

Systems of Care for Acute Stroke in Ontario

Provincial Stroke Rounds

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2024.11.06

Evaluation

For the **Provincial Stroke Rounds Planning Committee**:

- To plan future programs
- For quality assurance and improvement
- For **You**: Reflecting on what you've learned and how you plan to apply it can help you enact change as you return to your professional duties
- For **Speakers**: The responses help understand participant learning needs, teaching outcomes and opportunities for improvement.

Link: <https://forms.office.com/r/S1YFUkE3vt>



Please take 2 minutes to fill the evaluation form out. Thank you!

Disclosure of Affiliations & Financial Support

- Speaker Name: Dr. Amy Yu
- Affiliations
 - Stroke Neurologist, Sunnybrook Health Sciences Centre
 - Associate Professor, University of Toronto
 - Tier 2 Canada Research Chair in Data-driven design of stroke systems
 - Chair, Heart & Stroke's National Quality Advisory Committee
 - Chair, CorHealth Ontario's Hyperacute Stroke Performance Task Group
 - Associate Editor, for the Canadian Journal of Neurological Sciences.
- Grants/Research Support
 - Canadian Institutes of Health Research
 - Heart and Stroke Foundation of Canada
 - PSI Foundation
 - Sunnybrook AFP Innovation Funds
- Financial Support
 - This session/program has not received financial or in-kind support

Learning objectives

1. Discuss the impact of organized stroke systems on stroke care in Ontario
2. Examine opportunities to optimize stroke care within the current system to support stroke best practice implementation
3. Understand opportunities to improve imaging and revascularization treatments in rural areas of Ontario

Stroke in Canada

- Stroke is **common**: every 5 minutes, a Canadian experiences a stroke
- Stroke is **deadly**: 20% die during the hospitalization
- Stroke is the **#1 cause of disability** in adults
- In Canada, among patients discharged alive after stroke admission
 - 10-15% LTC/CCC
 - 30% rehabilitation
 - 10% home with services

Kamal N et al. CJNS 2015

Tanuseputro P et al. JAMDA 2017

Holodinsky et al. CJNS 2023

Effect of a provincial system of stroke care delivery on stroke care and outcomes

Moira K. Kapral MD MSc, Jiming Fang PhD, Frank L. Silver MD, Ruth Hall PhD, Melissa Stampelcoski BSc, Christina O'Callaghan BAppSc, Jack V. Tu MD PhD

ABSTRACT

Background: Systems of stroke care delivery have been promoted as a means of improving the quality of stroke care, but little is known about their effectiveness. We assessed the effect of the Ontario Stroke System, a province-wide strategy of regionalized stroke care delivery, on stroke care and outcomes in Ontario, Canada.

Methods: We used population-based provincial administrative databases to identify all emergency department visits and hospital admissions for acute stroke and transient ischemic attack from Jan. 1, 2001, to Dec. 31, 2010. Using piecewise regression analyses, we assessed the effect of the full implementation of the Ontario Stroke System in 2005 on the proportion of patients who received care at stroke centres, and on rates of discharge to long-term care facilities and 30-day mortality after stroke.

Results: We included 243 287 visits by patients with acute stroke or transient ischemic

attack. The full implementation of the Ontario Stroke System in 2005 was associated with an increase in rates of care at stroke centres (before implementation: 40.0%; after implementation: 46.5%), decreased rates of discharge to long-term care facilities (before implementation: 16.9%; after implementation: 14.8%) and decreased 30-day mortality for hemorrhagic (before implementation: 38.3%; after implementation: 34.4%) and ischemic stroke (before implementation: 16.3%; after implementation: 15.7%). The system's implementation was also associated with marked increases in the proportion of patients who received neuroimaging, thrombolytic therapy, care in a stroke unit and antithrombotic therapy.

Interpretation: The implementation of an organized system of stroke care delivery was associated with improved processes of care and outcomes after stroke.

Competing interests:

Frank Silver has received payments for board membership, lectures or travel expenses from Boehringer Ingelheim Canada, Bristol-Myers Squibb, Sanofi Canada and Bayer Canada. No other competing interests were declared.

This article has been peer reviewed.

