



**Secondary Stroke Prevention
Expert Advisory Panel
Final Performance Measurement
Recommendations**

Authors:

**M. Patrice Lindsay PhD
Frank L. Silver MD, FRCPC
David J. Gladstone MD, FRCPC**

**Copyright © 2006
Institute of Clinical Evaluative Sciences, Toronto, Ontario
Ontario Stroke Strategy – Ontario Ministry of Health & Long Term Care
Canadian Stroke Network, Ottawa Ontario**

Synopsis of Secondary Stroke Prevention Indicators - Recommendations of a National Expert Panel

Part A: Recommended Secondary Prevention Triage Model

1) Summary of Discussion Related to Secondary Stroke Prevention Triage Model

Triaging of Patients – Recent data has determined that the risk of recurrent stroke in patients with TIA or minor stroke is high and that another stroke may occur within the first few days. [Gladstone et al, 2004] To prevent recurrent stroke, an attempt should be made to rapidly determine the responsible stroke mechanism (e.g. artery to artery embolism secondary to carotid artery stenosis, cardioembolism secondary to atrial fibrillation, etc.) so that specific preventive interventions can be instituted without delay. In the case of patients with symptomatic carotid artery stenosis who are candidates for carotid endarterectomy, new evidence suggests that their surgery should be performed quickly, ideally within two weeks of their TIA or minor stroke. [Rothwell PM *Lancet*; 2004; AAN Guideline 2005]

Given that the interval between initial presentation and recurrent stroke in some patients is very short, the panel suggested the need to implement a simple triage tool that would help determine the patient's risk and therefore the urgency for assessment by a secondary prevention clinic or stroke specialist. The panel members recommended that the triage categories for urgency of assessment, once established, could be applied to many of the indicators that involve time to diagnostic test or treatment. Patients that are deemed to be at low risk for early stroke recurrence can have their investigations completed in a less urgent fashion. The time frames provided also represent a compromise between the need for urgency based on short term risk and practical limitations of our health care system.

In searching for a simple and valid tool for determining risk, the panel selected Rothwell's ABCD Score. [Rothwell et al. *Lancet* 2005; 366: 29–36] This tool predicts risk of stroke within 7 days of a TIA. The components of the scale were derived from a population-based cohort of patients with TIA (Oxfordshire Community Stroke Project- OCSP) and validated on a cohort of TIA patients from the Oxford Vascular Study (OXVASC). The panel was concerned that the ABCD Score was validated on a rather small cohort of patients, it needs further validation in other cohorts, and that better triage tools will emerge over time, however they concluded that the ABCD score was an excellent initial tool for use at this time.

ABCD Scoring Scale: Prognostic instrument for predicting **7-day** risk of stroke after TIA (Rothwell et al. *Lancet* 2005;366:29-36.)

- A. age (1 point for age 60 years or greater)
- B. blood pressure (1 point for SBP >140 or DBP >90 at the acute evaluation)

- C. clinical features (2 points for focal weakness, 1 for speech disturbance without weakness)
- D. duration of symptoms (1 point for 10-59 min., 2 points for 60 min. or more)

Total score ranges from 0 (lowest risk) to 6 (highest risk). In their validation cohort, 7-day stroke risk ranged from 0% in those with scores <4, to 36% in those with scores of 6.

ABCD score	N (%)	Events (%)	%Risk (95%CI)
≤ 1	28 (7)	0 (0)	0
2	74 (20)	0 (0)	0
3	82 (22)	0 (0)	0
4	90 (24)	1 (5)	1.1 (0 - 3.3)
5	66 (18)	8 (40)	12.1 (4.2 - 20.0)
6	35 (9)	11 (55)	31.4 (16.0 - 46.8)
Total	375 (100)	20 (100)	5.3 (3.0 - 7.5)

Rothwell et al. *Lancet* 2005;366:29-36

Hospital Admission for TIA: In some situations, patients who are deemed in need of emergent investigation and treatment should be admitted to hospital. The decision to admit will depend on the patient and the local resources available. In some centres, immediate access to a stroke prevention clinic may obviate the need for admission to hospital. For further discussion of the merits of hospital admission vs. management in an ambulatory care setting see Donnan et al, *Stroke* 2006. The stroke prevention panel recognizes this controversy and does not take a specific position on whether patients should or should not be admitted to hospital.

