Framework for regional acute stroke services in Victoria

Victorian Stroke Clinical Network
Acknowledgements

This framework has been developed by the Regional Transfers Working Party, a subcommittee of the Victorian Stroke Clinical Network (VSCN). The development of this document is essentially an extension of the work already conducted by those responsible for the Stroke care strategy for Victoria, the Clinical guidelines for stroke management 2010 and the Acute stroke services framework 2011.

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In addition the Department of Health gratefully acknowledges the valuable input from key people who have helped develop this document including:

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1. Purpose

This document provides recommendations for regional acute stroke service provision, to ensure all suspected stroke patients in regional Victoria receive timely and appropriate evidence-based acute stroke care.

2. Background

Stroke is a serious health issue for Victorians. It is the second leading cause of death in both the state and the country. In 2010 there were 2,607 deaths from stroke, representing 7.3 per cent of all deaths in Victoria.\(^1\) In 2011–12, 15,240 people were admitted to Victorian public hospitals with stroke or transient ischaemic attack (TIA) and of these approximately 22 per cent were admitted to regional hospitals.\(^2\)

*Stroke care strategy for Victoria*\(^3\) (the strategy) provided a framework for how stroke services should be organised to deliver evidence-based stroke care. A key deliverable was to improve the capacity and capabilities of health services across the state, to deliver stroke care, and ensure appropriate regional pathways for the management of acute stroke patients. This work supports principles articulated in the *Victorian Health Priorities Framework 2012–2022*\(^4\) (VHPF):

- universal access and focus on those most in need
- equitable outcomes across the full continuum of care
- person–and family centred care
- evidence-based decision making.

Since 2007, the Victorian Stroke Clinical Network has promoted the objectives and driven the implementation of the strategy’s recommendations. Several of the recommendations deal explicitly with access to services with particular emphasis on regional Victoria.

In line with the strategy’s recommendation 27, since 2008 clinical facilitators have been employed on a time-limited basis at 11 health services across metropolitan and regional Victoria to assist in the local implementation of the strategy. This has resulted in increased stroke care capacity and greater access to stroke unit care and thrombolysis for acute ischaemic stroke across the state.

In 2011, the Victorian Stroke Clinical Network established the Regional Transfers Working Party to drive improved regional access to specialist acute stroke services. As a result, this service framework has been developed for health services and other key stakeholders in regional areas, including Ambulance Victoria.

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2.1 Definitions

The definitions and terms used in the development of this framework are listed below:

- Regional areas are defined according to the Department of Health regions, depicted in Figure 1.
- Regional stakeholders include any individuals or organisations that may be involved in stroke management in a given region, who should be engaged in a collaborative process aimed at improving access to specialist stroke services.
- Terminology used in the National Stroke Foundation’s *Acute stroke services framework 2011*\(^5\) for classifying the stroke care capacity of health services has been adopted for use within this document. Details in the Appendix.

Scope

The scope of this framework includes:

- patients with acute stroke symptoms yet to be diagnosed as ischaemic or haemorrhagic stroke.

It does not include:

- patients with suspected or definite subarachnoid haemorrhage
- patients with ischaemic or haemorrhagic stroke transferred to a tertiary referral centre for neurosurgical intervention
- patients transferred to a comprehensive stroke centre for intra-arterial therapy.

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Figure 1: Regional Victorian public hospitals and Department of Health regional boundaries
3. Evidence-based stroke care

Providing effective evidence-based acute stroke care relies on the early identification of patients with stroke symptoms and rapid access to health services with specialist acute stroke care. Clearly defined and agreed systems and processes are needed to rapidly transfer patients to hospitals able to provide evidence-based interventions. This is particularly important in rural Victoria where patients may be some distance from specialist acute stroke services.

The National Stroke Foundation’s Clinical guidelines for stroke management 2010\(^6\) identifies key components of effective acute stroke therapy to which all Victorians should have timely access:

1. **Early diagnosis with CT brain imaging**

Timely brain imaging is necessary to determine whether a stroke is due to ischaemia or intracerebral haemorrhage (these types of stroke require different approaches to treatment) and to exclude other conditions that might mimic the symptoms of stroke and require different management.

