What is the Optimum Model of Service Delivery for Transient Ischaemic Attack?

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Executive Summary

Background

It is now well recognised that people who have a transient ischaemic attack (TIA) are at high risk of going on to have a stroke, and the risks of this happening are highest in the first few days following the event. There are several interventions, both medical and surgical, that can potentially substantially reduce this risk of stroke following a TIA. Therefore, it is relevant for health services to consider how best to provide services for patients who have had a TIA so as to ensure that they receive speedy diagnosis and prompt treatment to reduce the chance that they will have a stroke. National guidelines and policy recommend that the solution is to have patients seen rapidly by a specialist in an out-patient setting. It has been suggested that some patients at particularly high risk of stroke should be admitted to hospital so that if they do have a stroke, then they will receive prompt treatment to minimise the impact of that stroke (e.g. with thrombolysis). A further option is to encourage patients to contact the emergency services when they have symptoms. Alternatively, patients might be managed by their general practitioner.

Aim

The aim of this research was to conduct mathematical modelling to determine what is the optimum pattern of service provision for people presenting with a transient ischaemic attack or minor stroke.

About this study

In order to do this, it was necessary to gather data to populate the model. These data were obtained from the Oxford Vascular Study (OXVASC), the Newcastle Rapid Ambulance Protocol Study, the QRESEARCH general practice database, and the literature. From the OXVASC study, data were obtained on the incidence of TIA and minor stroke, and the risk of stroke following these events. The Newcastle data provided data on how long it took people to reach hospital when they attended via the emergency services. The QRESEARCH database provided data on the current management of TIA in general practice. The literature was used to determine the impact of treatments on reducing risks of subsequent stroke, accuracy with which GPs diagnose TIA, and to obtain costing data. In addition, we performed a patient survey to determine patient costs and patient preferences for different types of service.

The model comprised a discrete event simulation, programmed in Borland Delphi. It predicted what would happen under different patterns of service provision to people who present to the health service with symptoms suggestive of TIA or minor stroke. The model simulated 10 years of time for a population of 500,000. Current
practice was compared to different patterns of service provision, including daily rapid access clinics, twice weekly clinics and weekly clinics. It was assumed that the rapid access clinic would provide accurate diagnosis, rapid assessment for carotid endarterectomy where appropriate, and optimal medical management (blood pressure lowering; statin therapy; dual anti-platelet therapy; anticoagulation if atrial fibrillation). For each type of service provision, it tested what would happen if the referral threshold was changed according to predicted risk of stroke using the ABCD2 scoring system. It also modelled what would happen if high risk people were admitted to hospital, if greater use was made of emergency services, and if GPs improved their diagnosis and management. The principal outcome of the model was number of major strokes (i.e. strokes that lead to hospital admission) prevented and cost. This enabled incremental cost effectiveness ratios (ICERs) to be calculated.

Key findings

Daily rapid access clinics were more cost-effective than current practice. If a referral threshold was set at an ABCD2 score of 4 or more, then this would on average lead to 4 referrals per week, and prevent 4 strokes per year at an average cost of £27,000 per stroke. Referring all patients (approximately 16 per week) with possible TIAs was also cost-effective, with an ICER of £50,000 per major stroke prevented compared to the refer at ABCD2 score of 4 strategy. Admitting patients with high ABCD2 scores for three days observation was not cost-effective, with an ICER of over £1,000,000 per major stroke prevented as compared to referring all suspected cases to a daily rapid access clinic. Twice weekly and weekly clinics were less effective and less cost effective than daily clinics, but were cost effective compared to current practice. For example, referring to a twice weekly clinic with a threshold of ABCD2 score of 4 or more prevents 3.3 additional major strokes per year as compared to current practice at an ICER of £33,000 per stroke prevented. The conclusions of the model were unchanged if greater use was made of emergency ambulance services. However, it was not cost effective to encourage use of emergency ambulances to expedite rapid treatment of TIAs. If GPs initiated optimal medical management on seeing the patient, then it is only cost effective to use rapid access clinics if all patients are referred (regardless of whether the GP has made a diagnosis of TIA, or what the patient’s ABCD2 score is). If GPs were better at diagnosis of TIA than suggested by the literature then the option of referring all suspected TIAs is no longer cost effective.

Conclusion

We estimate that to prevent a stroke that would lead to a hospital admission is on average the equivalent of saving about 4 QALYs. Therefore, around £80,000 per major stroke averted is likely to be considered cost-effective. Therefore, we drew the following conclusions for service provision from the simulation model:

Configuration of rapid access neurovascular clinics:

- Where possible, these should allow for same day referrals. Daily clinics are more cost effective than less frequent clinics (e.g. twice weekly or weekly). The referral threshold for these clinics can be varied according to clinic capacity using an ABCD2 score cut off between 4 and 7.
• On grounds of cost-effectiveness the optimal threshold would be to refer patients with suspected TIA with an ABCD2 score of 4 or more if capacity is limited to around 1 patient per day (serving a population of 500,000). If capacity is not limited, then it is cost effective to see all possible TIs.

• If daily clinics are not possible, twice or once weekly clinics are cost effective with a referral threshold of ABCD2 of 4 or more.

• Flexible clinics, i.e where staff can do other work when capacity is not required on a given day, are more cost-effective than fixed clinics.

In patient admission:

• We do not recommend in-patient admission to facilitate thrombolysis for patients at high risk of stroke because of high ABCD2 score.

Use of emergency services:

We do not recommend that patients are encouraged to use 999 services where symptoms have resolved.
Disclaimer

This report presents independent research commissioned by the National Institute for Health Research (NIHR). The views and opinions expressed therein are those of the authors and do not necessarily reflect those of the NHS, the NIHR, the SDO programme or the Department of Health.

Addendum

This document was published by the National Coordinating Centre for the Service Delivery and Organisation (NCCSDO) research programme, managed by the London School of Hygiene and Tropical Medicine.

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