2) Recommended Secondary Stroke Prevention Triage Model

The panel agreed upon three triage categories: emergent, urgent and semi-urgent, with the following definitions:

- i) **EMERGENT:** acute stroke (persistent or fluctuating symptoms) or acute high risk TIA (ABCD Score >3; Rothwell) within the previous 24 hours; should have immediate medical assessment (same day), ideally in an emergency department with imaging capabilities. (Note: patients with persistent acute stroke symptoms should call 911)
- ii) **URGENT:** TIA within the previous 72 hours; initial diagnostic assessment should occur within 1 week of the event.

- iii) **SEMI-URGENT**: does not meet criteria defined as emergent or urgent; assessment within 1 month.

The panel further agreed upon corresponding times for diagnostic testing and interventions. These are described in the following chart:

Diagnostic Tests	Urgency (<i>tests completed within</i>)		
	Emergent	Urgent	Semi-Urgent
a) Time to stroke assessment from time of first contact (by neurology or other medical specialist trained in stroke)	24 hours	7 days	30 days
b) Brain CT or MRI	24 hours	7 days	30 days
c) Carotid imaging* (carotid dopplers; or CT angiography; or MR angiography)	24 hours	7 days	30 days
d) ECG	24 hours	7 days	30 days
e) Holter ECG monitoring and/or echocardiography	72 hours	14 days	30 days

* applies to patients presenting with symptoms compatible with a carotid artery territory TIA or stroke

References:

P M Rothwell; M Eliasziw; S A Gutnikov; C P Warlow; H J M Barnett. **Endarterectomy for symptomatic carotid stenosis in relation to clinical subgroup** *The Lancet*; Mar 20, 2004; 363, 9413;

David J. Gladstone, Moira K. Kapral, Jiming Fang, Andreas Laupacis, and Jack V. Tu. **Management and outcomes of transient ischemic attacks in Ontario** *CMAJ* 2004 170: 1099-1104

Geoffrey A. Donnan, Stephen M. Davis, Michael D. Hill, and David J. Gladstone **Patients With Transient Ischemic Attack or Minor Stroke Should Be Admitted to Hospital: For.** *Stroke* 2006 37: 1137 - 1138;

Richard I. Lindley. **Patients With Transient Ischemic Attack Do Not Need To Be Admitted to Hospital for Urgent Evaluation and Treatment: Against** *Stroke* 2006 37: 1139 - 1140;

Stephen M. Davis and Geoffrey A. Donnan **The Stroke-Prone State: Rapid Assessment of Transient Ischemic Attacks.** *Stroke* 2006 37: 1140.

S. Chaturvedi, A. Bruno, T Feasby, R Holloway, et al. **Carotid Endarterectomy – An evidence based review: Report of the Therapeutics and Technology Assessment Subcommittee of the American Academy of Neurology.** *Neurology*, 2005;65:794-801.

Recommended Secondary Stroke Prevention Core Performance Measures:

These performance indicators were recommended by the Canadian Stroke Quality of Care Study Phase V: Secondary Stroke Prevention (Lindsay MP, Silver FL, Gladstone DJ; 2006). They were derived at following a series of ratings of a broader list by a Canadian consensus panel with representation from across the country and several health disciplines. Full details on the methodology are available from the Principal Investigator, Dr. Patrice Lindsay (patty.lindsay@canadianstrokenetwork.ca).

