

International comparisons of selected service lines in seven health systems

ANNEX 4 – REVIEW OF SERVICE LINES: STROKE

Evidence Report
October 27th, 2014



Executive summary for acute stroke care¹

- There is a high degree of **international consensus on the evidence base underlying best practice in acute stroke care** – in particular in relation to the need for thrombolysis (for eligible patients) within a defined 4.5 hour time window from stroke onset and the need for immediate access to stroke specialists to review brain scans and make immediate treatment decisions. Given this agreement on what is required, standards tend to be broadly similar in content with some differences in approach, for example:
 - In health systems with **geographically dispersed populations**, **access requirements** (maximum distance to nearest acute stroke unit) may be emphasized
 - In health systems making an **explicit attempt to improve the quality of stroke care**, **process standards** are more likely to cover more steps in the acute care pathway – e.g. time to brain scan – which may be implicit in other systems (as thrombolysis cannot be delivered safely prior to brain scan and interpretation)
 - In more **highly-resourced health systems**, regulation may focus on accreditation of units delivering **sufficient volumes of activity** to justify specialist status
 - Almost all regions have, or are in the process of developing, **detailed audits of stroke services** and these may be used as a basis for driving improvement and change outside of explicit standards
- While there is wide agreement on the care that is required, different health systems have developed different models of provision:
 - In systems with a larger average hospital size, for example Netherlands and Sweden, **acute stroke care is offered on-site by most acute hospitals** using their own imaging facilities and staff
 - In Ontario, acute stroke care is organised as a **network with designated centers** providing acute stroke care with a small number of additional sites providing thrombolysis supported by **telemedicine links**. In Arkansas, stroke care is also organised as a network, but in this case a small number of hub sites provided telestroke support to a very large number of smaller spoke sites.
 - In Australia, the health system is beginning to address the need for greater centralisation of acute stroke services. Currently, a larger number of acute sites offer acute stroke care but are considered to be sub-scale.
 - In Germany, a system of tiered stroke designation exists for hospitals, but currently this has not led to significant centralisation
- Many countries operate a system of **tiered acute stroke services**. Many countries have formally designated **comprehensive specialist stroke units** – usually configured to serve a **population of around 1 million** – which have broadly similar requirements for on-site dependent services. The requirements for lower tier stroke services are more varied. Many health systems – including Arkansas, Ontario, Netherlands and Germany – operate a system of **dedicated, designated centres for post-acute stroke rehabilitation**. These are sometimes co-located with acute hospital services but often operate as entirely separate, specialist units.

¹ This document is focused on the care of stroke in the first 72 hours post-onset, sometimes referred to internationally as hyper-acute stroke care



Acute stroke care – NHS core standards

NHS standards bodies/sources

- NICE, Quality Standards for Stroke, Clinical Guideline 68 for Diagnosis and Initial Management of Acute Stroke and Transient Ischaemic Attack (TIA)
- Royal College of Physicians, National Clinical Guideline for Stroke, 2012
- SINAP Stroke Improvement National Audit Programme

Core NHS standards

Access

- Direct admission to specialist stroke unit and thrombolysis assessment and treatment
- **Admission to acute stroke unit ≤4 hrs when arrival is out of hours**
- Seen by stroke consultant/ associate specialist ≤24 hrs
- **<1 week wait to carotid endarterectomy post TIA**
- **Maximum one hour travel time to acute stroke care unit**

Process

- Transfer to specialist stroke rehab unit (following acute treatment phase) if required
- **Diagnosis with validated tool and transfer to specialist stroke unit ≤1hr if positive**
- **Brain imaging ≤1hr of arrival**
- Swallow screen ≤4hrs
- **Specialist rehabilitation assessment ≤24hrs, with full MDT rehab assessment ≤72hrs, and MD goals and plan ≤5 days**
- Transfer to specialist stroke rehab unit (following acute treatment phase) if required
- ≤45 mins active therapy 5 days/week, if required
- Incontinence assessment and care plan ≤2 weeks, if required
- Screening for mood disturbance and cognitive impairment ≤6 weeks
- Follow-up ≤72hrs by specialist stroke rehabilitation team for all patients discharged with residual stroke-related problems
- Named point of contact for carers
- **Thrombolysis ≤1hr**

Input

- Minimum service requirements for hyper-acute stroke unit:
 - Hyper acute stroke services need to be co-located with critical care and neurological services, and have 24/7 access to neuroradiology.

