Changes in the provision of transient ischaemic attack services in New Zealand 2008 to 2013

Wallace Brownlee, Annamarei Ranta, Julius Dale-Gandar, Patricia Bennett, John Gommans, John Fink, P Alan Barber

Abstract

Background Urgent assessment and management of patients with transient ischaemic attack (TIA) reduces the early risk of stroke. In 2008 an audit was conducted of TIA services in New Zealand and a substantial discrepancy was found between clinical practice and recommendations in TIA guidelines. We aimed to re-evaluate the situation again in 2013 to determine if there had been any change in provision of TIA services.

Methods A brief written questionnaire, based on the 2008 survey, was sent to lead stroke clinicians at all district health boards. Questions were asked about the provision of services, including investigation and management of patients with TIA.

Results The questionnaire was completed by all DHBs. The number of DHBs with a dedicated TIA clinic has increased from 3 in 2008 to 15 in 2013 and the number with a clinical pathway for assessment of patients with TIA has increased from 5 to 17. Brain and carotid imaging is usually available within 48h for patients assessed as having high stroke risk. Delays for other patients remain frequent for brain imaging in 14 DHBs and for carotid imaging in 16 DHBs. There was a decrease in the number of DHBs with a wait of more than a week for carotid endarterectomy when indicated from 16 in 2008 to 4 in 2013.

Conclusion There have been significant improvements in the provision of TIA services over the last 5 years. However in order to reduce the burden of stroke, DHBs need to consider further investments into adequately resourced TIA services as a priority.

Among patients presenting with a transient ischaemic attack (TIA), the risk of completed stroke may be as high as 10% in the first 48 hours. Early implementation of secondary prevention, including the timely identification and treatment of carotid stenosis and atrial fibrillation, can reduce the risk of early stroke by as much as 80%. Accordingly over the last 10 years there has been a significant move to consider TIA a medical emergency with a change in service models from routine outpatient assessment to rapid access specialist TIA clinics and inpatient admission for patients at highest risk of stroke.

In 2008, we conducted an audit of TIA services in New Zealand. A substantial under-provision of TIA services, and delayed investigation and management of patients with carotid stenosis, was found when compared with best practice recommendations. Since 2008, national guidelines have been published on the assessment and
management of TIA and a substantial effort has gone into improving stroke and TIA guideline implementation throughout NZ. 6,7

A modified audit was repeated to determine if publication of these guidelines, and increasing awareness of the early risk of stroke following a TIA, has led to changes in the provision of TIA services.

**Methods**

In August 2013, the lead stroke physician or head of medical services at all 20 district health boards (DHBs) was asked to complete a questionnaire regarding local organisation of TIA services, access to investigations and management of patients with TIA, and clinical audit activity.

Otago and Southland DHBs merged in 2010, and a separate questionnaire was also sent to Southland Hospital to enable direct comparison with the 2008 survey. The questionnaire could be completed in less than 10 minutes. Responses from the current survey were compared with those from the survey conducted in 2008.

**Results**

Clinicians at all 20 DHBs, and Southland Hospital (reported hereafter as 21 ‘DHBs’), returned the questionnaire. The respondents were neurologists in 7 (33%), general physicians in 5 (24%), geriatricians in 5 (24%), stroke physicians in 2 (9.5%) and other clinicians in 2 (9.5%) DHBs. 19 (90%) DHBs had a clinical lead who coordinates stroke and TIA services, an increase from 13 (62%) in 2008.

Compared with 2008, more DHBs manage TIA patients in the outpatient setting (Table 1). 15 (71%) DHBs have a dedicated specialist TIA clinic; of these 14 (67%) provide a ‘rapid access’ service for urgent outpatient evaluation of suspected TIA patients. No DHBs routinely admit patients with TIA, compared with 3 (14%) in 2008.

**Table 1. Service provision and investigation of TIA patients in 2008 and 2013**

<table>
<thead>
<tr>
<th>Variables</th>
<th>2008 (n=21)</th>
<th>2013 (n=21)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lead physician for stroke / TIA services</td>
<td>13</td>
<td>19</td>
</tr>
<tr>
<td>Dedicated TIA clinic</td>
<td>6</td>
<td>15</td>
</tr>
<tr>
<td>Usual assessment setting</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TIA clinic</td>
<td>3</td>
<td>10</td>
</tr>
<tr>
<td>Emergency department</td>
<td>10</td>
<td>5</td>
</tr>
<tr>
<td>Acute assessment unit</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>Inpatient admission</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Location for patients requiring admission</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stroke unit</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>Acute assessment unit (AAU) / medical wards</td>
<td>18</td>
<td>15</td>
</tr>
<tr>
<td>TIA pathway</td>
<td>5</td>
<td>17</td>
</tr>
<tr>
<td>Neuroimaging</td>
<td></td>
<td></td>
</tr>
<tr>
<td>All patients</td>
<td>9</td>
<td>10</td>
</tr>
<tr>
<td>Most patients</td>
<td>12</td>
<td>10</td>
</tr>
<tr>
<td>Some patients</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Waiting time for carotid endarterectomy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;1 week</td>
<td>5</td>
<td>16</td>
</tr>
<tr>
<td>1 week–1 month</td>
<td>12</td>
<td>1</td>
</tr>
<tr>
<td>&gt;1 month</td>
<td>4</td>
<td>3</td>
</tr>
</tbody>
</table>
Twice as many DHBs now admit patients who require hospital admission to acute stroke units rather than general medical wards or medical assessment units. 2 (9.5%) DHBs routinely follow TIA patients after an initial specialist assessment, down from 4 (19%) in 2008.