#	<u>SPC Performance Statement</u>	<u>Performance Measures</u>
Domain I: <u>Evaluation for Patients with a Suspected Acute TIA or Minor Stroke:</u>		
<u>Timing</u>		
1.	Public awareness programs should be present in communities to increase the public's knowledge of stroke symptoms so that they seek medical attention immediately.	<ul style="list-style-type: none"> ➤ Proportion of population that can name 2 or more stroke symptoms ➤ Proportion of patients who seek medical attention within 2.5 hours ➤ Median time from stroke event to presentation at an ED.
2.	Patients discharged from hospital following stroke should receive a referral to a stroke prevention clinic where available.	<ul style="list-style-type: none"> ➤ Percentage of inpatients who receive a stroke prevention clinic referral ➤ Percentage of patients with stroke/TIA discharged directly from the ED who receive a stroke prevention clinic referral. ➤ # of external referrals made for patients seen at a stroke prevention clinic (as documented in SPC)
3.	Patients with suspected TIA/stroke should be assessed according to a risk stratification tool and referred for assessment by a physician with stroke expertise within the specified time frames for each risk level.	<ul style="list-style-type: none"> ➤ Time from symptom onset to first assessment by a physician with stroke expertise
Domain II: <u>Evaluation for Patients with a Suspected Acute TIA or Minor Stroke:</u>		
<u>Diagnostic Evaluation</u>		
4.	For patients with a suspected acute TIA or minor stroke, the initial diagnostic investigation should include brain imaging (CT or MRI): <ul style="list-style-type: none"> a. Emergent – within 24 hrs b. Urgent – within 48 hrs c. Semi-urgent – within 7 days 	<ul style="list-style-type: none"> ➤ Number of pts who receive a CT/MRI within 24 hrs/ 7 days/ 30 days from symptom onset ➤ Median time from symptom onset to first CT/MRI ➤ Median time from first clinic assessment to CT/MRI
5.	For patients with carotid-territory ischemic symptoms, non-invasive imaging of the carotid arteries should be performed as soon as possible. Based on expert opinion, emergent cases should be performed within 24 hrs, urgent preferably within 7 days and semi-urgent within 30 days of symptom onset.	<ul style="list-style-type: none"> ➤ Number of patients with carotid territory disease who receive carotid imaging within 48 hrs from TIA/stroke onset ➤ Median time from TIA/stroke symptom onset to carotid imaging ➤ Median time from first physician assessment to carotid imaging ➤ % of patients who receive carotid imaging within 24hrs/7 days/30days

6.	For patients with a suspected acute TIA or minor stroke, the initial diagnostic investigation should include a 12-lead ECG.	➤ Number of pts who receive a 12-lead ECG as part of initial assessment
7.	The etiological stroke diagnosis should be determined and recorded at some point during secondary prevention assessment and follow-up.	➤ the # & % of patients with each type of stroke (Lacunar, etc)
Domain III: <u>Carotid Revascularization</u>		
8.	Carotid endarterectomy is recommended for recently symptomatic stroke/TIA patients (within previous 6 months) with severe (70 to 99%) carotid stenosis.	<ul style="list-style-type: none"> ➤ #/% of pts diagnosed with stroke/TIA and severe carotid stenosis (identifies denominator) ➤ #/% of these patients who undergo CE ➤ Time from stroke symptom onset to CEA surgery (mean and median)
9.	Carotid endarterectomy is recommended for <i>selected</i> patients with moderate (50 to 69%) symptomatic stenosis. These patients should be evaluated by a physician with expertise in stroke management.	<ul style="list-style-type: none"> ➤ #/% of pts diagnosed with stroke/TIA and moderate carotid stenosis (identifies denominator) ➤ #/% of these patients who undergo CE ➤ Time from stroke symptom onset to CEA surgery (mean and median) ➤
10.	Carotid endarterectomy is not recommended for patients with mild (<50%) stenosis.	<ul style="list-style-type: none"> ➤ #/% of pts diagnosed with stroke/TIA and mild carotid stenosis (identifies denominator) ➤ #/% of these patients who undergo CE ➤ Time from stroke symptom onset to CEA surgery (mean and median)
11.	The anticipated perioperative stroke, AMI and death rate for patients with carotid stenosis who underwent carotid endarterectomy should be < 6%	<ul style="list-style-type: none"> ➤ #/% of stroke pts who undergo CEA (stratified by carotid severity) ➤ Proportion of CEA patients who experience peri-operative stroke, AMI or death ➤ The 30-day post-CEA mortality and stroke rates by severity ➤ Stroke and death rate at one year post index event for patients who underwent CEA and those who did not
12.	Patients with an acute TIA or non-disabling stroke who are candidates for carotid endarterectomy and are neurologically stable should be referred for surgery without delay, and surgery should be performed within 2 weeks of the last ischemic event.	<ul style="list-style-type: none"> ➤ Median time from stroke/TIA onset to neuro or vascular surgery consultation ➤ Median time from stroke/TIA onset to CEA ➤ Proportion of patients who undergo CEA ➤ Proportion of patients who undergo CEA within 2 weeks, from 2 – 4 weeks; between 2 weeks and 3 months, and between 3 – 6 months of stroke onset ➤ Proportion of patients who wait > 6 months for CEA or who are cancelled due to long wait times. ➤ % pts who stroke/die while waiting on list for CEA
13.	Endarterectomy is not recommended for asymptomatic stenosis <60%, age >75 years, life expectancy <5 years, or if the surgical centre has	➤ Proportion of CEA patients with asymptomatic carotid stenosis who experience peri-operative stroke, AMI or