2. **Intravenous thrombolysis for eligible patients with acute ischaemic stroke presenting within 4.5 hours of stroke onset**

Intravenous thrombolysis with recombinant tissue plasminogen activator (rt-PA) is a highly effective therapy.\(^7\) One in every four to six patients treated has a significantly improved outcome compared with the outcomes without treatment.\(^8\)

3. **Care in a stroke unit staffed by a multidisciplinary team of health professionals with expertise in stroke**

Compared with treatment in a general medical or other ward, organised stroke unit care benefits patients of all ages and both genders with all types of stroke of any severity. For every 100 stroke patients treated in a stroke unit, an extra five patients will survive with no disability.\(^9\)

The National Stroke Foundation’s Acute stroke services framework identifies the minimum criteria for stroke unit care as:

- co-located beds within a geographically defined unit
- a dedicated interdisciplinary team consisting of at least medical, nursing and allied health (including occupational therapist, physiotherapist, speech pathologist, social worker and dietitian)
- at least weekly interdisciplinary stroke team meetings to discuss patient care
- regular education for clinicians involved in stroke care.

Ensuring that all hospitals admitting 100 or more stroke patients per year have stroke units remains a key priority for optimising stroke management in Australia.

Telehealth links between clinicians in regional and comprehensive metropolitan centres may be used to enhance local capability for safely and efficiently delivering thrombolysis, including brain imaging interpretation.


3.1 Access to evidence-based acute stroke care – the current situation

Until recently, a significant proportion of patients in regional Victoria did not have access to stroke unit care or thrombolysis for acute ischaemic stroke. Data collected by Ambulance Victoria in 2010\(^\text{10}\) revealed a disparity between the treatment of stroke in the metropolitan and regional areas. Between January and June 2010, 89 per cent of patients with stroke symptoms were delivered to thrombolysis-capable health services in the metropolitan area. The rate for rural delivery to thrombolysis centres between September 2010 and March 2011 was 58 per cent for the same patient group.

In 2012, 5,825 patients in Victoria with stroke suspected by a paramedic were transported by Ambulance Victoria. Between October and December 2012, 90 per cent of these patients were transported by Ambulance Victoria to facilities with stroke unit care or thrombolysis (94 per cent in metropolitan areas; 82.5 per cent in rural areas).

To ensure timely access to care for all Victorians, it is essential that all regional and subregional health services provide 24/7 stroke unit care with access to thrombolysis. The National Stroke Foundation’s \textit{Clinical audit report 2011}\(^\text{11}\) indicates that the percentage of stroke patients accessing stroke unit care has improved since 2007, but there is still some way to go. The report revealed that only 65 per cent of audited patients in metropolitan and regional sites were treated in a stroke unit on the day of the audit. However, the rate of access to stroke unit care in regional areas is thought to be even lower since there is no systematic transportation of patients to health services with stroke unit care.

Based on the 2011 audit results, the National Stroke Foundation recommendation was to:

- develop and establish processes to ensure patients with stroke in regions served by very small (< 50 patients with stroke per year) and small (50–99 patients with stroke per year) hospitals are immediately transported to a stroke unit hospital or are rapidly assessed at the smaller hospital, where there are systems for rapid assessment and management and adequate specialised support, and then transferred to a larger stroke unit hospital.

Transfer to metropolitan centres to access stroke unit care and thrombolysis is not a solution for the vast majority of stroke patients in rural areas who do not have access to local specialist stroke care. Regional and subregional centres need enhanced service capacity to improve the current inequitable situation. The use of telehealth in rural areas to access advice from specialist stroke clinicians can support the delivery of thrombolysis and enhance local capability.

Since the Victorian Stroke Clinical Network began addressing this service gap with the placement of facilitators at strategic sites, there has been a steady increase in the number of rural and regional health services providing stroke unit care. Table 1 and the figures below outline the current and evolving stroke care capacity in regional Victoria.

Figure 2 indicates that of the suspected strokes transported by Ambulance Victoria in 2010, 77 per cent were located within 60 minutes of a centre providing thrombolysis. The most significant gaps in access to thrombolysis for acute ischaemic stroke were in the north-west of the state, encompassing parts of the Grampians and Loddon Mallee regions.