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CMAJ 2013. DOI:10.1503/
cmaj.121418

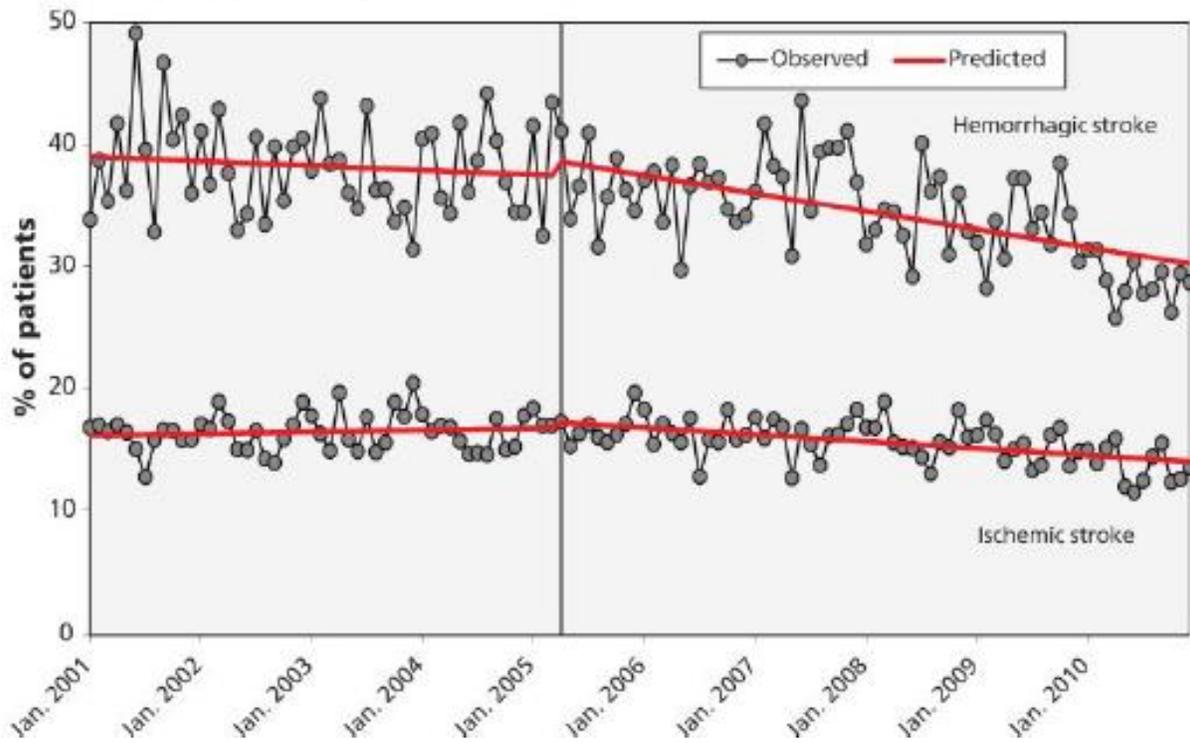


Coordinated stroke systems of care reduce mortality and admission to long-term care

