

TeleStroke in Manitoba



Susan Alcock, RN, MN
Department of Radiology
University of Manitoba
Winnipeg
November 17th, 2023
Stroke Day

Faculty/Presenter Disclosure

- **Faculty:** Susan Alcock
- **Relationships with financial sponsors:**
 - Any direct financial relationships including receipt of honoraria: NA
 - Memberships on advisory boards or speakers' bureau: NA
 - Patents for drugs or devices: NA
 - Other: financial relationships/investments NA

Mitigating Potential Bias

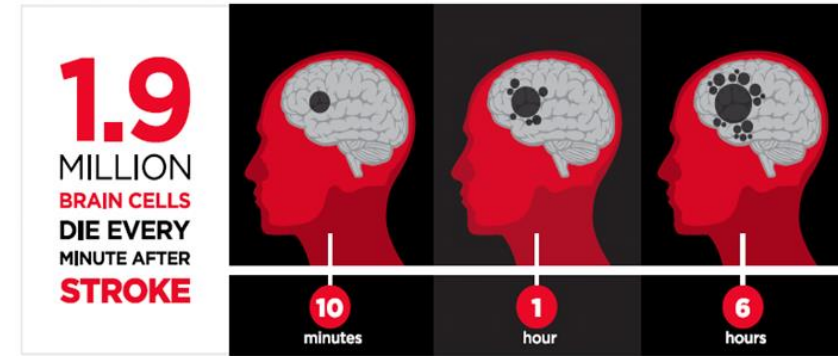
- The speaker of this program has complete control over the content of this program. There has been no influence from the sponsors on the content.
- No personal conflict of interest or bias

Learning Objectives

- To explore the evidence supporting TeleStroke
- To learn about the Manitoba TeleStroke Program
- To learn about our current TeleStroke research study

Acute Stroke

- Is a time sensitive medical emergency
- The longer the delay before treatment the greater the risk of permanent brain damage and more impairment
- Acute ischemic stroke treatment:
 - tPA & TNK – 4.5-hour window
 - EVT – 24-hour window
- The benefit of reperfusion therapy is strongly time dependent

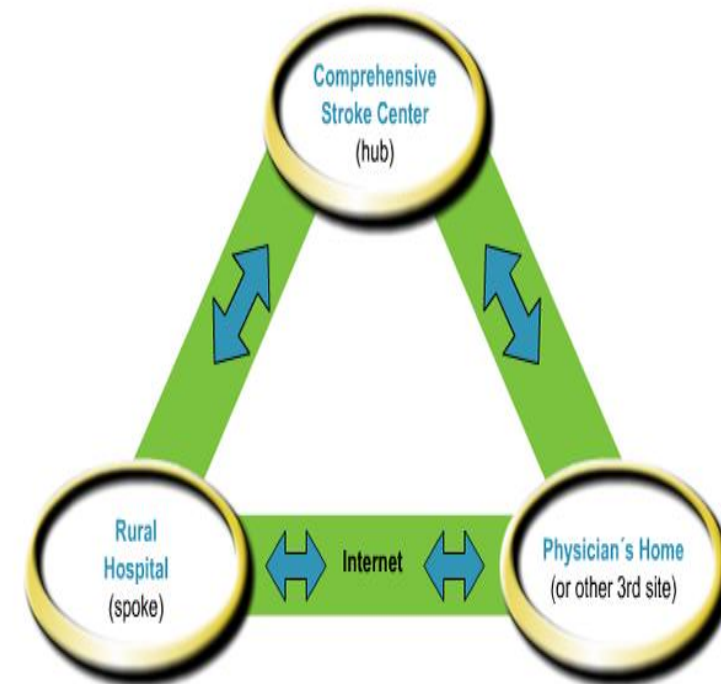


Treatment Challenges

- **Narrow treatment window**
- Often made narrower by:
 - Lack of stroke recognition and understanding of its urgency
 - Patient unable to seek help
- Canada's **vast rural geography** (Ganesh et al., 2014)
- Lack of neurologists in rural areas

What is TeleStroke?

