Who should manage transient ischemic attacks? A comparison between stroke experts, generalists, and electronic decision support

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Abstract

Aims Rapid expert management of transient ischemic attacks (TIA) has been shown to reduce the incidence of stroke, but is not always achievable. This study aims to demonstrate that TIA management by stroke experts is indeed more guideline adherent than that of generalists and that a TIA/stroke electronic decision support (EDS) tool closely mimics expert advice and improves guideline adherence.

Methods 11 general practitioners (GPs), 12 general physicians, and 12 stroke specialists assessed and provided management plans for 7 hypothetical patients with potential TIAs. Responses were compared with the advice provided when patient data was entered into a TIA/stroke EDS programme.

Results Diagnosis and medical management was highly consistent and guideline adherent amongst stroke experts. Diagnostic accuracy was lower in the GP and general physician groups (76% and 79% respectively) and only one-third of generalists initiated best medical therapy when indicated. The TIA/stroke EDS consistently agreed with expert diagnosis, investigations, and medical management and provided most comprehensive lifestyle advice.

Conclusion This study (a) confirms that stroke expert care achieves higher guideline adherence and (b) provides validation that the TIA/stroke EDS tool is able to mimic expert advice and can reliably apply best practice guidelines.

Transient ischaemic attacks (TIAs) identify people at high risk of stroke. The key intervention that reduces subsequent stroke is rapid initiation of best medical therapy via urgent (<24 hour) specialist review.1,2 Care following this model has been associated with an 80% reduction in 90 day stroke risk from 10.3% to 2.1% (adjusted hazard ratio 0.20, 95% CI 0.08-0.49; p=0.0001).2

In New Zealand, providing a 24 hour, 7 days a week, rapid access stroke specialist run TIA service is challenging. Involving other, less specialised clinicians is often the only alternative.3 However, the quality of care provided by such clinicians is uncertain and generally assumed to be inferior.

Electronic decision support (EDS) has been used in a variety of health care settings,4 but has not been widely used in the management of TIA or stroke.

In 2009 the MidCentral stroke service in collaboration with BPAC (Inc) launched a TIA/Stroke EDS tool after completion of a small pilot.5

This tool consists of a web-based single page data entry form (Figure 1) and a computer algorithm that utilises criteria from the New Zealand TIA guidelines5 to (a)
confirm a diagnosis of TIA or stroke and (b) recommend an evidenced based management plan which can, depending on risk stratification, range from immediate hospital referral to community management by the GP with access to relevant diagnostics.

Figure 1. TIA/stroke EDS data entry form with sample case
This study aimed to (a) confirm the notion that stroke specialist care is indeed superior to both general practitioners (GPs) and general physicians without special expertise in stroke and to (b) assess whether this novel TIA/Stroke electronic decision support (EDS) tool can help to enhance the management skills of generalists to more closely mimic management provided by experts and improve overall guideline adherence.

Methods

Twelve physicians with expertise in stroke care (neurologists and physicians/geriatricians with special training/experience in stroke care), ten GPs, and 12 general physicians without special training or experience in stroke care were recruited via various methods.

Stroke experts were identified through an informal New Zealand stroke doctor network and contacted via email with an 86% response rate. General physicians were recruited from the investigators’ home institution during a regular medical grand rounds lecture with a 71% response rate. These physicians all participate in the general medicine roster and are actively involved in the management of patients with stroke and TIAs.

GPs were recruited from the authors’ home DHB by contacting all GPs via email for whom an email address was on file in the department of neurology with a 27% response rate.

All participants were asked to assess seven hypothetical cases based on real life referrals to the MidCentral Stroke/TIA Service. Subsequently, all seven cases were entered into the EDS tool by the primary investigator for comparison to clinician responses.

To ensure that EDS advice was not strongly dependent on the degree of expertise of the individual entering the data, two volunteers with no medical background were also asked to enter these same seven cases into the TIA/stroke EDS tool.

The seven cases consisted of two patients with transient symptoms not typical of TIA (Case 1 & 7), one with a posterior circulation TIA (Case 2), one with an anterior circulation TIA (Case 3), one with a subtle posterior circulation stroke with delayed presentation (Case 4), one with a hyperacute anterior circulation stroke (Case 5), and one with progressive cranial nerve signs and symptoms developing over 48 hours and no vascular risk factors based on a real life patient with Miller-Fisher variant of Guillain-Barré syndrome (Case 6).

Clinicians were asked to make a diagnosis, triage the patient, and design a management plan. Answers were generally recruited in free text format to limit prompting.

Parameters assessed included: diagnosis (including anatomic localisation i.e. anterior versus posterior circulation), medication initiation (which and when), investigations requested and patient counselling (smoking cessation, diet advice, driving restrictions).

All cases were in part hypothetical and even when they closely approximated a real life patient a definite final diagnosis was not always possible. Thus in most cases the majority opinion of the stroke experts was considered to represent the ‘best possible diagnosis.’

Management appropriateness as regards triage, diagnostic work-up and medication/counselling was assessed by comparison with expert majority opinion and best practice guideline recommendations.

Diagnostic cost was estimated using MidCentral DHB public hospital prices. An appropriateness score was calculated by adding 10 points for each appropriate investigation and subtracting 10 points for each inappropriate or omitted investigation.

Investigations considered include MRI, CT, carotid imaging, electrocardiogram, echocardiogram, and Holter monitor/24 hour telemetry. When more than one option was suggested the cheapest option was used in calculations. Laboratory cost, other investigations, and hospitalisation costs were not considered.