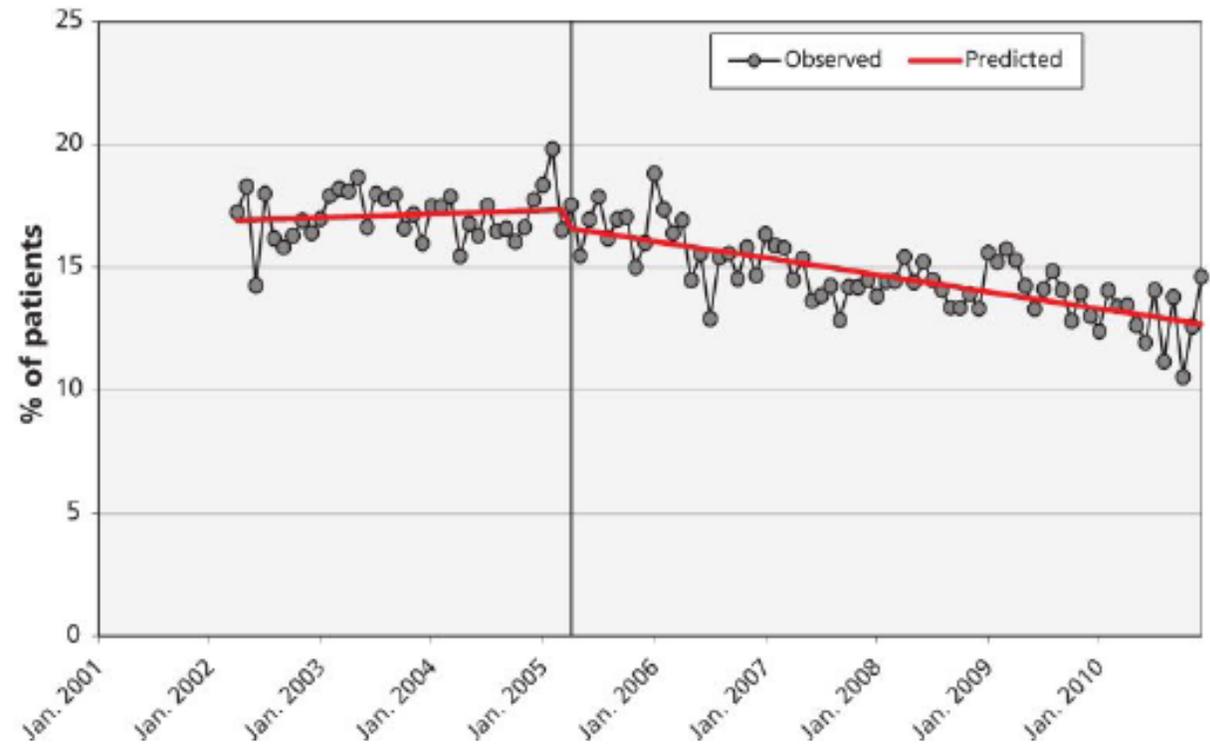


SCAN ME

B: Thirty-day mortality



A: Rates of discharge to long-term or chronic care facilities

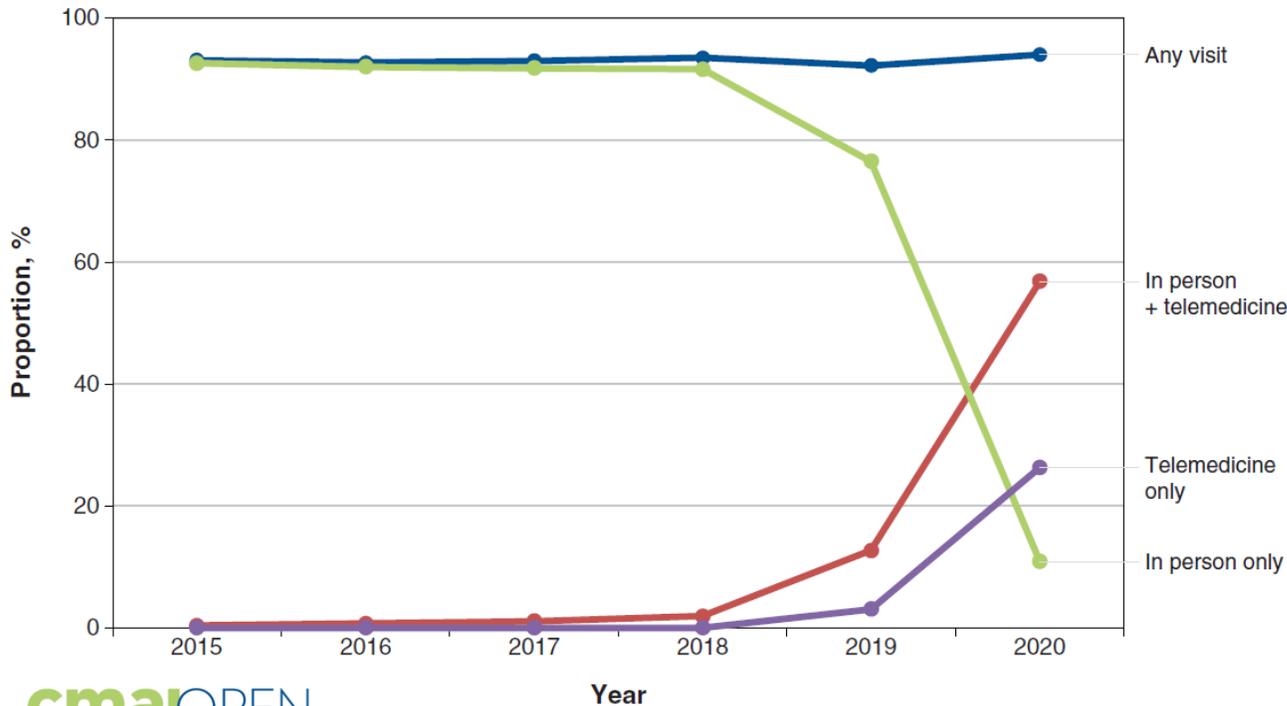


Virtual care during the pandemic



Telemedicine use and outcomes after transient ischemic attack and minor stroke during the COVID-19 pandemic: a population-based cohort study

Figure Pattern of clinic visits within 90 d of ED discharge for TIA or minor stroke



Yu AYX et al. CMAJ Open 2022



This cohort study included 47,601 Ontarians with TIA (transient ischemic attack) (75%) or ischemic stroke (25%).