- Innovative medium providing patients access to stroke care
- Real-time telecommunication linkage between 2 sites
- Facilitates rapid transmission of imaging
- Applications across the care continuum (spc, rehab, acute care, hyperacute)
- Mostly used for thrombolytic treatment
- EVT eligibility assessment



TeleStroke Systems

- Safety, feasibility, and efficacy of Hub & Spoke TeleStroke models has been established in Europe and North American (Lamote et al., 2003; Wilborg et al., 2003; Schwamm et al., 2004; Audebert et al., 2005; Waite et al., 2006; Vaishnav et al., 2006; Legris et al., 2016)
- Zhai et al., 2015- meta-analysis of 8 studies comparing outcomes of AIS patients treated with tPA through TeleStroke vs. in-person care. No increased risk of mortality and no increased risk of sICH associated with TeleStroke.

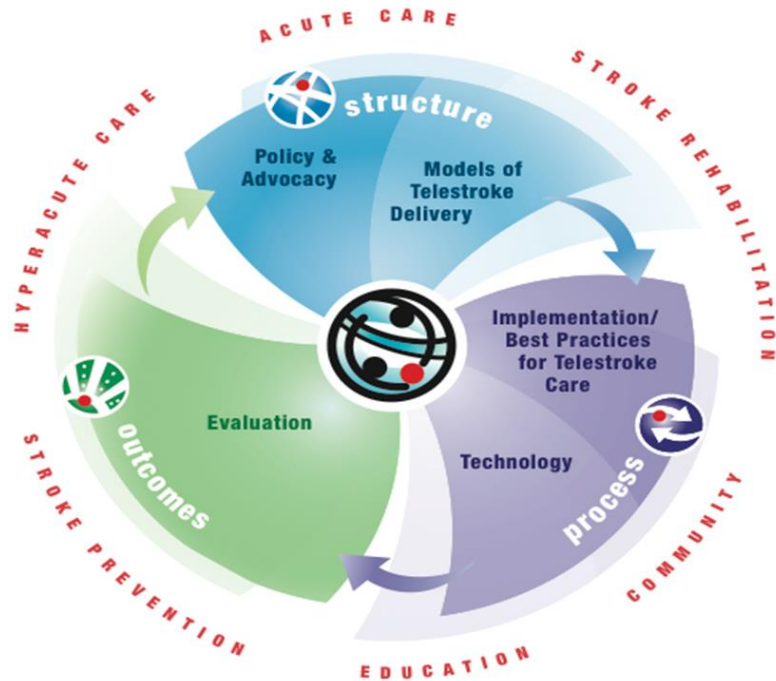
Canadian TeleStroke Systems

- Ontario and Alberta leaders.
- **Porter et al., 2018-** outcomes of patients treated with tPA with the Ontario TeleStroke Program (n=214) were compared to those treated with tPA at regional centres (n= 1855).
 - The administration of tPA using TeleStroke was not associated with an increased risk of death within 7 or 90-days (adjusted HR=1.29, 95% 0.68-2.44 and adjusted HR=1.01, 95% CI 0.67-1.50, respectively)
 - The administration of tPA using TeleStroke was not associated with an increased risk sICH or poor outcome (adjusted HR=0.71 (95% 0.29-1.71 and adjusted HR=0.75, 95% CI 0.46-1.23, respectively)



The Manitoba TeleStroke Program

TeleStroke-Hyperacute Framework



TeleStroke Action Framework
Heart and Stroke Foundation and Canadian Stroke Network, 2013

➤ Structure

- Equipment
- Stroke Protocols
- Skilled Workforce

➤ Process

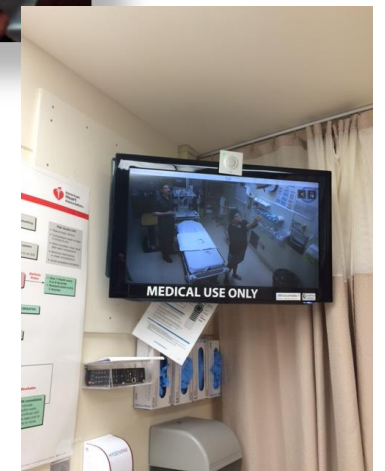
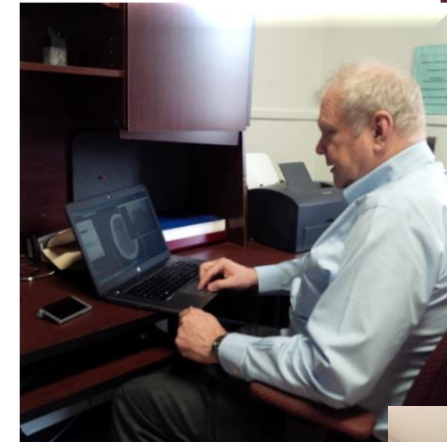
- Best practices
- Process metrics

