

A single consultation cerebrovascular disease clinic is cost effective in the management of transient ischaemic attack and minor stroke

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ABSTRACT *Aim:* We examined the cost effectiveness of a single consultation strategy to manage patients referred with TIA or stroke to our cerebrovascular disease (CVD) clinic, where all relevant investigations (blood tests, CT brain scan and carotid Dopplers) were obtained prior to the clinic appointment.

■ *Design:* Retrospective study of patients referred to the CVD clinic at St George's Hospital, London between October 1995 and 1996.

■ *Results:* Of 211 new patients seen in the clinic, 73% had CVD; 146 (68%) patients had imaging studies prior to clinic attendance. Of these, 132 (90%) were managed with a single consultation. This strategy cost £5,700 less than if these patients had been followed up.

■ *Conclusion:* Performing all relevant investigations prior to clinic attendance allowed a fully informed discussion with the patient at a single consultation and was cost effective.

Stroke is the third commonest cause of death and the commonest cause of adult disability in industrialised countries¹. The incidence is about 2 per 1,000 so there are approximately 100,000 new strokes each year in the UK responsible for 10% of all deaths². Incidence of stroke increases exponentially with age³. Overall about 20% of patients having their first stroke are dead within a month, and, of those alive at six months, about a third depend on others for their activities of daily living¹. The financial cost of stroke is high: in Scotland in 1988, the 'in-hospital' cost of each stroke was £6,000¹ and in the USA in 1990, the cost (including community costs) was \$70,000⁴. Therefore, as the average age of the population rises, stroke will become an increasing burden on health resources⁵. The few promising treatments available are currently applicable to a small minority of patients⁶, therefore the emphasis must still

remain on prevention⁷. We set up a dedicated cerebrovascular disease (CVD) clinic at St George's Hospital to facilitate early assessment of patients with transient ischaemic attack (TIA) or stroke. Our intention was to hold a single informed comprehensive consultation. All investigations were performed prior to this consultation so that all blood test results and full radiological reports would be available at the single consultation. The aims were to reduce delay before investigations were acted upon, initiate all secondary prevention measures at a single out patient consultation and minimise the requirement for follow up appointments. The disadvantage of this approach was that patients may undergo unnecessary tests. In this report, we have studied the utility and cost effectiveness of this single consultation approach.

Methods

The CVD clinic was set up in 1995 and general practitioners and hospital specialists were encouraged to use the service. All referral letters to the neurology department were screened by a consultant neurologist with a special interest in stroke within five working days of receipt. Patients who appeared to have a cerebrovascular disorder were sent appointments, whereas those unlikely to have cerebrovascular disease (e.g. those with isolated vertigo or loss of consciousness) were seen by the neurology service. The selected referral letters were stamped with a standard list of investigations to be requested. These investigations were: unenhanced CT brain scan, carotid Doppler ultrasound examination (Dopplers), ECG, full blood count, serum electrolytes, liver and thyroid function tests, fasting glucose and lipid profile, and serological tests for syphilis. Patients under 65 years had thrombophilia screens (protein C, protein S, antithrombin III, anti-cardiolipin antibodies, lupus anticoagulants and factor V Leiden mutation). CT scans were requested in all patients except those who had had a recent scan. Dopplers were performed only in patients with carotid territory symptoms. Copies of the stamped referral letters were accepted by the neuroradiology department as requests for CT brain scans and Dopplers in place of the normal hospital request forms. A clinic clerk sent appointments for the CT scan, Dopplers, ECG, a set of blood test forms, an explanatory letter and clinic appointment to the patients. Dopplers and CT scans were arranged within

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two weeks after receipt of the referral letter and patients were seen in clinic the following week. At this consultation, the results of all blood tests, written reports of the CT scan and carotid Doppler and hard copies of the CT scan and ECG were available.