Sunnybrook HEALTH SCIENCES CENTRE | IC/ES Data Discovery Better Health

This study compared the periods of:

2015 - 2020 → 2020 - 2021

Virtual care visits **rapidly increased** after April 1, 2020, with 83% of patients having at least one virtual care visit within 90 days of emergency department discharge, compared to 4% at baseline.

Investigations for stroke, renewal of medications, and clinical outcomes (death or readmission to hospital) **remained stable** throughout the study period.

These findings would suggest that **virtual care is an effective healthcare** delivery method that can be complementary to in-person care for TIA or minor stroke.

Yu et al. CMAJ Open. 2022.

Virtual care effective in treating patients with transient ischemic attack or minor stroke

Virtual care visits for transient ischemic attack (TIA) and minor stroke rapidly increased during the COVID-19 pandemic, but study finds that care and short-term health outcomes remained stable.

Developing new research methods



Open access

Original research

BMJ Open Hospital-based cohort study to determine the association between home-time and disability after stroke by age, sex, stroke type and study year in Canada

Yu et al. BMJ Open 2019

Amy Ying Xin Yu ^{1,2}, Jiming Fang,² Joan Porter,² Peter C Austin,² Eric E Smith,³ Moira K Kapral^{2,4}

Amy Y.X. Yu, MD, MSc
Edwin Rogers, MA
Meng Wang, MSc
Tolulope T. Sajobi, PhD
Shelagh B. Courtts, MD, MSc
Bijoy K. Menon, MD, MSc
Michael D. Hill, MD, MSc
Eric E. Smith, MD, MPH

Population-based study of home-time by stroke type and correlation with modified Rankin score

Neurology[®] 2017;89:1-7

STROKE JOURNEY CONTINUES AFTER DISCHARGE



57 days **

Average number of days spent at home in the first 90 days after stroke

33%** received home-based rehabilitation*

- **8**** median number of visits

74% of patients aged 65 and older with atrial fibrillation filled a prescription for anticoagulant therapy within 90 days of acute care discharge*

Developing multi-jurisdiction tools

Circulation: Cardiovascular Quality and Outcomes

ORIGINAL ARTICLE

Deriving a Passive Surveillance Stroke Severity Indicator From Routinely Collected Administrative Data: The PaSSV Indicator

Amy Y. X. Yu, MD, MSc
Peter C. Austin, PhD
Mohammed Rashid, MSc
Jiming Fang, PhD
Joan Porter, MSc
Michael D. Hill, MD, MSc
Moira K. Kapral, MD, MSc



Réseau de recherche sur les données de santé du Canada
Health Data Research Network Canada