Critical standards

	Level achieved
1 Admission to acute stroke unit ≤4 hrs when arrival is out of hours	65% of patients arriving out of hours
2 Brain imaging ≤1hr of arrival	40% of patients
3 Full MDT rehab assessment ≤72hrs	68% of patients
4 Thrombolysis ≤1hr	70% of eligible patients got thrombolysis, 51% ≤1hr
5 <1 week to carotid endarterectomy post TIA	Not available
6 Acute stroke care to be available within 1 hour (maximum travel time)	Not available



Acute stroke care – International standards

Topic of standards	Standard specifics						
	England	Victoria	Ontario	Netherlands	Germany	Sweden	Arkansas
Time to admission to specialist stroke unit	<4 hrs if arrival out-of-hours; otherwise direct	Direct admission (no time stated) – met for 53% of stroke patients ⁴	No standard	Direct admission (no time stated)	No standard	Direct admission (no time stated) – met for 87% of stroke patients)	Not relevant as certification is for specialist stroke units
Time to brain imaging	<1 hr	Immediately if urgent and available and always <24hrs	Immediate (to allow 1hr thrombolysis) and <24 hrs for TIA	As fast as possible	No standard (but implied in thrombolysis standard)	<24 hrs where possible	No standard (but implied in thrombolysis standard)
Time to thrombolysis	<1 hr	<3 hrs where possible (earlier preferred) and always <4.5 hrs	<1hr	<4.5 hrs after first symptoms	<4.5 hrs	<3 hrs where possible and always <4.5 hrs	<3 hrs (TJC/Hospital Compare)
Time to multi-disciplinary specialist stroke assessment	Full MDT assessment <72 hrs and 5 days for management plan	Assessment <48 hrs (measured for each service separately)	<48 hrs for MDT assessment and management plan	Individual care plan within 24hrs with all care providers	No standard	No standard	No standard
Time to carotid endarterectomy post-TIA (if clinically indicated)	7 days	No standard	14 days (if patient is stable)	14 days	No standard	≤14 days	No standard
Distance and access targets	<1 hr nationally (many urban regions set target of 30-45 mins)	<1 hr ambulance travel time to nearest acute stroke centre	<3.5hrs pre-hospital time (where possible)	45min from call to hospital for all care	None	No standard	None
No NHS equivalent:							
Volume for specialist acute stroke unit	No volume requirement	>100 pts/yr for acute unit >350 pts/yr for CSC ¹	No volume requirement	Not yet – but national insurers want a 350pts/yr minimum	>250 ² pts/yr for acute unit >450 pts/yr for CSC ¹	No volume requirement	≥25 IV tPA patients/yr for CSC ^{1,5}