Figure 3 indicates that in 2012, significant development in primary level acute stroke services in Ballarat, Horsham, Mildura and Swan Hill has resulted in the availability of stroke care in strategic health services. This improvement suggests that 94 per cent of suspected strokes across Victoria are now located within 60 minutes' travel time by ambulance to a health service with thrombolysis and stroke unit care.


\(^{11}\) National Stroke Foundation 2011, \textit{National stroke audit: acute services clinical audit state report 2011}, NSF, Melbourne
Figure 2: Suspected stroke/TIA in 2010 with overlay of 60 minutes' travel time by Ambulance Victoria to a thrombolysis centre.

Map 3: Improved coverage of thrombolysis capacity and stroke unit care in 2012.
Table 1: Stroke and TIA separations and stroke centres in each region

<table>
<thead>
<tr>
<th>Region</th>
<th>Health service/hospital</th>
<th>Acute stroke/ TIA separations 2011–12</th>
<th>Stroke unit care</th>
<th>With rt-PA</th>
<th>Current service category</th>
</tr>
</thead>
<tbody>
<tr>
<td>Barwon-South Western</td>
<td>Barwon Health, Geelong†</td>
<td>831</td>
<td>Yes</td>
<td>Yes</td>
<td>Comprehensive</td>
</tr>
<tr>
<td></td>
<td>South West Healthcare, Warrnambool†</td>
<td>189</td>
<td>Yes</td>
<td>Yes</td>
<td>Primary</td>
</tr>
<tr>
<td></td>
<td>Western District Hamilton</td>
<td>63</td>
<td>Yes</td>
<td>Yes</td>
<td>Primary</td>
</tr>
<tr>
<td>Grampians</td>
<td>Ballarat Health Service†</td>
<td>318</td>
<td>Yes</td>
<td>Yes</td>
<td>Primary</td>
</tr>
<tr>
<td></td>
<td>Wimmera Health Care Group, Horsham</td>
<td>132</td>
<td>Yes</td>
<td>Yes</td>
<td>Primary</td>
</tr>
<tr>
<td>Loddon Mallee</td>
<td>Bendigo Health†</td>
<td>318</td>
<td>Yes</td>
<td>Yes</td>
<td>Primary</td>
</tr>
<tr>
<td></td>
<td>Mildura Base Hospital†</td>
<td>138</td>
<td>Yes</td>
<td>Yes</td>
<td>Primary</td>
</tr>
<tr>
<td></td>
<td>Swan Hill District Hospital†</td>
<td>76</td>
<td>Development phase</td>
<td>Yes</td>
<td>Basic</td>
</tr>
<tr>
<td></td>
<td>Echuca Regional Health</td>
<td>73</td>
<td>Development phase</td>
<td>Development phase</td>
<td>Basic</td>
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<tr>
<td>Hume</td>
<td>Northeast Health, Wangaratta</td>
<td>183</td>
<td>Yes</td>
<td>Yes</td>
<td>Primary</td>
</tr>
<tr>
<td></td>
<td>Goulburn Valley Health, Shepparton†</td>
<td>285</td>
<td>Implementation phase</td>
<td>Yes</td>
<td>Basic</td>
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<tr>
<td></td>
<td>Albury Wodonga Health†</td>
<td>154</td>
<td>Yes</td>
<td>Yes</td>
<td>Primary</td>
</tr>
<tr>
<td>Gippsland</td>
<td>Latrobe Regional Hospital, Traralgon†</td>
<td>228</td>
<td>Yes</td>
<td>Yes</td>
<td>Primary</td>
</tr>
<tr>
<td></td>
<td>West Gippsland Healthcare Group, Warragul</td>
<td>135</td>
<td>Yes</td>
<td>Yes</td>
<td>Primary</td>
</tr>
<tr>
<td></td>
<td>Central Gippsland Health Service, Sale</td>
<td>101</td>
<td>Yes</td>
<td>Yes</td>
<td>Primary</td>
</tr>
<tr>
<td></td>
<td>Bairnsdale Regional Health Service</td>
<td>133</td>
<td>No</td>
<td>Yes</td>
<td>Basic</td>
</tr>
</tbody>
</table>

Source: Victorian Admitted Episode Dataset 2011–12. Number of separations based on list of 60 ICD-10-AM seventh edition codes to define stroke/TIA.