Algorithms from Multi-regional Research

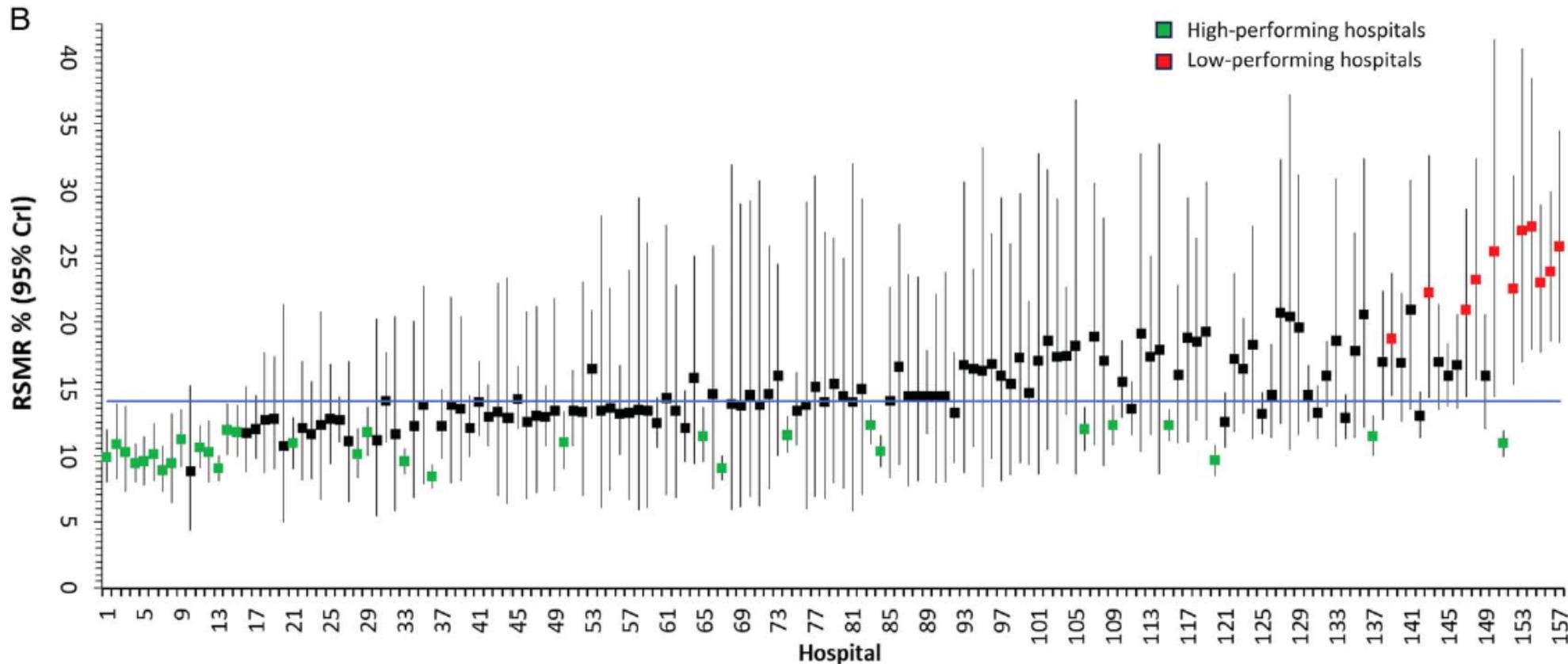
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Filters Selected - 0 Clear All

Category	Sub-category	Jurisdiction
Admission	Acute Chest Infection	Alberta
Deprivation	Acute Myocardial Infarction	B.C.
Early Childhood Development	Aggressive End of Life Care	Manitoba
Gender	Alzheimer's Disease and Other Dementias	National
Health Services Quality	Anemia	New Brunswick
Health Services Utilization	Anticoagulation Reversal	Newfoundland and Labrador



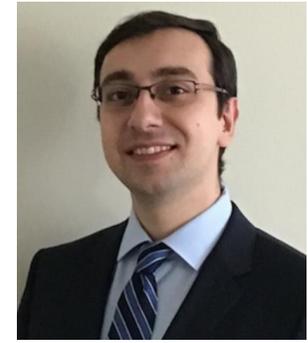
Adjusting for PaSSV reclassified 1 in 5 hospitals in Ontario with regards to risk-standardized stroke mortality performance



Who cares about inefficiency as long as care is given and received?

- Longer emergency department stays for patients
- Inequities in imaging and EVT access
 - Healthcare lottery based on postal code
- We are in it together: broader systems implications