➤ Outcome

- Access to care
- Patient outcomes

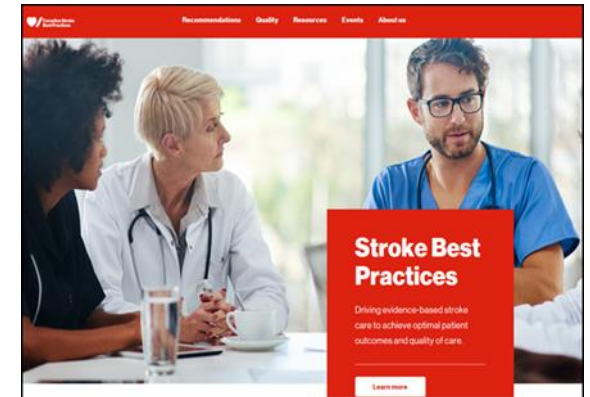
Structure – Setting

- Work started in 2013 with MB Health and HSFM.
- **HSC Hub**
 - 6- 10 TeleStroke Neurologists
 - On-call 24/7
 - Fixed equipment
 - Mobile equipment
- **TeleStroke Sites**
 - Fixed TeleStroke equipment
 - Dedicated stroke bed, clot box, stroke pkg
 - I-Pad backup solution



Structure – Stroke Protocols

- Pre-Hospital Stroke (rapid recognition and transport to stroke centre)
 - EMS
 - Community Sites
- TeleStroke Site
 - Pre-notification
 - ED stroke protocol (order sets)
 - CT & Lab protocol
 - Dysphagia screen, stroke deficit tool
 - Post ED care



Structure – Skilled Workforce

- Skilled workforce in Hyperacute stroke care
 - Neurologist
 - EMS & community sites (pre-hospital phase)
 - Stroke Centres: nurses, physicians, technologists
 - Acute Inpatient
- Formal Stroke Education
- Telehealth equipment training
- Mock trial (walk through and test)
- On going resources & education



Measure Process and Outcome Metrics

Process

- The care we provide in Hyperacute stroke Care
- Time driven
- Process metrics (DTN)

Outcomes

- Patient (mortality, functional outcomes, adverse events)
- Organizational (access to care)

TeleStroke Sites



Thompson: Nov 2014



The Pas: April 2015



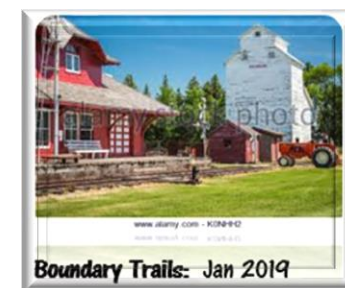
Dauphin: May 2016



Brandon, Aug 2016



Portage la Prairie: Jan 2019



Boundary Trails: Jan 2019



Steinbach: Jan 2019

**Map Of Manitoba
Regional Health
Authorities**

The Pas (NRHA)

- 2nd site (est. Apr 2015)
- Large catchment area

Thompson (NRHA)

- Pilot site (est. Nov 2014)
- Large catchment area
- 1st TeleStroke consult 20Nov2014
- Satellite SPC

Dauphin (PMH)

