Endovascular clot retrieval (ECR) is now considered the standard of care for selected patients with acute ischaemic stroke due to a large vessel occlusion (LVO). There is a strong correlation between outcome and time to treatment with ECR. Patients need ECR initiated within six hours of symptom onset; however, recent evidence suggests that this time window, in highly selected patients and utilising advanced imaging, can be extended to 24 hours.

1.66 million New Zealanders live in regional centres (outside Auckland, Wellington and Christchurch) where access to ECR involves emergency inter-hospital transport to a metropolitan centre. However, there are diagnostic, resource, logistical and time constraints that make accessing ECR a challenge.

The Taranaki District Health Board (TDHB) formed a working group in late 2017 to revamp the hyper-acute stroke pathway with an emphasis on giving our residents access to the ECR service offered by Auckland City Hospital (ACH).

The distance from Taranaki to Auckland is 318.5km with a helicopter flight time of 72 minutes. The Taranaki Rescue Helicopter is based at Taranaki Base Hospital and St John, flight-credentialed intensive care paramedics (ICPs) are responsible for patient care during transport.

TDHB utilises a ‘Code Stroke’ model which ensures timely access to resources to assess, treat and transfer acute stroke patients.

Key elements of the implementation process/pathway:

1. Pre-hospital notification by St John (ambulance)
2. Code Stroke Team with adequate human resource and expertise
3. Standard imaging including both non-contrast CT and CT angiography with automated and rapid transfer of images to the ECR centre
4. Activation of the helicopter transfer team once LVO confirmed, prior to acceptance by the ECR neurologist
5. Documentation with appropriate communication channels
6. ICP training
7. Regular ‘Code Stroke’ training scenarios

The new pathway was rolled out on 22 July 2018. The following describes a patient representative of those who have utilised the pathway. Table 1 shows the key time points.

A fully independent 87-year-old New Plymouth resident started to feel unwell at 0800 and took herself to bed. One hour later she realised that she was unable to move the left side of her body, coincidentally her daughter rang and recognised her speech was slurred so called for an ambulance. Paramedics had to break in to enter while avoiding the patient’s dog, identified that the patient had likely had a stroke and pre-alerted the hospital.

On arrival to hospital she was assessed by the emergency department (ED) personnel and Stroke Team. Her National Institutes Health Stroke Scale (NIHSS) score was 11 with dense left hemiplegia and sensory loss. She was transferred to the CT scanner on the ambulance stretcher.

Her non-contrast CT head excluded intracranial haemorrhage and her CT angiography showed a thrombus in the right M1 segment of the right middle cerebral artery. Following consent she was treated on the CT table with a fibrinolytic bolus.
Simultaneously, the helicopter transfer team was activated and a phone call was made to the neurologist at ACH. She was returned to ED, a fibrinolytic infusion was commenced and the ICP arrived to prepare her for transport. It took three hours and seven minutes from arrival at TDHB to having her clot successfully extracted, including a 64-minute helicopter flight and 24-minute ACH door-to-groin-puncture time. Her last seen well-to-clot extraction time was five hours and five minutes.

Twenty-four hours after ECR, her NIHSS score was six with mild limb and facial weakness and a small basal ganglia infarct on her CT. She was repatriated to TDHB on day two, and discharged home on day eight with subtle weakness on her left side, a NIHSS score of zero and a Modified Rankin Scale (mRS) score of two.

The working group agreed that patients would be prepared for flight, transported to and loaded into the helicopter prior to ECR centre acceptance. We believe this can save up to 45 minutes. Thrombolysis and ECR pathways occur in parallel, with the remaining fibrinolytic infusion administered in flight, which minimises delay to ECR.

In this issue of NZMJ, Burnell et al report on patients treated with ECR by ACH.\(^6\) Not surprisingly, symptom onset to groin puncture time for patients presenting at regional hospitals averaged 141 minutes longer than those presenting to metropolitan hospitals. It is unknown how outcomes differ between these two groups. To date, TDHB have transferred six patients to ACH for ECR, all six patients have returned home, four are functionally independent with a mRS score less than three, the other two have a mRS score of three. The above case highlights that rapid transfers are feasible with good clinical outcomes but significant cultural, technological and structural changes are required. We hope that our pathway sets the standard for acute stroke care in regional New Zealand.

Table 1: Key time points of ECR case.

<table>
<thead>
<tr>
<th>Time</th>
<th>Time from last well (mins)</th>
<th>Length of last step (mins)</th>
<th>Milestone</th>
</tr>
</thead>
<tbody>
<tr>
<td>~0800</td>
<td>0</td>
<td></td>
<td>Patient last felt well</td>
</tr>
<tr>
<td>~0900</td>
<td>60</td>
<td>60</td>
<td>Patient noticed left-sided weakness</td>
</tr>
<tr>
<td>0914</td>
<td>74</td>
<td>14</td>
<td>111 call received</td>
</tr>
<tr>
<td>0920</td>
<td>80</td>
<td>6</td>
<td>Ambulance arrived on site</td>
</tr>
<tr>
<td>0952</td>
<td>112</td>
<td>32</td>
<td>Ambulance departed to ED</td>
</tr>
<tr>
<td>0958</td>
<td>118</td>
<td>4</td>
<td>Ambulance arrived at ED</td>
</tr>
<tr>
<td>1010</td>
<td>130</td>
<td>12</td>
<td>CT Head started</td>
</tr>
<tr>
<td>1026</td>
<td>146</td>
<td>16</td>
<td>Activation of helicopter transfer team</td>
</tr>
<tr>
<td>1030</td>
<td>150</td>
<td>4</td>
<td>Alteplase bolus given and call made to ACH neurologist</td>
</tr>
<tr>
<td>1039</td>
<td>159</td>
<td>9</td>
<td>Helicopter team arrived in ED and acceptance for transfer to ACH</td>
</tr>
<tr>
<td>1116</td>
<td>196</td>
<td>37</td>
<td>Helicopter lift-off</td>
</tr>
<tr>
<td>1220</td>
<td>260</td>
<td>64</td>
<td>Helicopter landed at Auckland City Hospital</td>
</tr>
<tr>
<td>1245</td>
<td>285</td>
<td>25</td>
<td>Groin puncture</td>
</tr>
<tr>
<td>1305</td>
<td>305</td>
<td>20</td>
<td>Clot extraction</td>
</tr>
</tbody>
</table>

LETTER
Competing interests:
Nil.

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