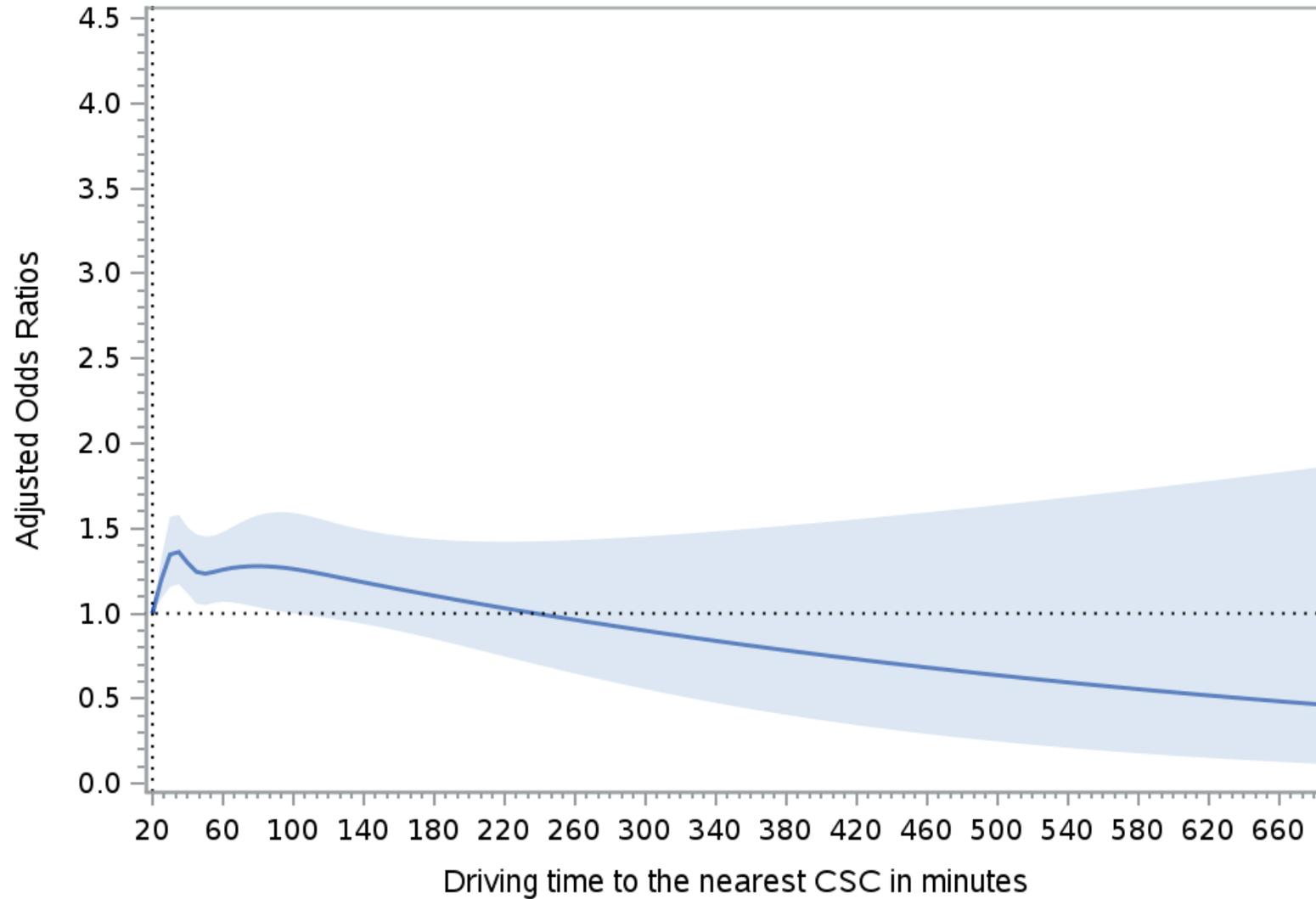
3. Use of EVT by distance to RSC



- 57,687 adults admitted with ischemic stroke across Ontario
 - April 1, 2017, and March 31, 2022
- Calculate travel time by car from each patient's geocoded location of primary residence to the nearest RSC
 - Postal Code Conversion File
 - ArcGIS version 10.2 by the Environmental Systems Research Institute
 - 2017 Ontario Road Network (ORN) Road Net Element File from Land Information Ontario