1 CSC = Comprehensive Stroke Centre

4 53% spent >90% of time on an acute stroke unit

2 Plans to increase this to 300 patients/yea

5 Also ≥20 subarachnoid hemorrhage patients and ≥15 endovascular coiling or surgical clipping procedures for aneurysm

3 The Joint Commission




Acute stroke care – Comparison of standards

Stricter target than NHS

Same target than NHS

More lenient target than NHS

No target

	England	Victoria	Ontario	Netherlands	Germany	Sweden	Arkansas	NHS strict?
Time to admission to acute stroke unit ¹	<4 hrs	×	×	×	×	×	×	 ¹
Time to brain imaging	<1 hr	<24hrs	<1 hr	ASAP	×	<24hrs	×	
Time to thrombolysis	<1 hr	<4.5 hrs	<1hr	<4.5 hrs	<4.5 hrs	<4.5 hrs	<3 hrs	
Time to multi-disciplinary specialist stroke assessment	<72 hrs	<48 hrs	<48 hrs	<24hrs	×	×	×	
Time to carotid endarterectomy post-TIA (if clinically indicated)	7 days	×	14 days	14 days	×	14 days	×	
Distance and access targets	<1 hr	<1 hr	<3.5hrs	45min	×	×	×	
Volume requirements for specialist acute stroke unit	×	>350 pts/yr	×	×	>450 pts/yr	×	>25 IV tPA pts/yr	

¹ Difficult to compare as no clear standard or measurement in other countries; but only met 66% in the NHS. Other regions studied do not make a distinction between standards for in-hours and out-of-hours patients for stroke



Acute stroke care – Reasoning behind critical standards

Topic of standards	Why critical?
Time to admission to specialist stroke unit	<ul style="list-style-type: none">When a hospital does not have a specialist stroke unit, network and referral agreements need to be in place to meet this targetHospitals in more rural areas may struggle to meet the time targetThis target is monitored and reported on nationally
Time to brain imaging	<ul style="list-style-type: none">Brain imaging requires both a scanner as well as a technician to be available at all times, which requires investment regardless of demandThis target is monitored and reported on nationally
Time to thrombolysis	<ul style="list-style-type: none">Identifying whether a patient is eligible for thrombolytic treatment is crucial for proper treatment, and requires the availability of a CT or MRI scan, as well as a doctor capable of interpreting the resultsTimely treatment is directly linked to outcomes, and depends on the availability of a someone trained to administer the drugThis target is monitored and reported on nationally and internationally
Time to multi-disciplinary specialist stroke assessment	<ul style="list-style-type: none">This standards requires a multidisciplinary team to be recruited, which may be more difficult for smaller hospitalsIt requires additional investment in ancillary services like pharmacy and rehabilitationThis target is monitored and reported on nationally
Time to carotid endarterectomy post-TIA	<ul style="list-style-type: none">The procedure is relatively complex and is ideally done by an experienced vascular surgeon, and smaller hospitals may have trouble recruiting such surgeons as they do not present enough volumeThe standard has recently been reduced from 2 weeks to 1 week, increasing the pressure on hospitals
Distance and access targets	<ul style="list-style-type: none">In more rural areas it may be more difficult to meet the time and distance standards set, which mainly affects smaller hospitals
No NHS equivalent:	
Volume for specialist acute stroke unit	<ul style="list-style-type: none">Set volume requirements for stroke units affect smaller hospitals with lower volumes and may lead to closures of units



Acute stroke care – Sources

Sources for standards

England

- NICE Stroke Quality Standards (reviewed May 2014)
- Royal College of Physicians, National Clinical Guideline for Stroke, 2012
- SINAP (Stroke Improvement National Audit Programme)
<http://www.rcplondon.ac.uk/projects/stroke-improvement-national-audit-programme-sinap>

Victoria

- Stroke Foundation (2010) Clinical guidelines for stroke management and National Acute Stroke Unit, 2013
- Victoria Department of Health, Framework for regional acute stroke services in Victoria, Victorian Stroke Clinical Network, 2013

Ontario

- Ontario Stroke Network audit – published in Institute for Clinical Evaluative Sciences (Toronto), 2013, Stroke Evaluation Report 2013: Spotlight on Secondary Stroke Prevention and Care
- Canadian Best Practice Recommendations for Stroke Care, 2012/13

Netherlands

- Kennisnetwerk CVA Nederland - Zorgstandaard CVA/TIA, Nov 2012

Germany

- Deutsche Schlaganfall-Gesellschaft, Zertifizierungsanträge der Regionalen und Überregionalen Stroke-Units in Deutschland, 2012

