Patients With Transient Ischemic Attack or Minor Stroke Should Be Admitted to Hospital: For
Geoffrey A. Donnan, Stephen M. Davis, Michael D. Hill and David J. Gladstone
Stroke 2006;37;1137-1138; originally published online Mar 16, 2006;
DOI: 10.1161/01.STR.0000209255.66933.3b

The online version of this article, along with updated information and services, is located on the World Wide Web at:
http://stroke.ahajournals.org/cgi/content/full/37/4/1137
Transient ischemic attacks (TIAs), like other vascular diseases, whether acute limb ischemia or acute coronary syndromes, are high-risk, unstable conditions. TIA heralds a relatively high risk of stroke, variably estimated to range between 10% and 20% in the ensuing 90 days.\(^4\) This has been known for several decades.\(^5\)–\(^8\) What is new are reports that show that at least half of the risk of early stroke accrues in the first 2 days after TIA. Necessarily then, any protective strategy needs to be implemented rapidly.

It is surprising that for a condition as common and serious as TIA, there remains so much variability in acute management. Whereas in some institutions, TIA patients are admitted routinely, in other jurisdictions, TIA patients are frequently discharged from the emergency department with suboptimal management, and many discharged TIA patients are unlikely to obtain adequate evaluation or treatment on an outpatient basis within 30 days.\(^4\)

### What Are the Potential Benefits of Hospitalization?

Although the value of inpatient stroke units is well established, little is known about the value of acute observation and investigation units for patients with TIA or minor stroke. Some potential benefits of a short-stay hospital admission include: (1) expedited diagnostic evaluation; (2) monitoring of fluctuating patients with ready access to thrombolysis if they deteriorate; (3) facilitation of early carotid revascularization; and (4) greater opportunity for risk factor modification.\(^9\)

### What Evidence Is There That We Should Apply Stroke Prevention Strategies Rapidly?

The benefit of carotid endarterectomy for stroke prevention in symptomatic patients is time dependent. Pooled analysis of the European Carotid Surgery Trial and North American Symptomatic Carotid Endarterectomy Trial studies has demonstrated that surgery is most effective when performed within 2 weeks of the index ischemic event (number-needed-to-treat [NNT] to prevent 1 stroke in 5 years=5), and this benefit declines dramatically over time (NNT=125 if surgery is delayed >12 weeks after the ischemic event).\(^10\) Thus, once carotid endarterectomy is considered for an appropriate patient, surgery should not be delayed. In Calgary, among patients admitted to hospital, we have been able to improve our rates of fast carotid revascularization for inpatients (within 2 weeks) from 72% in 2002 to 92% in 2004 (Hill MD, unpublished data, 2004).

In contrast, there is little evidence that patients with atrial fibrillation require immediate anticoagulation. Stroke recurs at a rate of \(\approx5\%\) in the first 2 to 4 weeks, and anticoagulation does not seem to prevent recurrence.\(^11\) Despite this result, some have argued in favor of early anticoagulation of TIA patients with atrial fibrillation including immediate use of low molecular weight heparin as a bridging therapy until the International Normalized Ratio can be adjusted to a target of 2.5.

Unfortunately, all of the stroke prevention studies investigating antiplatelet therapies have enrolled patients late after stroke or TIA onset. Only the International Stroke Trial and Chinese Acute Stroke Trial (CAST) studies showed a reduced recurrence of stroke in the first 2 weeks, with an absolute risk reduction of \(\approx1\%\) when acetylsalicylic acid was given in the first 48 hours.\(^12\) Among patients in the recent Management of ATherothrombosis with Clopidogrel in High-risk patients (MATCH) study who were enrolled within a week, the risk of recurrent stroke appeared to be substantially (but not significantly attributable to small numbers) reduced with double-antiplatelet therapy versus clopidogrel alone, compared with no risk reduction when patients were enrolled later.\(^13\) The ongoing Fast Assessment of Stroke and TIA to Prevent Early Recurrence (FASTER) study will provide direct evidence of whether double-antiplatelet therapy and a statin are useful in the hyperacute stage after TIA or minor stroke.\(^14\)

### Can We Select Patients at Highest Risk?

There is some evidence that patients with motor or speech deficits, TIA duration >10 minutes, age >60 years, or diabetes are at the greatest risk of early stroke. A clinical risk
stratification model developed in northern California has now been validated. A similar risk score has been developed based upon the Oxvase study. However, it seems likely that the patients with clear neurological symptoms (eg, witnessed hemiparesis or aphasia, with or without residual signs) are at the highest risk. Other patients with pure sensory events have a more benign prognosis. One reason may be that they may have an alternate diagnosis such as simple partial sensory seizure or a sensory migrainous event.