† Sites that have had a stroke network facilitator
1 rt-PA = thrombolysis for acute ischaemic stroke
2 Definitions of service categories provided in the Appendix
3 Transfer post rt-PA to Sale
3.2 Equity-focused health impact assessment

There is some evidence that particular subgroups of the Victorian population are at risk of adverse health outcomes associated with reduced access to specialist acute stroke care services. For example older people and Aboriginal and Torres Strait Islander people who experience a stroke may be less likely to have access to acute stroke care than the general rural and regional population.

Older patients (over 80 years)

There is evidence that stroke survivors of all ages benefit equally from stroke unit care and that this benefit also applies to stroke survivors of both sexes across the range of stroke severity. While there is now evidence that older patients with stroke do benefit from thrombolysis, studies have shown that younger people are more likely to be treated than older patients.

Aboriginal and Torres Strait Islander patients

The National Stroke Foundation Aboriginal Stroke Project reported in 2003 that Aboriginal and Torres Strait Islander people often failed to access emergency services immediately after experiencing a stroke and this was attributed to poor awareness of stroke in this subgroup. There was also clear preference by this population to be treated locally rather than be transferred to distant or metropolitan centres, away from vital family, community and cultural support.

In 2009, the National Stroke Foundation Acute Clinical Audit found that ‘Australian indigenous patients with stroke received a reduced quality of care in hospitals and experienced worse outcomes than non-indigenous patients.’ In addition, a study investigating the burden of stroke reported in 2011 that the stroke mortality rate for Aboriginal and Torres Strait Islander populations was significantly higher than the non-indigenous rate and that the Aboriginal and Torres Strait Islander population was affected by stroke at a younger age: ‘Indigenous needs in the acute stroke care context were found to relate to dissemination of knowledge about stroke and acute stroke services, addressing cultural needs, geographical isolation, access to services, and improved recognition of the impact on and support for families.’

The strategy of developing stroke service capacity at regional and subregional centres is aligned with the concept of treating ATSI stroke survivors as near as possible to their social, community and cultural supports.

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18 Ibid.
4. Recommendations

**Recommendation 1: Ensure capacity and capability in all rural regions**

All Victorian regional and subregional health services should provide evidence-based acute stroke care, in line with the *Acute stroke services framework 2011*, to maximise access to treatment within 60 minutes’ travel time.

**Recommendation 2: Improve access to appropriate evidence-based stroke care**

**Timely access to evidence-based acute stroke care**

All patients experiencing a stroke should be managed in a stroke unit. Currently 65 per cent of patients in Victoria are managed in a stroke unit. This contrasts with 80 per cent in Scandinavian countries.19

All patients with suspected acute stroke should be transported by Ambulance Victoria to the nearest primary or comprehensive stroke centre with 24/7 CT brain imaging, thrombolysis and stroke unit care. ‘Nearest’ refers to the least time required to transport and access treatment. Paramedics should pre-notify clinicians at the intended delivery destination if the patient is potentially eligible for thrombolysis, advising them of relevant case details (including onset time) and estimated time of arrival.

Clinicians involved in acute stroke management must ensure that older people and ATSI people presenting with stroke symptoms have equal access to specialist acute stroke services, including thrombolysis and stroke unit care.

**Exceptions**

In some circumstances a stroke survivor may make an informed choice to be treated at a health service without stroke unit care or access to thrombolysis for acute ischaemic stroke, rather than be transferred to a primary or comprehensive stroke centre. In addition, there may be clinical reasons where family, in consultation with the treating doctor, may also opt for local management. Appropriate management guidelines and protocols should be in place to guide care delivery in such circumstances.

**Recommendation 3: Improve timely repatriation to local health services**

The stroke survivor’s local health service should accept ‘back transfers’ from comprehensive and primary stroke centres in a timely manner, once the specialist stroke service component of care has been completed.