	low case volumes or a perioperative stroke/death rate >3%.	death <ul style="list-style-type: none"> ➤ 30-day mortality and stroke rate for asymptomatic patients who underwent CEA
Domain IV: <u>Pharmacotherapy</u>		
14.	Patients with non-cardioembolic stroke/TIA should be treated with antiplatelet therapy such as aspirin, clopidogrel (Plavix®) or ASA/extended-release dipyridamole (Aggrenox®), unless contraindicated. Patients with cardioembolic stroke or TIA should receive anticoagulants (e.g. warfarin), unless contraindicated.	<ul style="list-style-type: none"> ➤ Proportion of stroke/TIA patients prescribed antithrombotic therapy on discharge from acute care. ➤ Proportion of stroke/TIA patients prescribed antithrombotic therapy on discharge from SPC care.
15.	Patients with stroke/TIA and atrial fibrillation should be treated with warfarin unless contraindicated to achieve a target INR of 2.5 (range 2.0 – 3.0). In patients where warfarin is contraindicated should be treated with aspirin as an alternative	<ul style="list-style-type: none"> ➤ Proportion of eligible stroke/TIA patients with atrial fibrillation prescribed anticoagulant therapy on discharge from acute care. ➤ Proportion of stroke/TIA patients with atrial fib. prescribed anticoagulant therapy after a visit to an SPC. ➤ Proportion of patients on ASA ➤ Proportion of patients on warfarin with INR in therapeutic range.
16.	Patients who have had a stroke/TIA should be assessed for appropriateness of prescribing a lipid-lowering agent (statin or non-statin). <ol style="list-style-type: none"> i. lipid levels should be checked on initial assessment ii. statins should be prescribed for all appropriate patients to achieve a target LDL levels as per current Canadian guidelines. (< 2.5 mmol/L, or 1.8 mmol/L)* <p>* 1.8 is new guideline recommendation</p>	<ul style="list-style-type: none"> ➤ Proportion of stroke/TIA patients prescribed statin therapy on discharge from acute care. ➤ Proportion of stroke/TIA patients prescribed statin therapy through an SPC. ➤ Proportion of patients with LDL < 2.5 mmol/L; < 1.8 mmol/L
17.	Blood pressure lowering agents should be prescribed for patients with elevated blood pressure to achieve target levels as defined by the Canadian Hypertension Education Program. <p>(CHEP guidelines recommend BP be maintained below mmHg; mmHg for diabetics; mmHg for those with renal dysfunction and >1 gm/day microalbumuria).</p>	<ul style="list-style-type: none"> ➤ Proportion of stroke/TIA patients prescribed blood-pressure lowering agents on discharge from acute care. ➤ Proportion of stroke/TIA patients prescribed blood-pressure lowering agents after assessment in an SPC.
18.	All patients with minor stroke /TIA should be considered for ACE-inhibitor therapy or Angiotensine Receptor Blockers therapy unless contraindicated.	<ul style="list-style-type: none"> ➤ Proportion of stroke/TIA patients prescribed ACE inhibitors (alone or in combination) or ARBs on discharge from acute care. ➤ Proportion of stroke/TIA patients prescribed ACE inhibitors (alone or in