Adjusted Odds Ratio of Receiving Thrombolysis

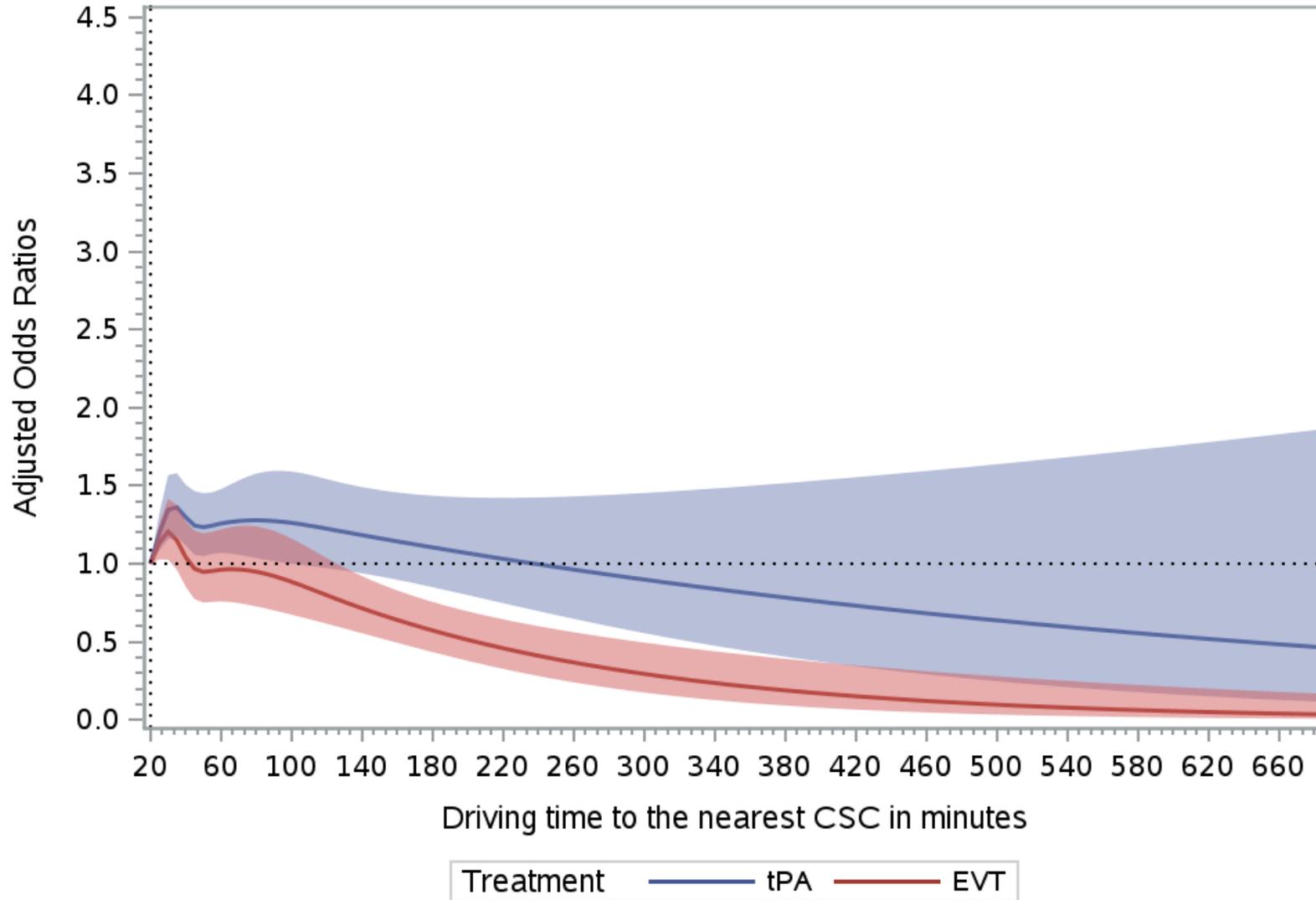
OR reference = 20min



Thrombolysis use does not vary by distance to Regional Stroke Centres

Adjusted Odds Ratio of Receiving Revascularization

OR reference = 20min



EVT use decreases with increasing driving time to the nearest RSC

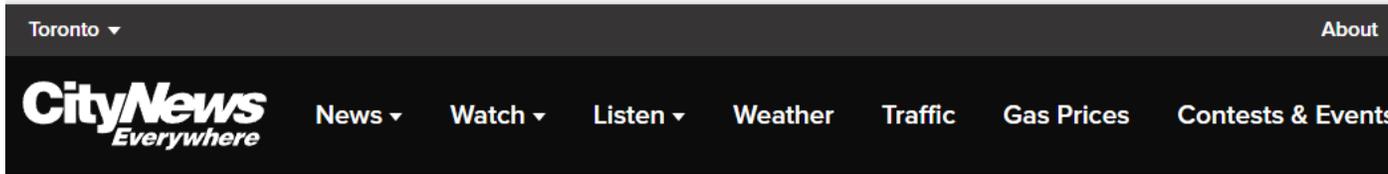
Q4. What proportion of patients with large vessel occlusion presenting within 24 hours of last seen normal receive EVT?

- A. 50%
- B. 60%**
- C. 70%
- D. 80%

20% of patients who received EVT did not have an M1 or basilar occlusion



4. Broader systems implications



-  Service resumes after Toronto paramedics issue another code red due to ambulance shortage
- 

KITCHENER

Code Red: Off-load delays leave Waterloo Region without available ambulances

Toronto

No ambulances available in Toronto 1,200 times last year, report finds

Mayor says council will '100%' look into auditor general's report on Toronto Paramedic Services