The number of DHBs that have clinical guidelines for TIA management has increased from 13 to 17 (81%). These guidelines incorporate recommendations for investigations in 17 DHBs, and secondary prevention in 15 DHBs. 17 (81%) DHBs have a clinical pathway for the evaluation of patients with suspected TIA, compared with 5 (24%) in 2008. Clinical pathways include sections relevant to general practitioners in 14, ambulance services in 6, emergency physicians in 17, radiologists in 16 and vascular surgeons in 14 DHBs.

Eighteen (86%) DHBs stratify TIA patients into high and low-risk groups on the basis of clinical features or risk-stratification tools to plan clinical assessment and investigations (Table 2).

Table 2. Usual waiting times for assessment and imaging in the 18 DHBs that stratify TIA patients into high- and low-risk groups

<table>
<thead>
<tr>
<th>Waiting time</th>
<th>Assessment</th>
<th>CT Head</th>
<th>Carotid USS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Low risk</td>
<td>High risk</td>
<td>Low risk</td>
</tr>
<tr>
<td>&lt;24 hours</td>
<td>0</td>
<td>14</td>
<td>3</td>
</tr>
<tr>
<td>24–48 hours</td>
<td>2</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>&gt;48 hours</td>
<td>11</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>&gt;1 week</td>
<td>5</td>
<td>0</td>
<td>9</td>
</tr>
</tbody>
</table>

Fourteen of 18 (78%) DHBs usually assess high-risk patients within 24 hours, but two DHBs see these patients after 48 hours. 11 of 18 (61%) DHBs usually assess low stroke risk patients between 48 hours and 1 week, and after more than 1 week in 5 (24%) DHBs. These 18 DHBs were asked to estimate waiting times for neuroimaging and carotid ultrasound among high and low-risk patients.

In only one (5%) DHB do high-risk patients usually wait for more than a week for carotid ultrasound, compared with 10 (48%) DHBs in 2008. Low-risk patients still wait for more than one week for carotid ultrasound in 6 (29%) DHBs.

The usual wait for carotid endarterectomy in patients with haemodynamically significant carotid stenosis is more than a week in 4 DHBs, a marked reduction from 16 in 2008. The waiting time for carotid endarterectomy was less than a week in all 10 DHBs with an on-site vascular service, compared with 7 of the 11 DHBs without a vascular service.

Clinical audit activity of TIA services has increased since 2008. 9 (43%) DHBs now conduct audit at the service level, compared with 3 (14%) DHBs in 2008. The issues identified as being most important for ongoing development of TIA services included improved access to investigations (n=8); education of GPs, ambulance staff and emergency physicians (n=5); improved access and efficiency of an existing TIA clinic.
(n=3), or establishing a TIA clinic (n=2); and development of a pathway for TIA patients (n=3).

**Discussion**

The findings of this national audit of TIA services show significant improvements over the past 5 years. There has been an increase in the number of lead stroke and TIA clinicians. More TIA patients are now seen in the ambulatory rather than the acute care setting with an increase in the number of dedicated TIA clinics.

The number of DHBs using local guidelines and clinical pathways to standardise and streamline TIA care has increased. Finally, there have been improvements in the usual waiting times for specialist assessment, key investigations and carotid endarterectomy.

It is encouraging that 15 DHBs now have dedicated TIA clinics. In 10 DHBs the TIA clinic is now the main setting for TIA patient assessment. The number of DHBs where TIA patients are usually seen in the emergency department has fallen by half and there are no longer any DHBs where TIA patients are routinely admitted to hospital. However, it is not sufficient to have a TIA clinic if patients are not seen in a timely manner. Rapid access TIA clinics reduce the risk of stroke, neurologic disability and death.\(^2,3\)

In larger DHBs TIA clinics should operate at least 5 days per week and a less frequent service may result in delays in obtaining investigations, starting secondary prevention and ultimately preventing stroke. Smaller DHBs serving a population of 100,000 or less can expect 2–3 patients with TIA each week.\(^8\) In this setting coordinated care through GPs and emergency department services with rapid access to necessary investigations and input from a stroke physician or stroke nurse specialist may be more feasible than a dedicated TIA clinic.