Stockholm¹

- National Guidelines for Stroke Care/Nationella riktlinjer för strokesjukvård, National Board for Health and Welfare (Socialstyrelsen), 2013

Arkansas

- The Joint Commission, Specifications manual for national hospital inpatient quality measures v4.3b, 2014; Facts about Advanced Certification for Comprehensive Stroke Centers; Facts about Primary Stroke Center Certification (accessed May 2014)



Acute stroke care – Standard setting context

Standard setting context

England

- NICE has published guidelines on the treatment of stroke
- The Royal College of Physicians published a National Clinical Guideline for Stroke that reviews on standards largely similar to the NICE ones
- The Best Practice Tariff enforces some standards by financially rewarding those providers that meet the standards

Victoria

- Guidance from the National Stroke Foundation (Clinical Guidelines for Stroke Management, 2010) and Acute Stroke Services Framework, 2011) are used as a basis for the regional stroke strategy and framework
- Services available (resources required to deliver high-quality care) and quality (performance against audit criteria derived from clinical guidelines) are published nationally by the NSF but achievement rates are variable with limited consequences for sub-par performance

Ontario

- The Canadian Stroke Strategy, an expert panel convened by the Canadian Stroke Network and Heart and Stroke Foundation, publishes Best Practice Recommendations for Stroke Care which form the basis of the state-level stroke strategy and standards
- The Ontario Stroke Network provides province-wide leadership including performance improvement and monitoring through the state-level stroke registry and audit

Netherlands

- The National Association for Neurology (NVN) has developed guidelines for the treatment of stroke
- 90% of hospitals are part of the Knowledge Network CVA, who compare performance publish care standards
- A national audit (CVAB) has been initiated in January 2014, based on the Knowledge Network, but no results have been published yet

Germany

- The German Stroke Society has the authority to designate specialist stroke status (at two levels) to providers
- Other providers may still offer stroke care but ambulance services would be much less likely to take a patient to a hospital without a designation
- Ambulance providers compete for contracts with payors and will offer this type of protocol (i.e. transfer direct to a designated centre) as part of their offer

