



Clinical Study

Rapid access point of care clinic for transient ischemic attacks and minor strokes



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ABSTRACT

We present 24 months of prospective data from a new model of care for transient ischemic attacks (TIA) and minor stroke, established at the Royal North Shore Hospital, a tertiary teaching hospital in Sydney, Australia. Prior to 2011, approximately 200 patients were admitted to our emergency department (ED) annually, following presentation with a suspected TIA. These patients had an average length of stay of 5.3 days. Following the establishment of a twice weekly multidisciplinary, one stop, stroke prevention and hospital avoidance clinic, all patients with suspected TIA were investigated and treated as outpatients. There was an average time to clinic from the initial presentation in the ED of 3.9 days. Symptoms that were highly suggestive of TIA were seen in 47% of patients, and an additional 14% had MRI-confirmed acute stroke. In total, 405 patients were referred to the clinic, saving 2146.5 inpatient bed days and approximately AUD\$1,180,575. Our model of care for patients with suspected TIA provides early access for investigation, treatment and management of the risk factors. The rapid access TIA clinic is highly cost effective and provides a transferable model of care for other health districts with similar patient loads and cost structures.

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1. Introduction

Patients who present with a transient ischemic attack (TIA) or minor stroke are at high risk of a recurrent stroke or vascular death. An urgent assessment, risk factor modification and secondary prevention therapy may prevent up to 80% of these events [1–5]. Due to the risks associated with TIA and the impact of immediate treatment, most patients are investigated and treated as inpatients, despite having no neurological deficit or disability.

Financial pressures and patient expectations have changed the delivery of primary health care. Patients without disability are more often managed in an ambulatory care setting if access to diagnostics and therapy can be provided reliably and in a timely fashion. This has led to the establishment of rapid access TIA and stroke prevention clinics in Australia and many other countries in the last decade. These services differ significantly in regards to their accessibility and scope [6].

Prior to 2011, approximately 200 patients were admitted annually to the Royal North Shore Hospital (RNSH) in Sydney, Australia, with a clinical diagnosis of TIA and an average length of stay of 5.3 days. RNSH covers a population base of approximately 840,000 (more than 11% of the NSW population). We present the results of a rapid access TIA and stroke prevention clinic for patients presenting to the emergency department (ED) with a suspected transient neurovascular event. TIA was defined in the ED as an acute neurological deficit, which resolved within 24 hours and was of a presumed vascular origin, with no evident lesion on CT scans. This one stop, point of care clinic is run by a multidisciplinary team, and it is different to the majority of other ambulatory acute stroke services.

2. Methods

2.1. The rapid access TIA clinic

The clinic was started to reduce hospital admissions, and the referral base was primarily from the ED. This service worked collaboratively with the ED, which performed baseline tests

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including brain CT scans, electrocardiogram (ECG), blood pressure measurement and routine bloods. From 8 am to 10 pm Monday to Friday, an in house neurology registrar (advanced or basic physician trainee) supported the ED in the management of patients with suspected acute neurological disease, including all TIA patients. After 10 pm there was an on call advanced neurology trainee registrar who was involved with all patients with suspected neurological disease. Patients with an unclear history or symptoms that were not suggestive of TIA were admitted to the hospital.

In the first 12 months, we utilized the ABCD2 score [7] as a risk stratification tool and allowed only low risk patients to be referred to the TIA clinic (ABCD2 score <4). After 12 months, we modified the referral practice to allow all TIA patients, even those with ABCD2 scores above 4, to our TIA clinic, as long as their symptoms had fully resolved and all known and new risk factors were treated and with secondary prevention also initiated in ED. This was always based on the clinical judgement of the involved neurology team. Secondary prevention therapy is mandated at this first point of contact in the ED, with antithrombotic agents or oral anticoagulation if atrial fibrillation is shown, as well as management of the initially found risk factors such as new hypertension, hyperlipidemia and diabetes.

The clinic operated twice a week, and patients received a pre visit telephone call outlining the preparation for, access to, and schedule of tests during the TIA clinic visit. All patients were seen in our TIA clinic by a consultant neurologist and clinical nurse consultant (CNC). The patients underwent a full suite of diagnostic tests during this single visit, including MRI (T1 and T2-weighted, fluid-attenuated inversion recovery, time of flight angiograms of the intracranial vessels, diffusion-weighted imaging, apparent diffusion coefficient and susceptibility weighted images), duplex ultrasonography of the cervical arteries, echocardiogram, fasting bloods and Holter ECG, as well as a thrombophilia screen, if indicated (Table 1). The clinic attendance duration was around 4 hours.