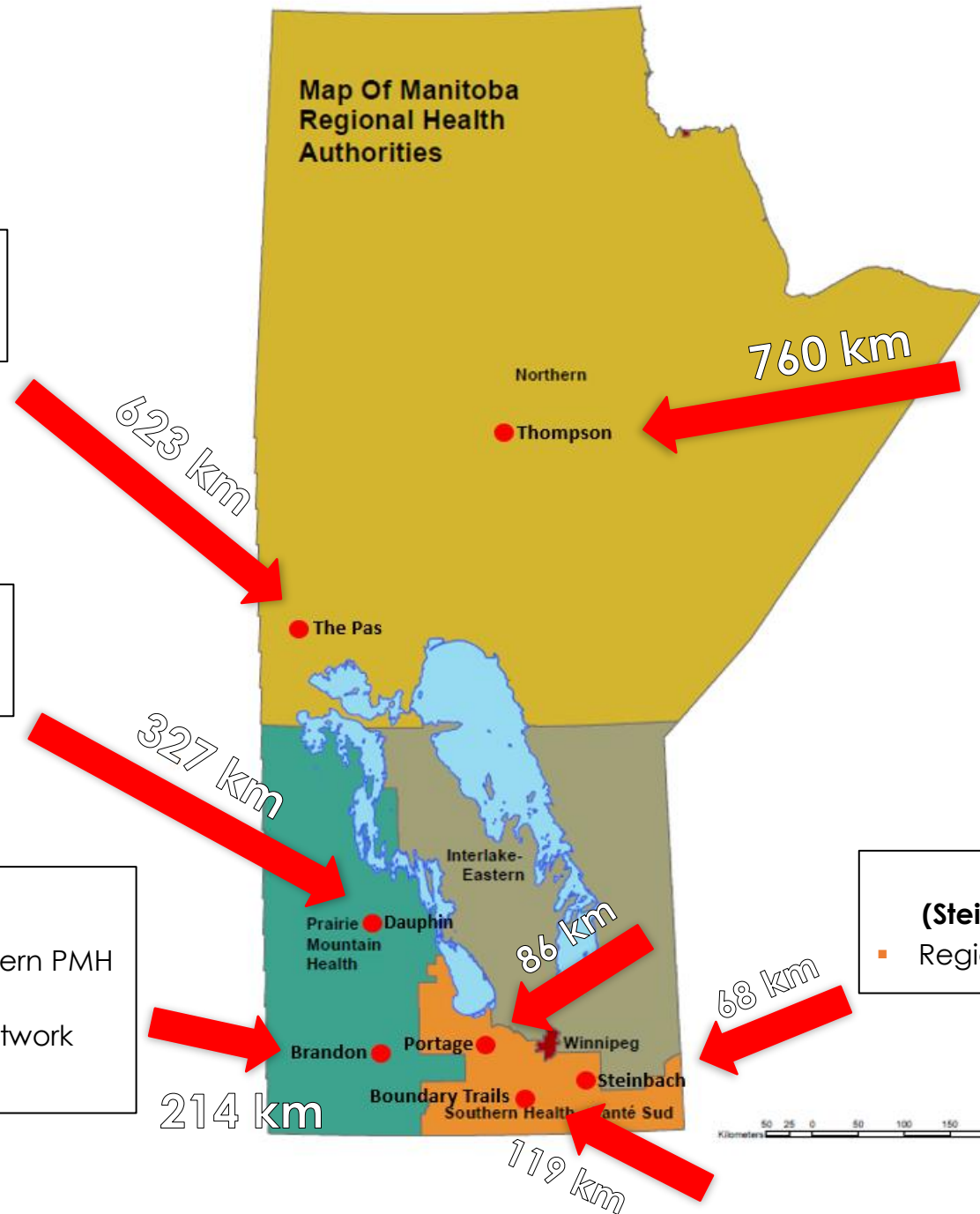
- 3rd site (est. May 2016)
- Catchment area- northern PMH

Brandon (PMH)

- 4th Site (est. Aug 2016)
- Catchment-Brandon and southern PMH
- Stroke protocol – Dr. Tamayo
- Afterhours access TeleStroke network
- SPC

**Southern Health
(Steinbach, Portage, Boundary Trails)**

- Regional Implementation (est. Jan 2019)



Implementation of the Manitoba TeleStroke Program: Lessons learned from the first eight years and the path forward



Funding: Heart & Stroke Foundation

REB Number: HS25492 (H2020:163)