Results

Diagnosis and localisation was highly consistent amongst stroke experts. Stroke experts concurred with one another as regards diagnosis and anatomic localisation
(anterior versus posterior circulation) in 93% (range: 75–100% depending on the case) and 98% (93–100%) of cases respectively. Where a definite diagnosis was known (Cases 3–6) all 12 experts arrived at the correct diagnosis.

GPs and general physicians demonstrated diagnostic accuracy of 76% (45-100%) and 79% (33-100%) respectively. Accurate localisation was achieved by GPs in only 9% (0-27%) and by general physicians in 58% (33-77%) of cases (Figure 2).

By contrast when appropriate patient data was entered into the TIA/Stroke EDS expert diagnosis and localisation were matched 100% of the time.

**Figure 2. GP and general physicians (%) achieving diagnostic and localisation consistency with expert majority opinion**

Triage advice was more consistent across all groups although with this variable GPs outperformed general physicians: 84% (60–100%) of GPs achieved appropriate triage advice compared with only 59% (39–100%) of general physicians; by contrast the software achieved this in 100% of cases.

When appropriate (as determined by both expert majority opinion and best practice guidelines) 92% of stroke experts recommended immediate initiation of best medical therapy (BMT) consisting of antiplatelet(s), statin, and an antihypertensive.

In comparison only 27% of GPs and 31% of internists initiated BMT immediately when indicated. The software recommended BMT initiation at first point of contact in every case where appropriate.

All three clinician groups significantly underperformed when it came to additional management advice including counselling on diet, smoking cessation, and driving restrictions.

By contrast, these items were consistently addressed by advice generated by the automated software (Figure 3).
Figure 3. Management consistency with New Zealand TIA Guidelines: GPs, general physicians, stroke experts, and EDS software

Overall the estimated management costs were highest amongst stroke experts and lowest amongst GPs and appropriateness of investigation amongst clinicians was highest in the expert group and generally inversely proportional to cost (Figure 4).

Figure 4. Investigation appropriateness and cost by clinician group

*Score is calculated by adding 10 points for each investigation ordered in accordance with New Zealand guidelines and subtracting 10 points for each omitted or inappropriate investigation ordered.
When two non-doctors were asked to enter the seven cases into the TIA/stroke EDS tool the same answers were elicited as when entered by a stroke expert except on a single occasion when a volunteer accidentally entered incorrect clinical data. The resultant diagnosis over-estimated the acuity of the problem prompting hospital level rather than outpatient care, however, other advice rendered remained appropriate.

**Discussion**

Unsurprisingly and quite reassuringly, stroke expert management was highly concordant with one another and generally guideline based. As expected diagnostic and localisation skills were poorer in the generalist groups with general physicians outperforming GPs.

The frequent omission of initiation of best medical management by generalists compared with experts echoes previous findings\(^1,\)\(^2\) and strongly supports the notion that generalists in isolation do not adequately implement secondary preventive measures. However, it is noteworthy that even experts frequently omitted implementing non-medical preventive strategies.

Diagnostic cost increased with level of expertise and the appropriateness of the diagnostics requested did as well. This is not surprising and further highlights that while expert care is probably more expensive than generalist care it is also more comprehensive and appropriate.

The performance of the TIA/Stroke EDS tool was superior to that of generalists, achieved diagnostic accuracy comparable with experts and closely mimicked expert triage and medication management advice.

The ‘check-list’ nature of an electronic tool is the likely explanation for its superior performance as regards the more comprehensive inclusion of otherwise often neglected non-medical management provision and highlights one of the clear strengths of such tools.

While cost effectiveness of investigation of the EDS tool appeared superior to both generalists and experts this finding has to be interpreted with caution. Firstly, the appropriateness score did not take into account potential variations amongst investigations as regards degree of importance, secondly cost assessment was solely based on investigation and specifically did not consider the cost of the EDS tool itself, and finally the EDS never advises to obtain MRI scanning as it is a primary care based tool and thereby will almost by definition incur a lower management cost than experts.

Whether an MRI is ever the most appropriate first investigation in the management of a probable stroke or TIA patient is debatable and beyond the scope of this paper. Nonetheless, the findings suggest that some degree of standardisation may in fact offer potential cost savings. The perhaps somewhat surprisingly lower ‘indication score’ amongst experts compared with the EDS was primarily related to frequent omission to request ECGs amongst the experts.

While the software can add value to generalist driven TIA care it is important to note that accuracy of data entry is paramount. Some precautions can be set to ensure that if in doubt the software errs on ‘over-estimating’ rather than ‘under-estimating’ clinical
risk ensuring adequate patient safety at the potential expense of optimum resource utilisation. However, on top of that it appears important that the individual using the software tool has some medical expertise so that overt errors are readily recognised and all management decisions are sanctioned by a clinician before being implemented.

This is a small, observational study limiting the conclusions that can be drawn. However, the close concordance with expert advice does provide a degree of validation of this tool and several outcome measures strongly suggest that there is a role for an electronic decision support tool in aiding general doctors with the management of TIAs especially when experts are not readily available.

A large randomised controlled trial (FASTE Trial: ACTRN12611000792921) is currently underway to conclusively ascertain the safety, efficacy, and cost effectiveness of this tool in clinical practice.

Competing interests: Nil.

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