		<p>combination) or ARBs after assessment in an SPC.</p> <ul style="list-style-type: none"> ➤ Proportion of patients seen in a SPC and not prescribed these therapies
Domain V: <u>Risk Factor Assessment & Management</u>		
19.	Smoking status should be assessed and smoking cessation counselling should be initiated or reinforced.	<ul style="list-style-type: none"> ➤ Proportion of stroke/TIA patients documented as active smokers ➤ Proportion of these patients who have documentation to indicate that smoking cessation counselling was initiated ➤ Proportion of patients who report never smoking
20.	On initial assessment for secondary stroke prevention, patients should be screened for the presence of diabetes mellitus and treated according to current Canadian Guidelines..	<ul style="list-style-type: none"> ➤ Proportion of stroke/TIA patients assessed for diabetes status, and results documented ➤ Proportion of patients with previous Type II diabetes ➤ Proportion of patients with NEW diagnosis of Type II diabetes
21.	All patients followed in a stroke prevention clinic should be screened for risk factors of dietary patterns and exercise habits.	<ul style="list-style-type: none"> ➤ % of patients with Waist measurements done
Domain VI: <u>Patient & Family Care</u>		
22.	A stroke caregiver and the patient should receive education about stroke (i.e., cause, treatment, risk factor modification, and/or other topics) and should be given information about resources for social support or services.	<ul style="list-style-type: none"> ➤ Proportion of stroke/TIA patients with documentation to indicate that education was provided related to stroke/TIA care and prevention.
23.	Patients should be screened and referred for ongoing rehabilitation needs during initial/ongoing assessments for secondary stroke prevention.	<ul style="list-style-type: none"> ➤ Proportion of stroke/TIA patients with documentation to indicate screening for stroke rehab needs was performed ➤ Number of patients referred for rehabilitation services, which may include OT, PT and/or SLP
24.	Patients should be assessed for ongoing home support needs.	<ul style="list-style-type: none"> ➤ Proportion of stroke/TIA patients with documentation to indicate screening for community supports/services was performed ➤ Number of stroke patient referrals initiated for community supports/services, which may include home care, rehabilitation and/or other.

25.	Patients with stroke should be screened for the presence of mood changes (e.g. post-stroke depression) and referred as necessary.	<ul style="list-style-type: none"> ➤ Proportion of stroke/TIA patients with documentation to indicate assessment/screening for depression was performed either informally or using a formal assessment tool ➤ Proportion of stroke/TIA patients referred for additional assessment/intervention due to depression
26.	Patients with stroke should be assessed/screened for the presence of cognitive impairments and referred as necessary	<ul style="list-style-type: none"> ➤ Proportion of stroke/TIA patients with documentation to indicate assessment/screening for cognitive impairment was performed either informally or using a formal assessment tool ➤ Proportion of stroke/TIA patients referred for additional assessment/intervention due to cognitive impairment
27.	Patients with stroke should be assessed/screened for their fitness to drive post-stroke/TIA	<ul style="list-style-type: none"> ➤ Proportion of stroke/TIA patients with documentation to indicate that screening was performed to determine need for driving assessment ➤ #/% patients referred for driving assessment by OT
28.	Patients followed in a stroke prevention clinic should be monitored for new stroke/TIA events or death while under the SPC care.	<ul style="list-style-type: none"> ➤ # of new stroke/TIA events, AMI or death while under the SPC care.