SH Number: SH2020:092

PHRPC Number: P2022-89

Methodology

Study Design

- Retrospective observational study

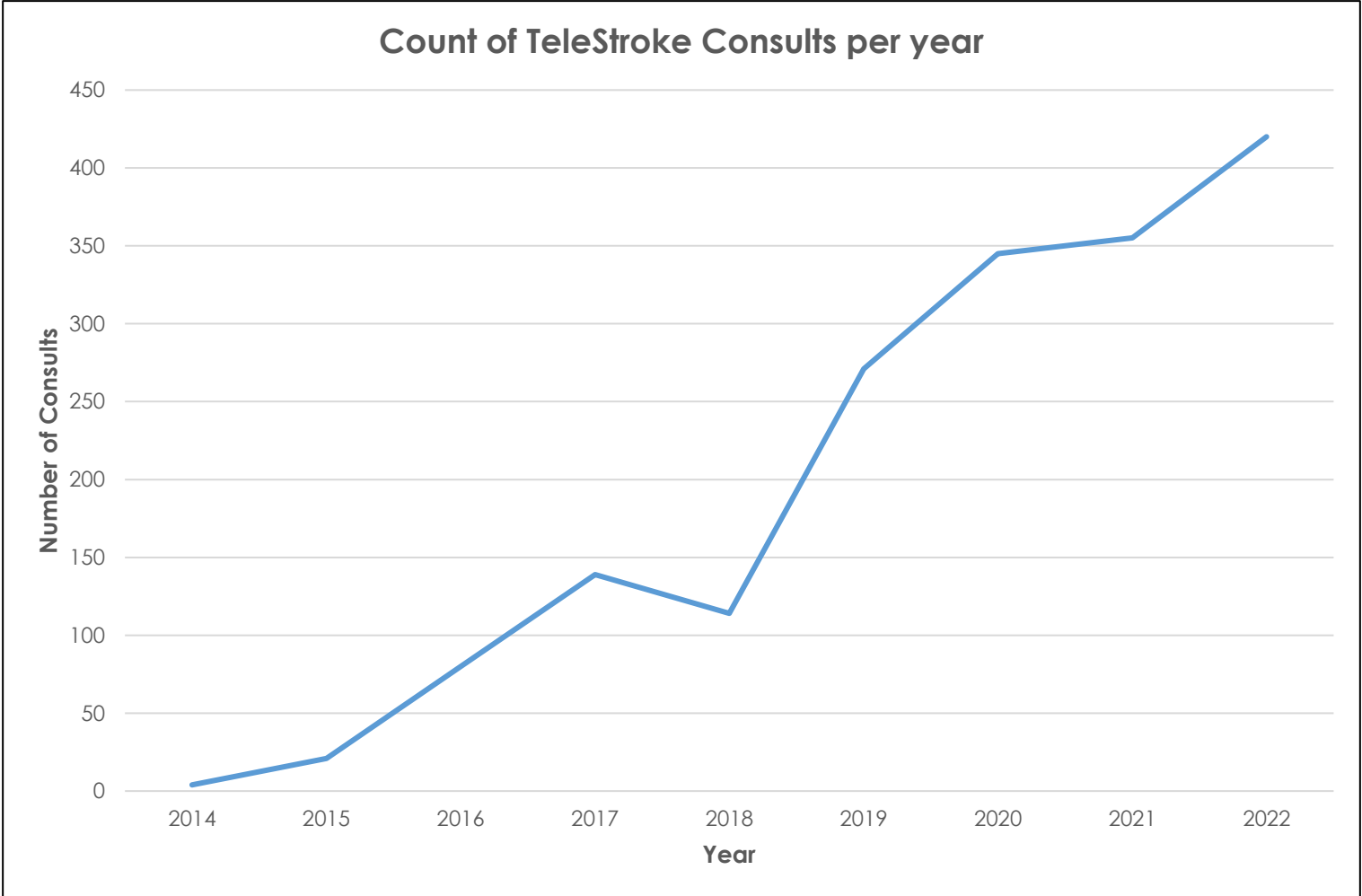
Sample

- All consecutive TeleStroke consults during the study period (Nov 2014- December 31st 2022)
- $N = 1749$

