

Telestroke: The Management of Acute Ischemic Stroke from a Distance

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The 1995 NINDS tissue plasminogen activator (tPA)¹ trial ushered in a new era in the management of acute ischemic stroke. Tissue plasminogen activator proved to be the first effective treatment, one that challenged our approach to acute stroke management. This thrombolytic agent has a remarkably short therapeutic window of 4.5 hours and the sooner treatment is initiated the better the outcome.² Furthermore, tPA carries a significant risk of secondary intracerebral hemorrhage. The appropriate administration of tPA necessitates the availability of both rapid brain imaging and stroke expertise, resources that tend to be limited to Canada's large urban hospitals. Patients that do not reside within close proximity to urban centres have not been able to access this treatment. The advent of "Telestroke", a term coined by Levine and Gorman,³ increased the radius of access to tPA by linking patients in peripheral communities to neurologists and other stroke experts.

Telestroke allows the consulting stroke expert to review the brain imaging and, through videoconferencing, the ability to directly examine the patient. Additionally, decisions pertaining to the optimal management of the patient can be discussed simultaneously with the referring physician, the patient, and the patient's family. In most cases, Telestroke results in patients being treated at their local hospital, rather than delaying treatment until they are transferred to a stroke centre.

In this issue of the Canadian Journal of Neurological Sciences, Khan and colleagues report their experience implementing the Northern Alberta Telestroke program.⁴ In their program neurologists from a single large academic hospital provide consultations to seven remote referring hospitals with CT scanners. Four hospitals were connected by two-way videoconferencing whereas three had only telephone links. In all cases, the five consulting neurologists had access to the patient's CT scan images or a local radiologist's report. The clinical data were collected by chart review.

Over the two year course of the study, 21% of the 210 patients cared for in their program received tPA. There was a dramatic reduction in the need to transfer patients to the "hub" hospital. The outcomes of the 44 patients who were treated with tPA were similar between the 34 patients that used videoconferencing and ten that used telephone consultation only. At three months 40% had a good outcome (modified Rankin <2) and the mortality was 22.5%. The early secondary hemorrhage rate was 11.4% with two of the five patients having clinical worsening. These results are comparable to published outcomes in patients treated with tPA in stroke centres with onsite neurologists.^{5,6} Similar outcomes have been reported by other Telestroke programs as outlined in their Table 4 of their paper. The largest experience comes from the TEMPiS group in Germany, where the authors showed that the outcomes of patients in 12 community hospitals managed with a Telestroke program were identical to patients treated in their own stroke centres.⁷

The major limitation of this study is the small number of patients and the incompleteness of the clinical data. The number of patients in the specific subgroups are too small to draw any firm conclusions. This is particularly the case in the comparison between patients treated with videoconferencing versus telephone consultation.

In Canada, where there are only a limited number of neurologists, Telestroke affords the efficiency of having one neurologist provide consultative services to many smaller community hospitals. As an example, The Ontario Telestroke Program⁸ currently has a primary and back-up stroke neurologist (from a roster of 15) on-call for each 24 hour shift to provide stroke consultations to 16 referring hospitals.

Telestroke has enabled many stroke patients in remote areas to benefit from treatment with tPA and its use is now well established as a standard of care. The next installment of the Canadian Best Practice Recommendation for Stroke⁹ is currently being updated to include a new section on Telestroke. The American Stroke Association has recently published their scientific statement of the evidence¹⁰ and practice guidelines on telemedicine within stroke systems of care.¹¹

Evidence from Northern Alberta and many other programs suggest that when it comes to providing acute stroke care, to paraphrase an old Bell Canada slogan, Telestroke is the ... next best thing to being there¹².

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REFERENCES

1. The National Institute of Neurological Disorders and Stroke rt-PA Stroke Study Group. Tissue plasminogen activator for acute ischemic stroke. *New Engl J Med.* 1995; 333:1581-8.
2. Lyden P. Thrombolytic therapy for acute stroke - not a moment to lose. *New Engl J Med.* 2008; 359:1393-5.
3. Levine SR, Gorman M. "Telestroke": the application of telemedicine for stroke. *Stroke.* 1999; 30(2):464-9.
4. Khan K, Shuaib A, Whittaker T, et al. Telestroke in Northern Alberta: a two year experience with remote hospitals. *Can J Neurol Sci.* 2010; 37(6):808-13.
5. Wahlgren N, Ahmed N, Davalos A, et al. Thrombolysis with alteplase for acute ischaemic stroke in the Safe implementation of Thrombolysis in Stroke-Monitoring Study (SITS-MOST): an observational study. *Lancet.* 2007; 369:275-82.
6. Hill MD, Buchan AM. Thrombolysis for acute ischemic stroke: results of the Canadian alteplase for stroke effectiveness study. *CMAJ.* 2005; 172:1307-12.

7. Schwab S, Vatankhah B, Kukla C, et al. Long-term outcome after thrombolysis in telemedical stroke care. *Neurology*. 2007; 69: 898-903.
8. Waite K, Silver F, Jaigobin C, et al. Telestroke: a multi-site, emergency-based telemedicine service in Ontario. *J Telemed Telecare*. 2006; 12:141-5.
9. Lindsay P, Bayley M, Hellings C, Hill M, Woodbury E, Phillips S. Canadian best practice recommendations for stroke care (updated 2008). *CMAJ*. 2008; 179:S1-25.
10. Schwamm LH, Holloway RG, Amarenco P, et al. A review of the evidence for the use of telemedicine within stroke systems of care. A scientific statement from the American Heart Association / American Stroke Association. *Stroke*. 2009; 40:2616-34.
11. Schwamm LH, Audebert HJ, Amarenco P, et al. Recommendations for the Implementation of Telemedicine Within Stroke Systems of Care: a policy statement from the American Heart Association. *Stroke*. 2009; 40:2635-60.
12. The Porticus Centre [homepage on the Internet]. Bell Systems advertisement. [cited 2010 Aug 15]. Available from http://www.porticus.org/bell/bellsystem_ads.html.