Brain imaging and vascular imaging performed early after an acute TIA are important predictors of patients who are higher-than-average risk. Computed tomography (CT) data suggest that patients with evidence of new infarction after TIA (despite a lack of symptoms) are at high risk. However, CT is insensitive to small volumes of ischemia. Diffusion-weighted magnetic resonance imaging may provide better prognostic value. Recent work confirms that TIA or minor stroke patients with diffusion-weighted imaging lesion on MRI are at substantially higher risk than those without. This observation may allow the use of MRI to triage patients to admission or home with clinic follow-up.

Is It Cost-Effective?
The cost of admitting a patient to hospital is governed largely by the length of stay. In a global budget system, as in Canada, short stays resulting in higher up-front costs may be cost-effective if future costs are curtailed.

What Is the Calgary Approach?
We modified the Johnston risk factors and will admit TIA patients who have had a motor or speech event (high-risk TIA). Patients with pure sensory events, pure vertigo, or clear amaurosis fugax are discharged home to be followed in the stroke outpatient clinic. Pitfalls in this approach have emerged in that many nonstroke physicians fail to note that key words or phrases such as “numbness,” “dead,” “limp,” “swollen,” and “my arm was not my own” may imply true weakness rather than simply a sensory disturbance. Dysarthria may be impossible to distinguish from aphasia historically. Careful history taking is required to ensure that patients who have had weakness or speech impairment are identified. Failure to recognize this has resulted in recurrent stroke on several occasions.

Once admitted, patients are preferably enrolled in a clinical trial (eg, FASTER), and they are imaged. Over the past 2 years 12% of admitted TIA patients have required carotid revascularization (Hill MD, unpublished data, 2005). The remainder have had a presumed stroke mechanism identified and a logical stroke prevention strategy implemented with a 3-month clinic visit for medical follow-up and lifestyle interventions.

Conclusions
There is a dearth of evidence on exactly what to do with the TIA in the emergency department. Randomized trials are clearly needed. In the interim, our preference is to admit and investigate for stroke mechanism those who we believe are most likely at the highest risk.
Patients With Transient Ischemic Attack Do Not Need To Be Admitted to Hospital for Urgent Evaluation and Treatment

Richard I. Lindley, MBBS, MD, FRCP(Edin), FRACP

The essence of the assessment of a patient with suspected transient ischemic attack (TIA) is to confirm the diagnosis, identify and treat the cause, and start effective secondary prevention to prevent a disabling or fatal vascular event. In general, admission to hospital is required for patients who are medically unstable, those who have become dependent or require complex care that is unfeasible or unavailable elsewhere. You do not need to be admitted to hospital because of a TIA, but this is often done because of the absence of an alternative. Many TIA clinics now offer a “one-stop” service for which the patient is assessed, investigated (or investigated before the appointment), and given results at the same session. The chief problem of such a clinic is that patients may experience a completed stroke (or other vascular disaster) before being seen, so delays must be eliminated. Solutions include immediate access to regular clinics (by accepting telephone, email, or faxed referrals) and better public recognition of the seriousness of a TIA or minor stroke.

Confirming the diagnosis or identifying one of the many TIA mimics is an important aspect of a TIA clinic because about one third of referrals do not have cerebrovascular disease. In addition, the wide variety of neurological and general medical conditions that mimic TIA provide an invaluable resource for medical training. Appropriately trained personnel are vital, and the more senior personnel (including consultant specialists) who run TIA clinics are preferred over the typically less experienced staff initially assessing patients in the emergency room.

Once a definite diagnosis of TIA is made, examination and investigation is required to identify the cause. This should include blood tests and ECG for all patients, brain imaging for most, and selected use of echocardiography (transthoracic and transthoracal) and carotid scanning, and all of these can be done as an outpatient. Weight, blood pressure, glucose, cholesterol, and ECG testing can be done immediately at the bedside. A coordinated approach can facilitate access to magnetic resonance scanning (including gradient echo sequences to identify small bleeds in those patients who inevitably present late with minor stroke symptoms), computed tomography scanning to exclude a tumor (for those with multiple attacks), and echocardiography to help identify a cardiac or intrathoracic large vessel cause.

A patient with a TIA (or minor stroke) needs specialist advice and management, and this is often best done in the privacy of a clinic environment, especially if relatives are routinely available. Patients with cerebrovascular disease are increasingly elderly and commonly have significant comorbidity that will influence management plans. Patients need to be told their diagnosis and advised on lifestyle management and medication. Patients can be anticoagulated as an outpatient (many such services are now available), and aspirin or other antithrombotic should be started for those in sinus rhythm (do not forget the immediate loading dose required for aspirin and clopidogrel). Blood pressure and cholesterol lowering can be started (stop smoking, exercise regularly, reduce dietary salt and fat, and commence a diuretic, angiotensin-converting enzyme inhibitor and statin over the following few weeks) as dictated by tests and individual circumstances. Patients with a symptomatic tight carotid stenosis need to be fast-tracked to the local vascular team.