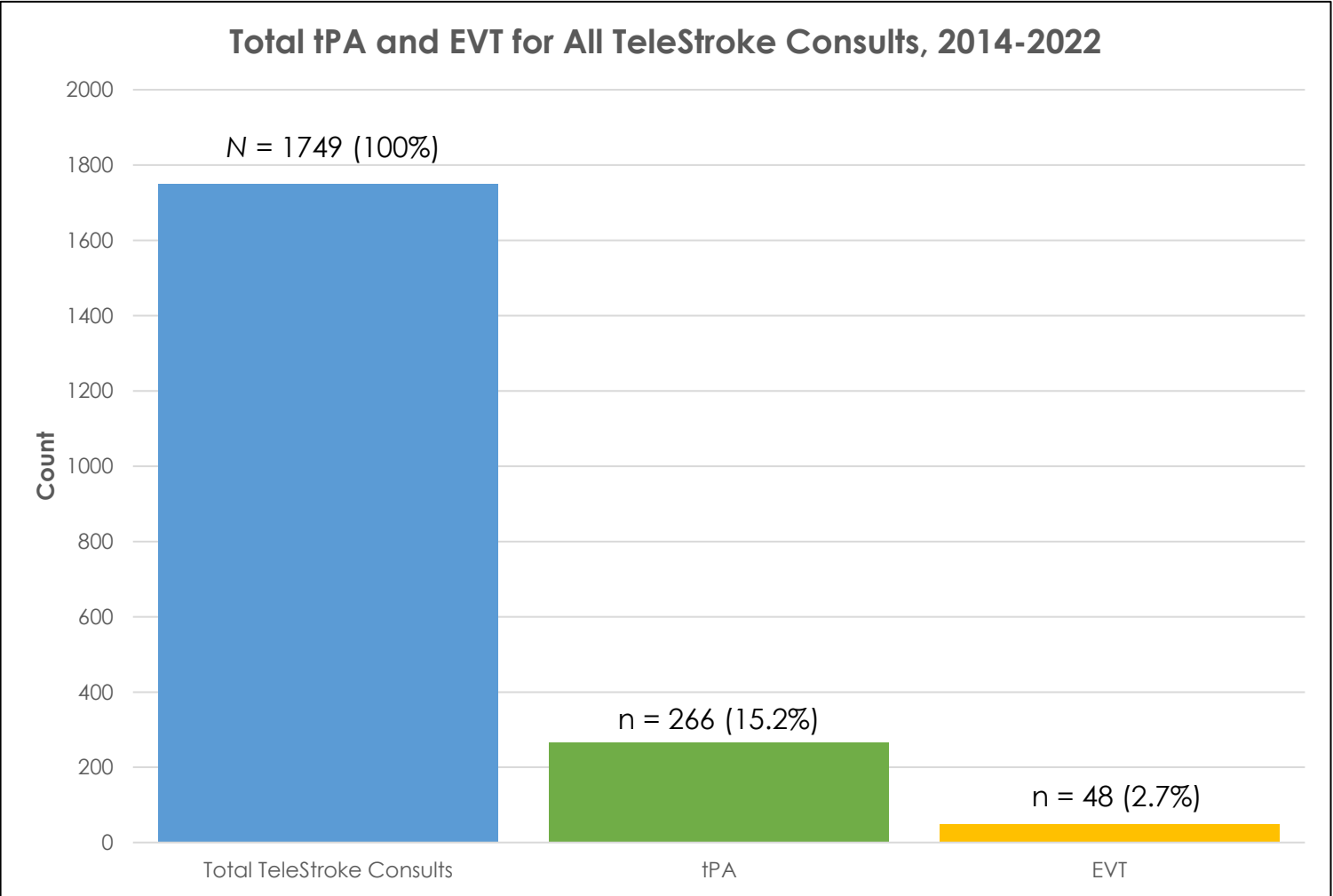
Data Collection

- TeleStroke Consult form
- Missing data EPR
- CT- CTA times IMPAX

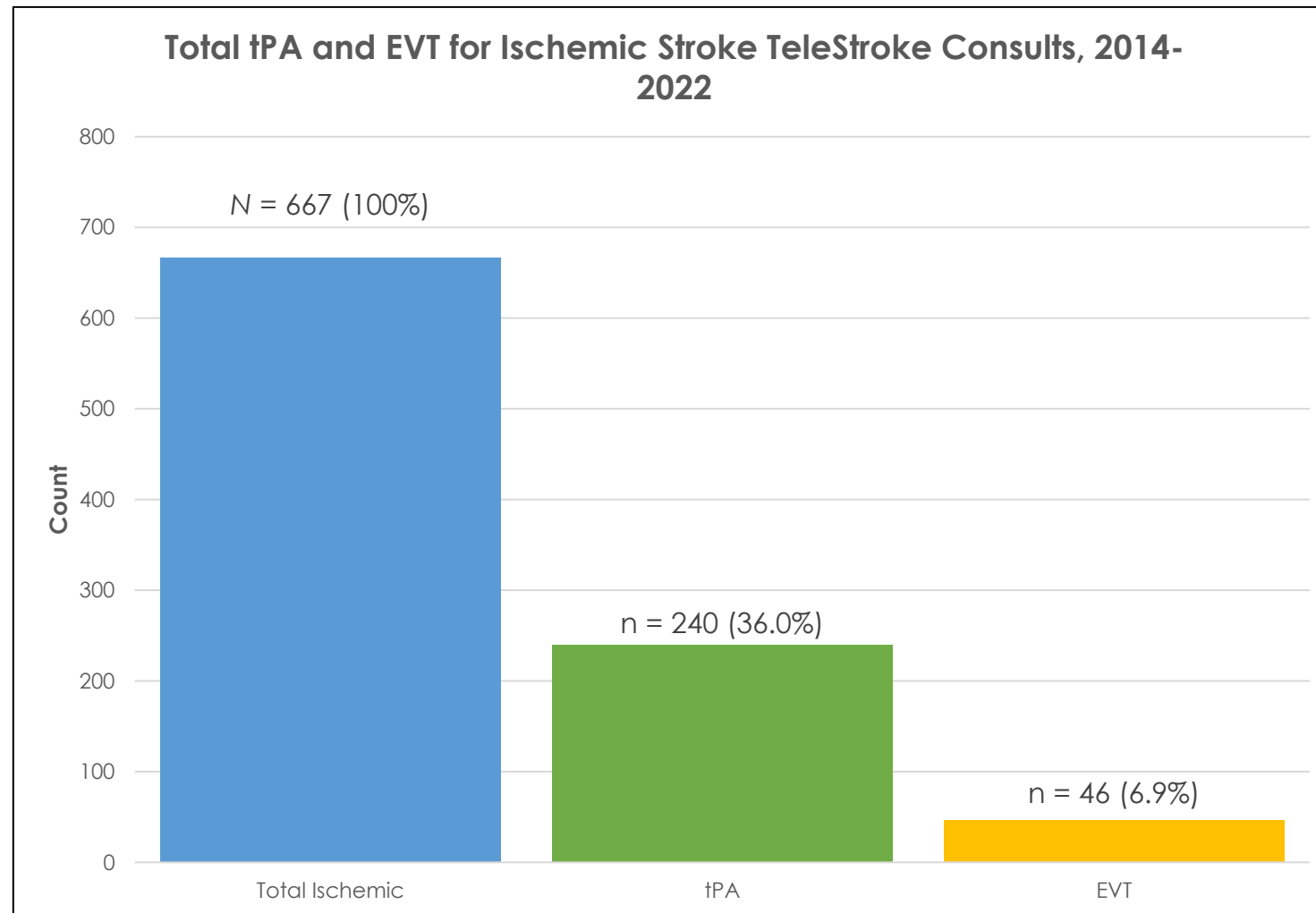
Access to Care: TeleStroke Consult Volumes



tPA Administration and EVT Procedures Among All Patients seen by TeleStroke



tPA Administration and EVT Procedures Among Acute Ischemic Stroke Patients seen by TeleStroke



Type of Reperfusion Therapy for AIS Patients seen by TeleStroke

Type	Ischemic Stroke Consults N = 667 (%)
tPA only	214 (32.1)
tPA with EVT	26 (3.9)
Primary EVT	20 (3.0)

- Most tPA (24.8%) and EVT (29.2%) cases from Brandon

TeleStroke Consults: Reasons tPA Not Administered

n= 1749

Reason	Count (%)
Minor deficits	502 (28.7)
Out of window	325 (18.6)
Not a stroke	294 (16.8)
Symptoms resolved	223 (12.8)
On a DOAC or INR >1.7	149 (8.5)
Hemorrhagic stroke	103 (5.9)
Unknown onset	69 (3.9)
Established infarct	63 (3.6)
Patient declined	32 (1.8)
Other	23 (1.3)
Sub-acute infarct	13 (0.7)

