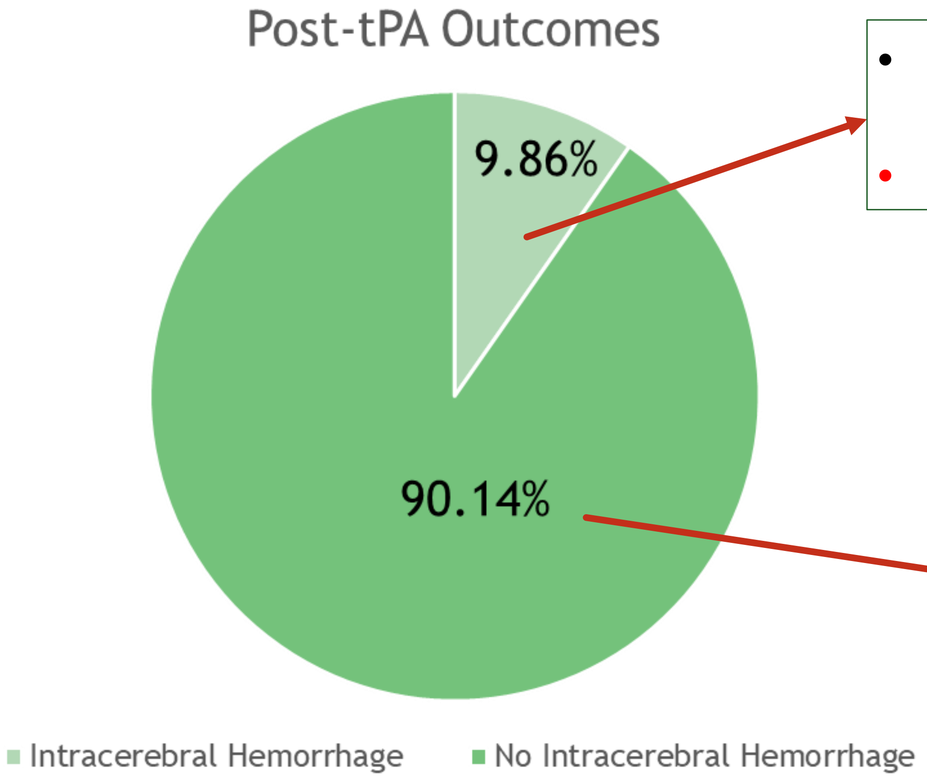


Figure 1: Graph showing the gender of the patients included for the QI.

Deaths and Intracerebral Hemorrhages



- 7 Patients had a post-tPA intracerebral hemorrhage
- 2 Deaths **28.6% Died**

- 64 Patients did **NOT** have an intracerebral hemorrhage
- 2 Deaths **3.13% Died**

Figure 6: Proportion of patients who experienced a post-tPA intracerebral hemorrhage.

Patient Discharge After Stroke

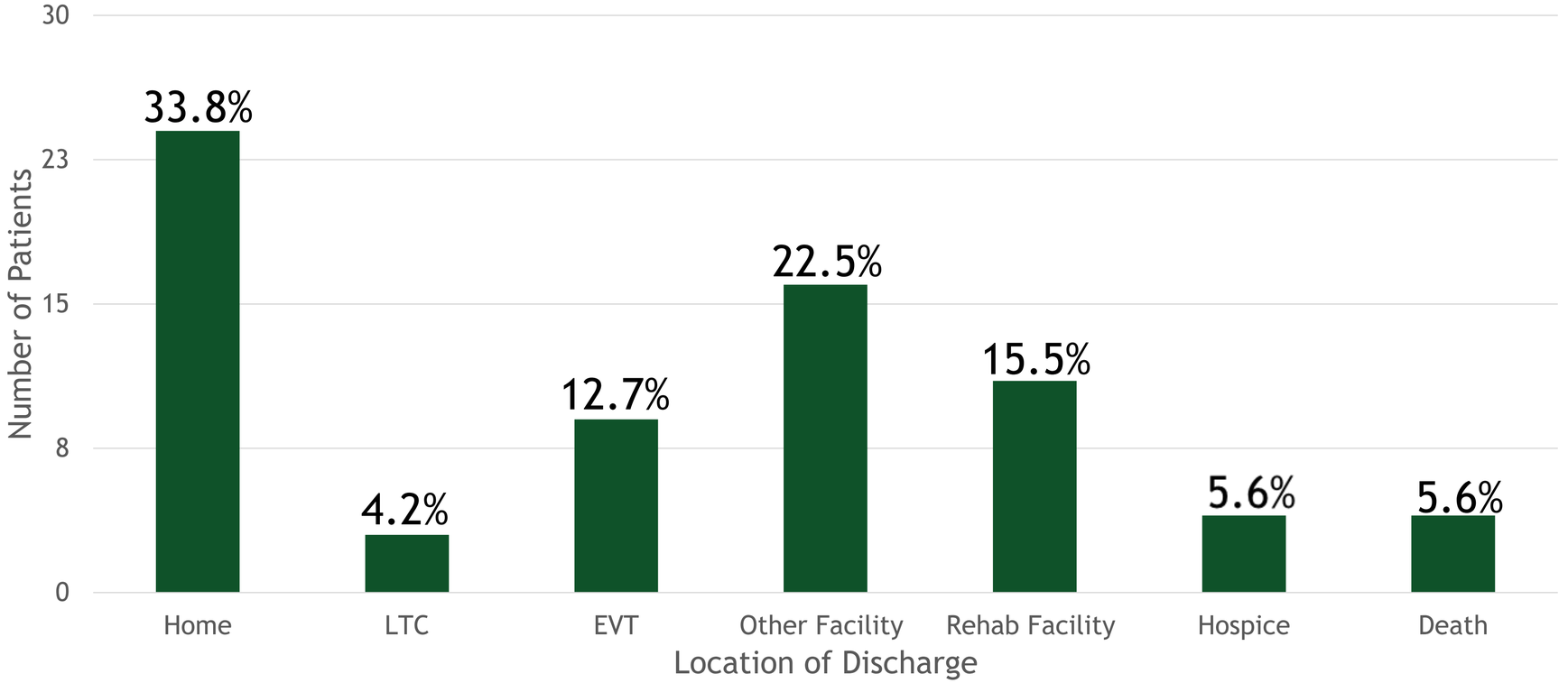


Figure 5: Discharge locations of patients who received tPA at the Huntsville Memorial Hospital.

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