Rapid Assessment and Treatment of Transient Ischemic Attacks and Minor Stroke in Canadian Emergency Departments

Time for a Paradigm Shift

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A majority of acute cerebrovascular syndromes are transient ischemic attacks (TIA) or minor ischemic strokes. They are often thought of and managed as though benign, but are in fact a warning of impending disabling stroke. The risk of stroke progression or recurrence is highest in the first hours to days from initial symptom onset, with a 6.7% risk at 48 hours and a 10% risk by 7 days after a TIA.12 The highest risk period is early, with a median time to a recurrence or progression event of 1 day; many events occur overnight after the initial ictus.2 Many strokes are preventable after a TIA. Rapid diagnosis and treatment reduces the risk of stroke by as much as 80%-4.5 and significantly reduces mortality, long-term disability, and costs.67 The estimated annual cost avoidance in Canada from the rapid assessment and treatment of TIA is $313.8 million (of which $269.2 million are indirect costs).8 To be most effective, the diagnosis and treatment of all TIAs and minor strokes must recognize the natural biology of the condition and should ideally occur on the same day as the event. Currently, this is not consistently achieved in Canada.

There are several overlapping challenges with TIA/minor stroke management, including (1) establishing an accurate diagnosis of brain ischemia quickly; (2) establishing accurate triage approaches to risk-stratify patients; and (3) establishing systems of care that expedite both the diagnostic evaluation and initiation of treatment. Rapid access to both brain and vascular imaging is a unifying component of the solution to all these challenges.

The clinical diagnosis of TIA/minor stroke is not always straightforward because a proportion of acute neurologic presentations with minor or resolving symptoms have a nonischemic pathogenesis (eg, acephalalgic migraine aura, seizure). Thus, a critical pragmatic problem is how to exclude the stroke mimics (which are at low risk because of a nonischemic pathogenesis) and how best to identify and ensure optimal treatment for patients with true ischemic events. Clinical scoring systems, such as the ABCD² score (is a score based on 5 parameters: age, blood pressure, clinical features, duration of TIA, and presence of diabetes), do not adequately discriminate between ischemic and nonischemic origins.9,10 Nevertheless, the clinical history and examination are useful in identifying higher- and lower-risk events. Patients with a history or examination findings of acute unilateral motor (any weakness) or speech (any aphasia or dysarthria) events are more likely to have had an ischemic event and are therefore at greater risk.11 Distinguishing vertigo caused by brain stem or cerebellar ischemia compared with peripheral causes is also a frequent problem. Neuroimaging, including both brain and vascular imaging of the intracranial and extracranial vessels, can confirm the diagnosis, establish possible causes, and risk-stratify patients. Patients can then be reliably divided into low- and high-risk groups. Normal studies have a high negative predictive value. Any evidence of acute ischemia on a diffusion-weighted brain magnetic resonance imaging sequence or acute ischemia on noncontrast brain computed tomography or a symptom-relevant neurovascular lesion (intracranial occlusion or carotid stenosis on computed tomographic angiography [CTA] or magnetic resonance angiography) immediately places such a patient in the highest risk category.12 Systems of care need to be improved. Neurovascular imaging with CTA is an ideal test for identification of intracranial and extracranial occlusions/stenosis and is recommended by Canadian secondary stroke prevention guidelines.13 For patients presenting at an emergency department, most Canadian hospitals with computed tomography have the technical ability to perform a CTA as well, which provides vascular imaging of the head and neck vasculature and confirms whether a symptom-relevant lesion is present. Treatment is extremely time-sensitive, and there are numerous proven therapies to reduce the risk of stroke after a TIA, varying by pathogenesis. Patients with recently symptomatic ipsilateral carotid artery stenosis (measuring ≥50%) should be considered for urgent carotid revascularization.14 Patients with atrial fibrillation without a contraindication should be anticoagulated.15 Because atrial fibrillation is a leading treatable risk factor for stroke and TIA, stroke/TIA patients presenting in sinus rhythm may need additional ECG monitoring if occult paroxysmal atrial fibrillation is suspected.16 Patients with intracranial occlusions may be considered for thrombolysis or at least monitored for symptom progression.17 Patients with intracranial stenoses should be initiated on aggressive medical management (Stenting & Aggressive Medical Management for Preventing Recurrent Stroke in Intracranial Stenosis [SAMMPRIS] trial protocol), including strict control of vascular risk factors and short-term dual antiplatelet therapy consisting of clopidogrel and aspirin.17 All patients should be considered for immediate antiplatelet therapy (if thrombolysis is not administered) or enrollment in a clinical trial testing early antithrombotic therapy.18,19 Once urgently assessed and treated within an emergency department setting, patients without high-risk vascular lesions can be safely discharged and...
referred to a stroke prevention clinic, rapid-access TIA/minor stroke clinic/day-unit, or vascular risk reduction clinic for management of vascular risk factors (hypertension, smoking, hyperlipidemia, diabetes mellitus) and attention to adherence with prescribed therapy. With the highest risk being in the first 24 hours, this is a condition that needs hyperacute management made in the emergency department.

We propose that all patients who present with neurological symptoms compatible with a high-risk TIA/minor stroke should have a clear diagnosis and management plan established within 24 hours (and ideally sooner than this) of their event. In particular, this means all patients with motor or speech symptoms or signs (by history or on examination) or a high index of suspicion that the event was truly an ischemic event should be urgently assessed. These patients require neurovascular imaging of the intracranial and extracranial circulation. Noncontrast brain computed tomography should be followed immediately with CTA from arch to vertex, assuming no contraindication to radiocontrast media (eg, allergy, renal insufficiency). In most jurisdictions, this would occur from the emergency department. If the imaging demonstrates an infarct, significant ipsilateral extracranial carotid artery stenosis, vertebobasilar or intracranial stenosis or occlusion, the patient should have immediate consultation with a stroke physician for same-day assessment/treatment. Patients with normal imaging but with other high-risk clinical features can be seen in an urgent clinic or day-unit (Figure) either the same day or the next business day. In all cases, treatment should be immediately implemented at the time of first assessment.

This model of care will require reorganization of resources to ensure that patients can be assessed and treated with the urgency required. Some community hospitals will need to initiate the use of CTA, with coordinated stroke clinic/telemedicine support from larger urban hospitals or build their own local stroke program. Stroke centers must ensure they develop rapid-access clinics/day-units to provide this comprehensive care. The specific changes that are required will vary based on the jurisdiction and their organization of stroke resources and governance. Acute cerebrovascular syndromes represent an opportunity to prevent a disabling or fatal stroke, but the time window for action falls within the first day. This is a paradigm shift; we must design our systems of care to respect the biology of the disease and realize that opportunity.

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**References**


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