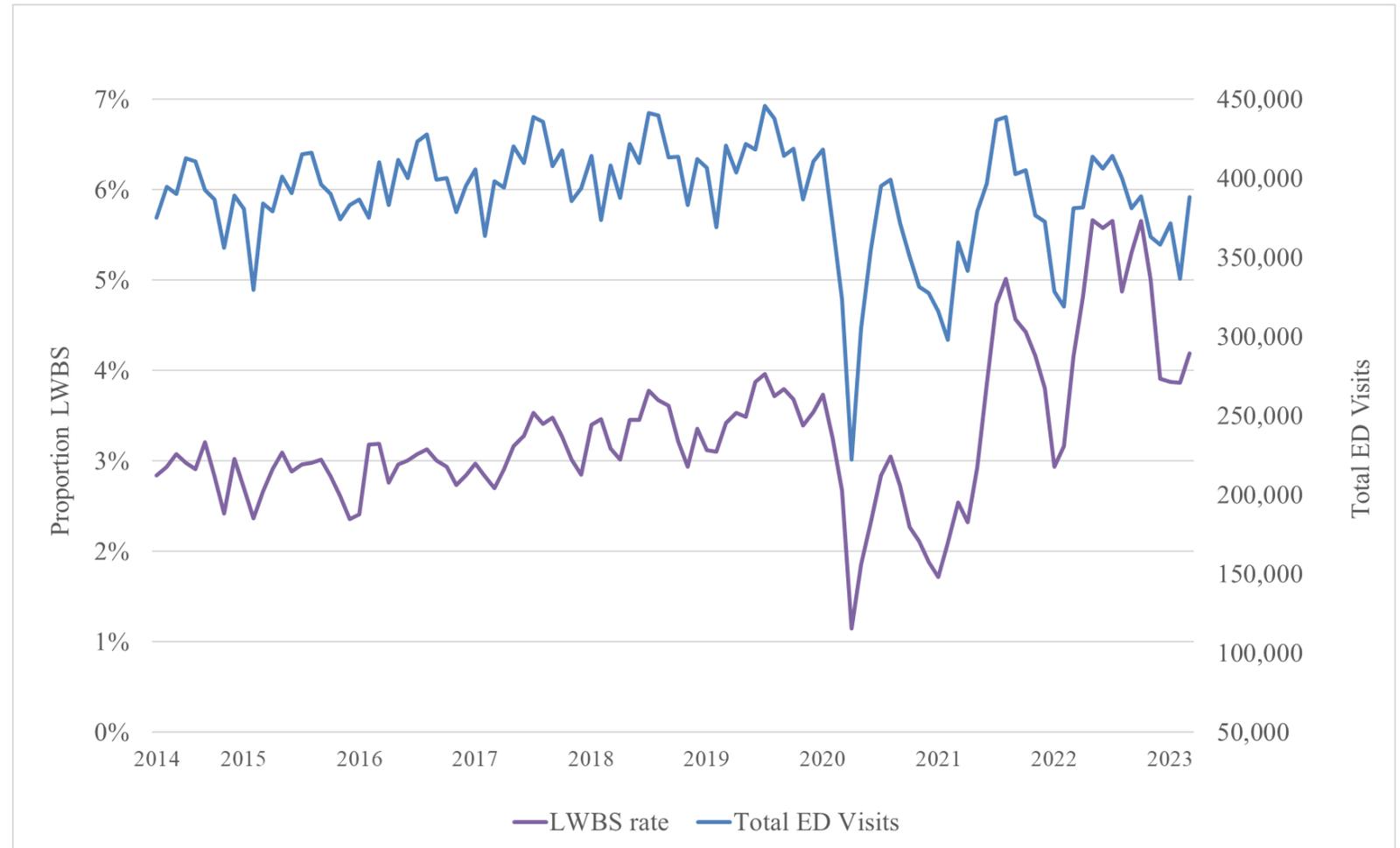
[Muriel Draaisma](#) · CBC News · Posted: Jun 27, 2024 8:22 PM EDT | Last Updated: June 28

LWBS ED visits are 43% higher, but... overall monthly ED visits are lower

- Total ED visits
- Monthly proportion of LWBS ED visits

April 1, 2014 through
March 31, 2023

McNaughton et al. J American
College of Emergency Physicians
Open 2024 (in press)



Future directions: we've done it before!

CMAJ

RESEARCH

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Future directions: data & accountability



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Ontario Stroke Registry

Scientists in the ICES Cardiovascular research program have a long-standing history of excellence in measuring and monitoring stroke care delivery and outcomes to inform policy, guidelines, and care standards.



Ontario Stroke Registry Publications

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Ontario Stroke Registry Reports

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Registry Case Report Form

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- Phase I to IV: 2003-2013
- Phase V:
 - 2019/20
 - 2022/23



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