All results, apart from the Holter ECG and thrombophilia screen, were available on the same day of the clinic presentation. Every patient received a complete management plan, prescriptions of all necessary medication, guideline-based advice on lifestyle adjustments, and behaviour change education to modify the risk factors. The patients were provided with written information on diet, exercise, blood pressure, lipid targets and glycemic control. Those who were identified as requiring further specialist input were referred to a diabetes or hypertension service, or a dietitian. The CNC provided post clinic contact to follow-up on any outstanding results that would impact the continuation of the planned care.

With stroke prevention as the key component, follow-up visits were offered to patients if it was felt that the monitoring of risk factors would encourage the necessary lifestyle changes and improve compliance.

Data on the patient demographics, diagnoses and vascular and lifestyle risk factors were recorded at the first visit. Obesity was reviewed using the body mass index (BMI) [8]. Outcome measurements (total cholesterol, low density lipoprotein [LDL] cholesterol, glucose, systolic and diastolic blood pressure) were collected at the first visit and follow-up. High blood pressure was defined as greater than 140/90 millimeters of mercury (mmHg) for non-diabetics, and above 130/80 mmHg for diabetic patients. Harmful alcohol consumption was defined by an excess of the World Health Organization recommended daily intake of one alcoholic drink for women and two for men [9].

2.2. Statistical analyses

The statistical analyses of the difference between the parametric continuous variables were performed using two sample t-tests, and differences in outcome variables across time were performed

Table 1
Tests performed in the ED and TIA clinic

Test	ED	TIA clinic
Clinical	Clinical examination/medical history (ED physician)	Clinical examination / medical history (neurologist/registrar/clinical nurse consultant)
Laboratory	Routine blood (electrolytes, renal function, full blood count, aPTT, INR)	Fasting bloods (glucose, total cholesterol, LDL, HDL, triglycerides) Optional: HbA1C, INR, Hemoclot TT, ^a thrombophilia screen
Imaging	Brain CT scan Chest radiograph	MRI brain, MRA COW Transthoracic echocardiogram Duplex sonography cervical and vertebral arteries
Electrophysiology Therapy	ECG Secondary prevention initiated Risk factor modification initiated	24 hour ECG (Holter) Secondary prevention reviewed and modified Risk factor management reviewed and modified Education/ information on life style changes (DVD, reading material, dietician) Referral to outpatient rehabilitation services

aPTT = activated partial thromboplastin time, COW = circle of Willis, ECG = electrocardiogram, ED = Emergency department, HbA1C = hemoglobin A1c, HDL = high density lipoprotein, INR = international normalized ratio, LDL = low density lipoprotein, MRA = magnetic resonance angiography, TIA = transient ischemic attack.

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with paired t-tests. The differences between proportions of categorical variables were assessed using the chi-squared test. All tests were undertaken using the SAS Enterprise Guide (version 4.3; SAS Institute Inc., Cary, NC, USA) and a significance level of $p < 0.05$ was considered statistically significant.

3. Results

Since July 2011, 405 new patients were assessed in the TIA clinic in the first 24 months (Table 2). There was an average time to clinic from ED presentation of 3.9 days. The average age of patients was 63 years (range: 21–97), with an equal female to male ratio. The average ABCD2 was 3.0.

At discharge from the TIA clinic, 47% of all the newly referred patients had symptoms that were highly suggestive of TIA, and an additional 14% had MRI-confirmed acute ischemic stroke. Other diagnoses included benign paroxysmal positional vertigo, migraine, seizure, and headache (Table 3).

The main risk factors for TIA and stroke patients were hypercholesterolemia and hypertension, and 19% of patients had a diagnosis of diabetes (Table 4). Approximately half of the TIA and stroke patients reported that they did not engage in any regular physical exercise and one third were obese (BMI > 30). In less than 5% of the patients, no modifiable risk factor was found.

On the risk factor analysis, there were no significant variances in cholesterol, glucose or blood pressure measurements between the vascular and non-vascular patients (Table 5). However, significantly more TIA and stroke patients had more than two vascular and lifestyle risk factors compared to the non-vascular patients ($p = 0.009$; Fig. 1). The prevalence of hypertension, diabetes, atrial fibrillation and smoking were significantly higher for patients with neurovascular events (Table 4).

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