Keeping patients out of hospitals cannot only be cost-effective but often provides the best service to patients, satisfies our political masters, and helps patients avoid those iatrogenic disasters of modern large hospitals (deep venous thrombosis, epidemic norovirus, methicillin resistant staphylococcus aureus, and deconditioning of frail older people). An outpatient service that offers a prompt specialized assessment is also a superb environment for training, audit, and research.

Finally, it is worth returning to the major criticism of a TIA clinic, namely whether serious or fatal strokes would occur in the waiting time between referral and being seen. Delays must be eliminated. However, we also need to consider why these events occur and whether hospital (as opposed to community) treatment would really make a difference? Our proven interventions include antithrombotic medication, which can be started by the referring doctor. Only a minority of TIA patients have tight symptomatic carotid stenosis requiring an early operation, but would a delay of a few days be significant? Statins probably need many months of treatment to have an effect (acute blood pressure and cholesterol-lowering trials are the focus of new trials). Anticoagulation for patients with atrial fibrillation often needs considerable thought, and antiplatelet therapy for a few days may be reasonable until a considered judgment is made about longer-term treatment.

Patients will continue to present late after TIA, some patients will refuse hospital admission, and many may prefer an urgent outpatient assessment over a hospital admission, and thus, patients do not have to be admitted to hospital for their TIA.

From the Department of Geriatric Medicine, Westmead Hospital (C24), University of Sydney, NSW.

Correspondence to Richard I. Lindley, Department of Geriatric Medicine, Westmead Hospital (C24), University of Sydney, NSW 2006.

E-mail richard_lindley@wmi.usyd.edu.au

(Stroke. 2006;37;1139-1140.)

© 2006 American Heart Association, Inc.

Stroke is available at http://www.strokeaha.org

DOI: 10.1161/01.STR.0000209329.67467.a0
The Stroke-Prone State
Rapid Assessment of Transient Ischemic Attacks
Stephen M. Davis, MD, FRACP; Geoffrey A. Donnan, MD, FRACP

There is no doubt that transient ischemic attack (TIA) heralds stroke and that urgent assessment and management are essential. Recent evidence has emphasized the brief time window available for stroke prevention in many patients. In one study of ischemic stroke with a preceding TIA, the warning event had occurred in 26% of cases within a day.1

The key issues are the identification of high-risk patients and optimizing management in individual centers. Challenges include accuracy of diagnosis and rapid access to appropriate resources, necessitating both expert clinical opinion and modern imaging facilities. Both of our protagonists agree that urgent assessment is essential, but on our request, they have taken divergent views concerning the need for hospitalization, which reflect the range of current clinical practice.

Interestingly, in recent years, because of increasing pressures on hospital systems worldwide, there has been a reallocation of hospital resources with a greater emphasis on emergency care and shorter length of stay. One approach has been the development of rapid assessment, short-stay units, often attached to emergency departments. This model eliminates the inpatient/outpatient dichotomy alluded to by our protagonists and provides an efficient system for TIA management. Emergency department algorithms for TIA patients must involve expert stroke opinion because accurate diagnosis is often difficult, as emphasized by Lindley. We have all had the experience of being called to see a TIA patient who has clearly had an event caused by migraine, epilepsy, and numerous other pathologies, or indeed has had an established stroke.

Although we encourage the specialized assessment of patients with TIA, we fear that the establishment of “TIA outpatient clinics” de-emphasizes the urgency required for their assessment. Specialized areas of assessment need to be established, which are appropriately badged to underscore the urgency of the problem of TIA management.

The diagnosis of high-risk TIA patients remains a challenge. It has been suggested that diffusion-weighted imaging might predict those at highest risk, although an alternative explanation is that a positive diffusion-weighted imaging scan merely rules out the many patients with other causes of transient ischemia attacks and hypertension.

It is worth remembering that the high-risk nature of the TIA patient is not a new concept.3 However, more recent studies have highlighted the urgency of the problem in the context of modern imaging techniques and evolving management options. Whether TIA patients are managed as inpatients or outpatients is probably immaterial as long as the patient who is in this high-risk stroke-prone state is quickly recognized and managed urgently.

References

Key Word: transient ischemic attack

From the Department of Neurology, Royal Melbourne Hospital and University of Melbourne, Australia; and the National Stroke Research Institute, Austin and Repatriation Medical Centre and University of Melbourne, Australia.

Correspondence to Stephen M. Davis, Department of Neurology, Royal Melbourne Hospital and University of Melbourne, Parkville, 30, Australia. E-mail stephen.davis@mh.org.au

(Stroke. 2006;37:1140.)
© 2006 American Heart Association, Inc.

Stroke is available at http://www.strokeaha.org
DOI: 10.1161/01.STR.0000209245.05915.df

Acknowledgments
Professor Lindley is supported by an infrastructure grant from NSW Health.
I would like to thank Dr Peter Landau for his helpful comments during the preparation of this article.

References