Stroke survivors should remain at the comprehensive or primary stroke centre until they have received the specialist stroke services for which they were transferred. In some instances, particularly where patients are transferred to regional primary stroke centres, subacute rehabilitation services should be accessed prior to return to a basic hospital service or prior to discharge.

If stroke patients from regional communities have accessed metropolitan stroke centres for acute management, it may be appropriate to transfer them to a regional primary stroke centre for ongoing care, including rehabilitation services, when clinically appropriate to support care closer to home.

The stroke survivor’s local health service is best placed to attend to discharge planning, whether that planning relates to return to the community, transition to residential care or linkage to ongoing support. The stroke survivor’s return to their local health service also helps enable optimal access to the available family, social and cultural support.

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Recommendation 4: Develop comprehensive regional transfer frameworks, to support a consistent approach to provision of evidence-based stroke care

All regional and subregional health services should work collaboratively to develop, implement and monitor systems and processes to facilitate timely and appropriate access to evidence-based acute stroke care.

Regional collaborative working groups (or relevant committees) should be established by health services and clinicians in partnership with regional officers of the Department of Health to develop region-specific frameworks for the management of acute stroke. This may include establishing a formal process with metropolitan centres to ensure transfer to the most appropriate specialist stroke service, in line with the acute stroke services framework.

Regional frameworks provide operational guidelines for the management of stroke patients across a region, so should:

- outline transfer and bypass protocols
- outline referral pathways for accessing neurosurgical and other necessary tertiary services
  (although the details of these arrangements are out of scope of this document)
- outline protocols for transfer back to local community
- govern implementation and monitoring of the transfer of stroke patients within the region.

These regional collaborative working groups would also work with their neighbouring group or groups to ensure a consistent approach to managing transfers across regional boundaries and timely access to evidence-based acute stroke care for all Victorians. This may also involve establishing formal transfer arrangements with a metropolitan comprehensive stroke centre with which a region has a principal relationship.

Basic hospital services should:

- actively participate in the development of referral pathways and formal links with primary stroke centres, comprehensive stroke centres and Ambulance Victoria to ensure timely access to stroke unit care and thrombolysis for patients with acute ischaemic stroke.

Primary stroke centres should:

- provide a lead role and collaborate with the region’s basic hospital services in establishing referral pathways that enhance access to evidence-based interventions
- collaborate with a comprehensive stroke centre to establish appropriate tertiary referral pathways for transfer and formal links for specialist support.

Comprehensive stroke centres should:

- establish referral pathways and formal links between themselves, and primary stroke centres in the regions
- ensure this system of formal links is structured in a way so that the responsibilities for handling regional enquiries about acute stroke management are evenly spread among the available comprehensive stroke centres and their specialist clinicians
- establish referral pathways with adjoining regions where they are the nearest point of access to specialist services for acute stroke presentations.

Recommendation 5: Monitoring and evaluation

Health services and the collaborative regional working groups should monitor implementation of acute stroke management frameworks to ensure access to evidence-based care for stroke patients is maximised across Victoria.

The governance process should be clearly outlined in regional frameworks and include regular (at least bi-annually) review of the frameworks and transfer protocols. Consideration should be given to escalation processes and communication mechanisms that enable smooth and timely transfer of patients.

Health services seeing and treating patients with stroke should participate in regular audit and stroke-specific quality improvement activities, as outlined in the National Stroke Foundation’s Acute stroke services framework.
2011 (see Table 2 in Appendix). All primary and comprehensive stroke services should participate in the Australian Stroke Clinical Registry.

There should be a formal system of evaluation of the outcomes of practice change as these recommendations are implemented. This may involve participation in NSF organisational and clinical audits and also include analyses based on the following data sets:

- Victorian Ambulance Clinical Information System
- Victorian Emergency Minimum Dataset
- Victorian Admitted Episodes Dataset
- Australian Stroke Clinical Registry

**Recommendation 6: Statewide implementation**

The Victorian Stroke Clinical Network should work with each region to deliver the recommendations detailed above.
Appendix

The National Stroke Foundation *Acute stroke services framework 2011* defines the health service capacity required to routinely care for stroke patients (Table 2) taking into account the key elements of effective acute stroke care. Services are classified as either category A, B or C.