The case notes of all patients attending the CVD clinic from October 1 1995 to September 30 1996 were reviewed. The following pre-specified information was sought: clinical details, demographic data, source of referral, number of clinic visits, investigations performed, final diagnosis. The appropriateness of the pre-clinic tests to the final diagnosis was decided by discussion. Data were collected on measures for secondary prevention of stroke started in clinic. A variety of diagnoses were made and the following were considered to be cerebrovascular disorders: stroke, TIA, vascular dementia, asymptomatic carotid stenosis.

Results

Two hundred and eleven patients were referred to clinic; 209 case notes were retrieved (99.1%). The mean age of

Table 1. Numbers of patients referred from different sources and the accuracy of the referring group's diagnosis of CVD.

	Number of Patients	Patients with CVD	Patients with other diagnoses	% CVD
General Practice	146	97	49	66
Physician/Neurologists	37	30	7	81
Surgeons	21	17	4	81
A&E	6	5	1	83
Other hospitals	5	5	0	100
TOTAL	209	148	61	

Table 2. Number of patients with a CVD or non-CVD diagnosis.

CVD diagnosis	Number of patients	Non-CVD diagnosis	Number of patients
Cerebral infarct	66 (31.5%)	Cardiac syncope	11
TIA	63 (30.1%)	Migraine	10
Asymptomatic carotid disease	12 (5.7%)	Vestibular dysfunction	8
Vascular dementia	5 (2.4%)	Epilepsy	5
Primary intracerebral haemorrhage	2 (1%)	Transient global amnesia	4
		Cerebral tumour	3
		Tension headache	2
		Multiple sclerosis	1
		Motor neurone disease	1
		Cerebellar degeneration	1
		Ischaemic retinopathy	1
		Root lesion	1
		Chorea	1
		Alzheimer's disease	1
		Hypoglycaemia	1
		Anxiety disorder	1
		No diagnosis made	9

TIA = transient ischaemic attack

Key Points

Performing all relevant investigations prior to clinic attendance allowed a fully informed discussion with the patient at a single consultation

The single consultation strategy is cost effective compared to conventional practice of seeing the patient first, ordering tests and then reviewing them

About 30% of the patients referred to the clinic did not have cerebrovascular disease

In patients presenting with syncope, other diagnoses (e.g. cardiac syncope or epilepsy) should be considered

new referrals was 66 years and 55% were men. There was no significant difference in the average age of male and female patients. As shown in table 1, most patients were referred from primary care physicians or the Accident and Emergency department (152 patients, 73%). Fifty eight (28%) came from other hospital specialties and five (2%) from other hospitals in the health region. Of the 211 patients referred, 148 (71%) had CVD (Table 2). The commonest alternative diagnoses made were cardiac syncope, migraine, vestibular dysfunction and epilepsy (65% of alternative diagnoses). In 11 patients (4%) no diagnosis was made. One hundred and eighty two new patients (87%) were managed with a single consultation.

One hundred and forty (66%) patients had CT and 138 (66%) had Dopplers performed prior to their clinic attendance. Therefore, 146 patients had either CT or Dopplers; 132 (63%) had both tests. Of these 146 patients, 132 were managed with a single consultation. CT was considered to

have been performed unnecessarily in 16 (12%) patients and Dopplers in 23 (16.7%). The costs of CT and carotid duplex examinations in our hospital were £131 and £56 respectively. Therefore, the total cost of unnecessary investigations performed over those 12 months was £3,384. The cost of follow-up visits, at £69 each, would have been £9,108 (£69 x 132 patients) if patients had been followed up conventionally. Therefore, the single consultation strategy saved £5,724.

Six patients (3%) had internal carotid artery (ICA) occlusion and 44 patients (21%) had greater than 70% stenosis of at least one ICA. In 23 of these 44 patients, the stenosed artery was considered asymptomatic and treated conservatively. Twenty one patients were referred on for carotid surgery or endovascular treatment. Two of these patients refused surgical treatment.