Not all TIA patients have the same stroke risk. Patients with recurrent (crescendo) events, atrial fibrillation and persisting neurologic symptoms require urgent evaluation, probably in the inpatient setting.\(^3\) Other patients such as those with isolated sensory symptoms or those with transient neurological symptoms that occurred more than a week ago are at a much lower risk of stroke and may need less urgent assessment. Risk stratification tools are available to identify stroke risk and prioritise assessment and investigations.

The most widely used risk stratification tool is the ABCD2 score incorporating age, blood pressure, clinical features, duration of symptoms and diabetes has been shown to correlate with the risk of stroke after TIA.\(^9\) The ABCD2 score has been incorporated into national and international TIA guidelines,\(^6,10\) and many DHBs now use it, along a number of other clinical features, to stratify TIA patients.

Approximately half of the strokes that follow a TIA occur in the first 48 hours after symptom onset. NZ guidelines recommend that TIA patients at high stroke risk are assessed “as soon as possible but definitely within 24 hours”, and low-risk patients within 7 days.\(^6\) In the SOS-TIA study, where a rapid-access TIA clinic led to a 79% reduction in the risk of stroke, 87% of patients were seen within 24 hours of the event.
It is therefore encouraging that more than three quarters of DHBs see high-risk patients within 24 hours. However, it is of concern that four DHBs usually see high-risk patients after 24 hours, and 5 DHBs see low-risk patients after 1 week. Delays in the assessment and investigation of patients with TIA represent a missed opportunity for early implementation of secondary prevention.

New Zealand guidelines recommend brain imaging within 24 hours among high-risk patients, and within one week in low-risk patients. This is in order to exclude TIA mimics where antithrombotic treatment may be contraindicated such as subdural haematoma, mass lesions and convexity subarachnoid haemorrhage due to cerebral amyloid angiopathy.

Almost one-third of DHBs reported that high-risk patients usually wait more than 24 hours for brain imaging and in more than half of DHBs low-risk patients usually wait more than a week for brain imaging.

Among TIA patients with severe (>70%) ipsilateral carotid stenosis, the 90-day stroke risk may be as high as 1 in 4. Candidates for carotid revascularisation should be screened with carotid ultrasound within 1 week, or within 1 working day if considered at high stroke risk.

While there have been improvements since 2008, in 6 DHBs low-risk patients are still usually waiting for more than a week for carotid ultrasound. CT carotid angiography done at the same time as CT brain scanning may be an alternative approach in those centres where there is limited access to carotid ultrasound.

Carotid endarterectomy reduces the risk of stroke in patients with severe ipsilateral carotid stenosis and the most benefit is gained if it is done within 2 weeks of TIA. It is therefore encouraging to see that the usual wait for carotid endarterectomy is now less than one week in 17 DHBs, compared to 4 in 2008.

The benefit of carotid endarterectomy is much lower if performed more than a month after TIA, and may be eclipsed by the risk of peri-procedural stroke and other complications. It is of concern that the usual wait for carotid endarterectomy is still greater than 1 month in 3 DHBs. All of the DHBs where patients routinely wait more than a week for carotid endarterectomy do not have a local vascular surgery unit, suggesting a need for better coordination of regional services.

The additional resources required to set-up and run rapid access TIA clinics may be unattractive to DHBs. However, TIA clinics lead to a number of direct and indirect cost savings, including freeing up resources in busy emergency departments and reducing the number of patients requiring inpatient assessment.

In a UK study, the institution of a rapid assessment TIA clinic reduced the mean number of hospital bed days from 6 to 2 and the mean cost per patient from £1056 to £432, effects primarily driven by a reduction in hospital admissions with stroke. These short-term savings are relatively small compared with the long-term costs of caring for people living with disability due to stroke. Other improvements to TIA services are not necessarily costly.

An effective service requires prompt access to key investigations. Better coordination with local radiology services with dedicated slots for brain and carotid imaging may lead to faster institution of secondary prevention measures without an increased cost.
This study has a number of limitations. Questionnaires offer a convenient means of surveying clinical practice in a large number of hospitals. This survey is one of a number on the provision of stroke services carried out over a number of years and so we have been able to identify individuals with interest in stroke and TIA in most of the DHBs.\textsuperscript{15,16} It was made clear that no individual DHB would be identified, however, it is possible that responses do not reflect actual practice and no attempts were made to verify responses.

There were also some differences between the current and 2008 surveys. Responses about the timeliness of assessment and investigations were separated into those for high and low stroke-risk patients in the current survey. This was not done in 2008 so that direct comparisons were not always possible.

**Conclusion**

There have been significant improvements in the provision of TIA services in New Zealand over the last 5 years. However, almost a quarter of DHBs still have no dedicated TIA services and there are still delays in obtaining brain and carotid imaging and carotid endarterectomy. In order to reduce the burden of stroke, DHBs need to consider adequately resourced TIA services a priority.

**Competing interests:** Nil.

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**References:**