- **Category A:** Comprehensive stroke centres (Table 3) – possess advanced capability in managing stroke patients. Such centres would typically manage more than 350 stroke patients each year in their stroke unit and would usually be situated within a large tertiary referral centre with specialised resources and personnel available 24 hours a day, 365 days a year.

- **Category B:** Primary stroke centres – provide 24 hours access to CT brain imaging, stroke unit care and IV thrombolysis to eligible patients and protocols to transfer appropriate patients to a comprehensive stroke centre (with or without telehealth support or via rapid transfer protocols to a thrombolysis-capable centre. Primary centres may have responsibility for regional coordination of stroke services).

- **Category C:** Basic hospital services – are generally small centres without a stroke unit and hence without sufficient capacity to routinely manage patients with stroke. The National Stroke Foundation recommends that there should be mechanisms to transfer stroke patients from hospitals with a basic service to a stroke unit in a primary or comprehensive stroke centre as required.

Table 2: Characteristics of stroke centres as defined by the *Acute Stroke Services Framework 2011*

<table>
<thead>
<tr>
<th>Characteristic of service</th>
<th>Comprehensive stroke centre (A)</th>
<th>Primary stroke centre (B)</th>
<th>Basic hospital service* (C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stroke presentations per year</td>
<td>&gt; 350</td>
<td>&gt; 100</td>
<td>&lt; 100</td>
</tr>
<tr>
<td>Stroke unit care</td>
<td>√</td>
<td>√</td>
<td>¥</td>
</tr>
<tr>
<td>Computed tomography (24/7)</td>
<td>√</td>
<td>√</td>
<td>¥</td>
</tr>
<tr>
<td>Stroke coordinator</td>
<td>√</td>
<td>√</td>
<td>×</td>
</tr>
<tr>
<td>Neurosurgery</td>
<td>√ ¥</td>
<td>¥ ¥</td>
<td>¥ ¥</td>
</tr>
<tr>
<td>Audit / quality improvement</td>
<td>√</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>IV rt-PA</td>
<td>√ ¥</td>
<td>¥ ¥</td>
<td>¥ ¥</td>
</tr>
<tr>
<td>Regional responsibility</td>
<td>Commonly</td>
<td>Occasionally</td>
<td>Engaged by regional hub</td>
</tr>
</tbody>
</table>

√ Has this element of stroke care
× Does not have this element of stroke care
IV rt-PA = Intravenous recombinant tissue plasminogen activator
¥ There are clear transfer arrangements to centres with this service
* Some hospitals treat fewer than 100 stroke presentations per year however they have increased capacity to include stroke unit care and rt-PA (refer to Table 1)

Table 3: Comprehensive stroke services in Victoria

<table>
<thead>
<tr>
<th>Health Services and campuses</th>
<th>Metropolitan</th>
<th>Regional</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alfred Health</td>
<td>The Alfred</td>
<td>X</td>
</tr>
<tr>
<td>Austin Health</td>
<td>Austin Campus</td>
<td>X</td>
</tr>
<tr>
<td>Barwon Health</td>
<td>Geelong Hospital ¥</td>
<td>X</td>
</tr>
<tr>
<td>Eastern Health</td>
<td>Box Hill Hospital ¥</td>
<td>X</td>
</tr>
<tr>
<td>Melbourne Health</td>
<td>Royal Melbourne Hospital</td>
<td>X</td>
</tr>
<tr>
<td>Monash Health</td>
<td>Monash Medical Centre</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>Dandenong Hospital ¥</td>
<td>X</td>
</tr>
<tr>
<td>Northern Health</td>
<td>Northern Hospital ¥</td>
<td>X</td>
</tr>
<tr>
<td>Peninsula Health</td>
<td>Frankston Hospital ¥</td>
<td>X</td>
</tr>
<tr>
<td>St Vincent’s Hospital</td>
<td>St Vincent’s Hospital</td>
<td>X</td>
</tr>
<tr>
<td>Western Health</td>
<td>Western Health ¥</td>
<td>X</td>
</tr>
</tbody>
</table>

¥ No neurosurgery services for stroke patients on site