All patients were screened for the presence of modifiable risk factors. Fifteen patients were newly diagnosed as hypertensive and 29 with known hypertension were identified as having sub-optimal blood pressure control. Seventy four patients had serum cholesterol levels greater than 5.2 mmol/l; 59 of these had not previously been identified as having raised cholesterol. Two patients were newly diagnosed with atrial fibrillation (AF) and nine others were identified in AF but not anticoagulated. Of these 11 patients, six were referred for anticoagulation, two were treated with aspirin as anticoagulation was considered too hazardous, and one was considered inappropriate for either aspirin or warfarin. Two patients were not treated as they did not have CVD and AF was a lone risk factor. One patient was newly diagnosed as diabetic and 38 current smokers were identified. Thrombophilia screening in patients under 65 years identified two patients with Lupus anticoagulant, two patients with antithrombin III deficiency, one with anti-cardiolipin antibody syndrome and one with protein C and S deficiency; two patients had the factor V Leiden mutation. Six patients had positive serology for syphilis: five were referred for lumbar puncture, all of which were normal, and one had already had a lumbar puncture, also normal.

Aspirin was started in 29 patients referred to clinic; the usual starting dose was 300 mg daily. Eight patients had their dose of aspirin increased and five were started on dipyridamole. Aspirin was stopped in 17 patients: 11 did not have CVD and six were treated with warfarin instead.

Discussion

This study demonstrates that a single consultation CVD clinic, with all the main relevant investigations performed beforehand, is cost effective. The saving at St George's was approximately £6,000 over one year. Although this is not a great saving, this strategy is less expensive than the traditional approach of seeing the patient first, ordering investigations and reviewing the patient with the results at a follow up visit. Also, it allows a fully informed discussion with the patient at the time of the consultation of the relative benefits of treating risk factors or undergoing

carotid surgery. Furthermore, our strategy releases follow up clinic slots which can be used for more new patient visits, hence shortening the waiting time for an appointment. Using our strategy, about 12% of patients will have an unnecessary CT scan and 16% unnecessary Dopplers. However, in those patients in whom a CT was not essential, the clinician and patient were often reassured by the normal scan and the normal result may have influenced the diagnosis.

Patients who have suffered a TIA or minor stroke have a 10% risk of stroke within the next year, particularly over the ensuing few months⁸⁻¹¹. Therefore, it is important rapidly to identify and treat risk factors, particularly carotid stenosis, in these patients. Twenty one per cent of patients had an ICA stenosis greater than 70% and about half of these were symptomatic and referred for further treatment; the rest were treated conservatively. The CVD clinic was useful, therefore, not only in identifying patients for carotid surgery but also ensuring that asymptomatic patients were appropriately managed.

In our series, 71% of patients were diagnosed as having CVD, a similar figure to that reported by Martin *et al*¹², who noted that only 73% of the referrals to their CVD clinic had suffered a cerebrovascular event. In their series, 10% of patients had an ICA stenosis greater than 70%, whereas in our study 11% had an asymptomatic ICA stenosis and 10% had a symptomatic ICA stenosis. In a recent report, Joseph *et al*¹³ determined the success of risk factor modification in patients attending a stroke clinic over two years. They found that although most patients received help and advice to improve their risk factor profiles over two years, there was disappointingly very little improvement. Hence, diagnosing and referring patients with carotid stenosis for surgery may be a particularly important function of a CVD clinic.

An additional benefit of a CVD clinic may be to identify those patients who do not have CVD and ensure they are not inappropriately managed with antiplatelet agents. In our study, 11 patients who were taking aspirin when referred to clinic did not have CVD. Aspirin was stopped in these patients. It is important to appreciate that aspirin is associated with an increased risk of cerebral haemorrhage in patients who take it without having a specific vascular disease indication (eg TIA, angina, claudication)¹⁴.

Cardiac syncope and epilepsy were common alternative diagnoses to TIA or stroke. These diagnoses are associated with loss of consciousness, a symptom unusual in CVD unless the pathology affects the brainstem. To diagnose a brainstem TIA with syncope, we look for other brainstem symptoms such as nausea, vertigo, diplopia or limb weakness. Similarly, in differentiating vestibular from brainstem disease, it is important to identify other brainstem symptoms.

In conclusion, a single consultation strategy for the out patient management of patients with CVD does appear to be a useful and cost effective way of managing these patients.

Acknowledgement

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