Note: patients can have multiple reasons indicated

Mortality of AIS patients who received tPA through the Manitoba TeleStroke Program as compared to the Ontario TeleStroke Program

	Manitoba TeleStroke Program	Ontario TeleStroke Program (Porter, 2018)	p-value
Time period	2014-2022	FY 2010-2011 and 2012-2013	
n	266	214	
7-Day mortality n (%)	23 (8.6)	28 (13.1)	0.15 $\chi^2 = 2.0141, df = 1$
90-Day mortality n (%)	41 (15.4)	47 (22.0)	0.08 $\chi^2 = 2.9739, df = 1$

Acknowledgements

- Dr. J. Shankar
- Dr. E. Ghrooda, Dr. N. Singh & Dr. D. McMillan
- Diagnostic Imaging Research Unit
 - Roman Marin
 - Benjamin Blackwood
 - Reva Trivedi
 - Marco Ayroso





Questions?

References

- Audebert HJ, Kukla C, Clarmann von CS, et al. Telemedicine for safe and extended use of thrombolysis in stroke: The Telemed Pilot Project for Integrative Stroke Care (TEMPiS) in Bavaria. *Stroke* 2005;36:287-91.
- Blacquier, D., Lindsay, P. ..., Silver, F.; on behalf of the Telestroke Writing Group. *Telestroke Module 2017*. In Lindsay MP, Gubitz G, Dowlatshahi D, Harrison E, and Smith EE (Editors) on behalf of the Canadian Stroke Best Practices Advisory Committee. *Canadian Stroke Best Practice Recommendations: Telestroke Update 2017*. Sixth Edition 2017; Ottawa, Ontario Canada: Heart and Stroke Foundation.
- Fonarow, G. C., Zhao, X., Smith E., Saver, J., Reeves, M., Bhatt, D. L., ... Schwamm, L. H. (2014). Door-to-Needle for Tissue Plasminogen Activator Administration and Clinical Outcomes in Acute Ischemic Stroke Before and After a Quality Improvement Initiative. *JAMA*, 311(16), 1632-1640. Doi: 10.1001/jama.2014.3203.
- Ganesh, A., Camden, M., Lindsay, P., Kapral, M., Cote, R., Fang, J., ... Hill, M. D. (2014). The quality of treatment of hyperacute ischemic stroke in Canada: a retrospective chart audit. *CMAJ*, 2(4), E233-E239. doi: 10.9778/cmajo.20140067.
- Heran, M., Lindsay, P., Gubitz, G., Yu, A., Ganesh, A., Lund, R., . . . Shamy, M. (2022). Canadian Stroke Best Practice Recommendations: Acute Stroke Management, 7th Edition Practice Guidelines Update, 2022. *Canadian Journal of Neurological Sciences*, 1-94. doi:10.1017/cjn.2022.344.
- Porter J, Hall RE, Kapral MK, et al. Outcomes following telestroke-assisted thrombolysis for stroke in Ontario, Canada. *J Telemed Telecare* 2018;24(7):492-99.
- Saver, J. L., Fonarow, G. C., Smith, E. E., Reeves, M. J., Grau-Sepulveda, M. V., Pan, W., ... Schwamm, L. H. (2013). Time to Treatment With Intravenous Tissue Plasminogen Activator and Outcome From Acute Ischemic Stroke. *JAMA*, 309(23), 2480-2488. doi: 10.1001/jama.2013.6959.
- Schwab S, Vatankhah B, Kukla C, et al. Long-term outcome after thrombolysis in telemedical stroke care. *Neurol* 2007;69:898-903.
- Williams, J., Perry, L. & Watkins, C. (2010). *Acute Stroke Nursing*. United Kingdom: Wiley –Blackwell.
- Wilcock AD, Schwamm LH, Zubizarreta JR, et al. Reperfusion treatment and stroke outcomes in hospitals with telestroke capacity. *JAMA Neurol*. 2021 May 1;78(5):527-535.
- Zhai YK, Zhu WJ, Hou HL, Sun DX, Zhao J. Efficacy of telemedicine for thrombolytic therapy in acute ischemic stroke: a meta-analysis. *J Telemed Telecare* 2015;21(3):123-130.