Sweden

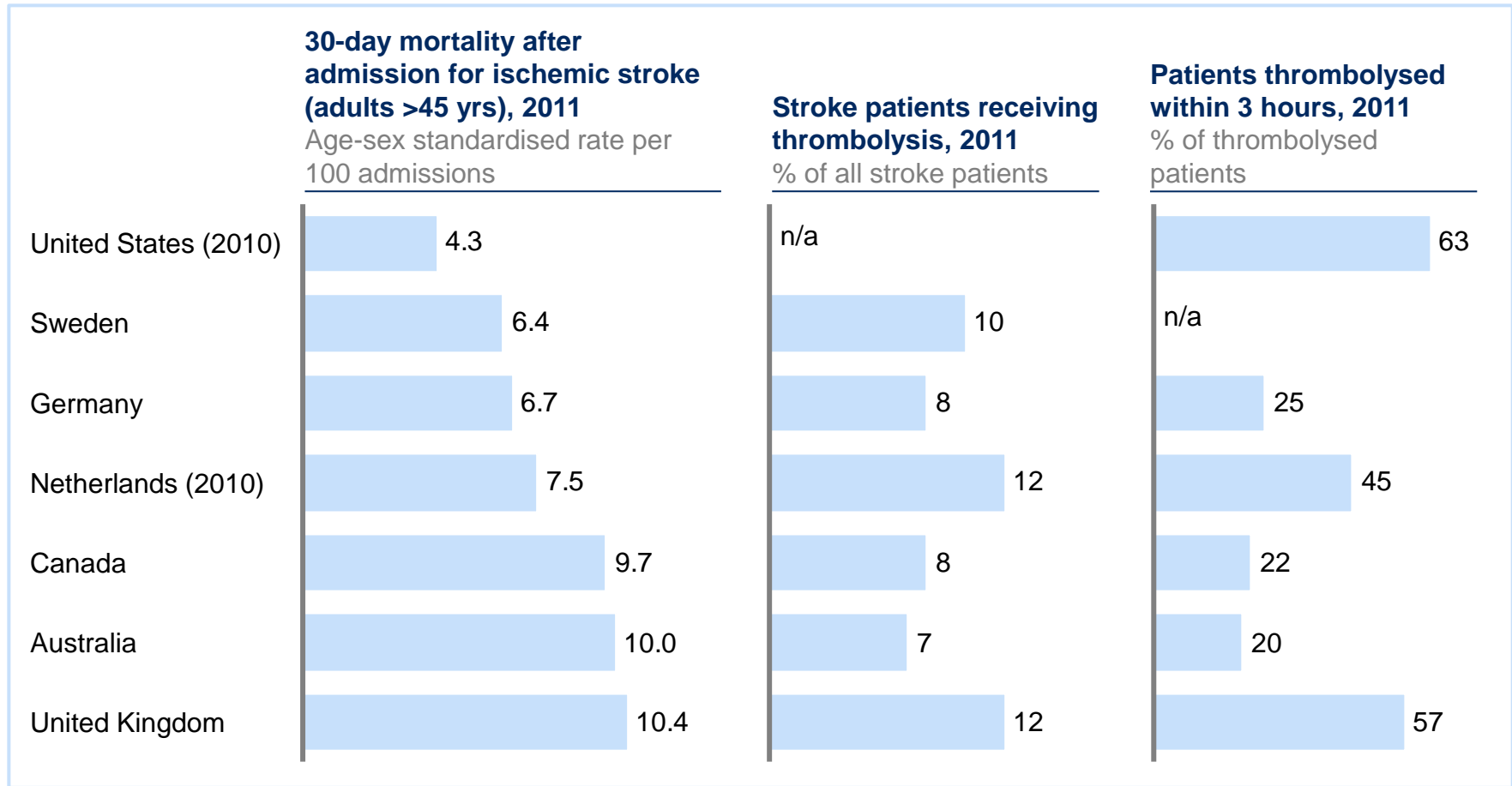
- National Guidelines for Stroke Care are published by the National Board of Health and Welfare
- Each regional Local Authority bases its local commissioning strategy including minimum service requirements on this national guidance
- The national Swedish Stroke Register conducts an annual audit and hospital-level results – including stroke mortality - are published in the public domain

Arkansas

- The American Heart Association/American Stroke Association publish guidelines for acute management of ischemic stroke which act as recommendations (rather than mandated standards)
- The Joint Commission, and state health departments, provide stroke centre certification which may be required by payors (requirements will vary)
- 9 stroke indicators are measured in Hospital Compare and monitored by Medicare (CMS)



International comparisons of stroke outcomes and quality of care



SOURCE:

- For stroke mortality: OECD Health Data 2013 (<http://www.oecd.org/health/health-systems/oecdhealthdata.htm>)
- For thrombolysis: Swedish Stroke Registry ; Canadian Stroke Network (<http://www.canadianstrokenetwork.ca/wpcontent/uploads/2011/06/QoSC-EN1.pdf>); Hospital Compare (USA); Singer et al, Time trends in systemic thrombolysis in a large hospital-based stroke registry, 2012, Cerebrovasc Dis. 2012;33(4):316-21 (Germany, data for 2010 for Hesse state only); Dirks et al, Promoting thrombolysis in acute ischemic stroke, Stroke. 2011 May;42(5):1325-30 (Netherlands); National Stroke Audit Acute Services, Clinical Audit Report, 2011 (Australia); SINAP (NHS England)

Acute stroke services in the Netherlands

Service line definition

- Stroke care in the Netherlands is delivered in almost all hospitals
- In the Netherlands there exist stroke networks (CVA Zorgketens) to coordinate stroke care between acute and primary care as well as rehabilitation services

Service delivery model

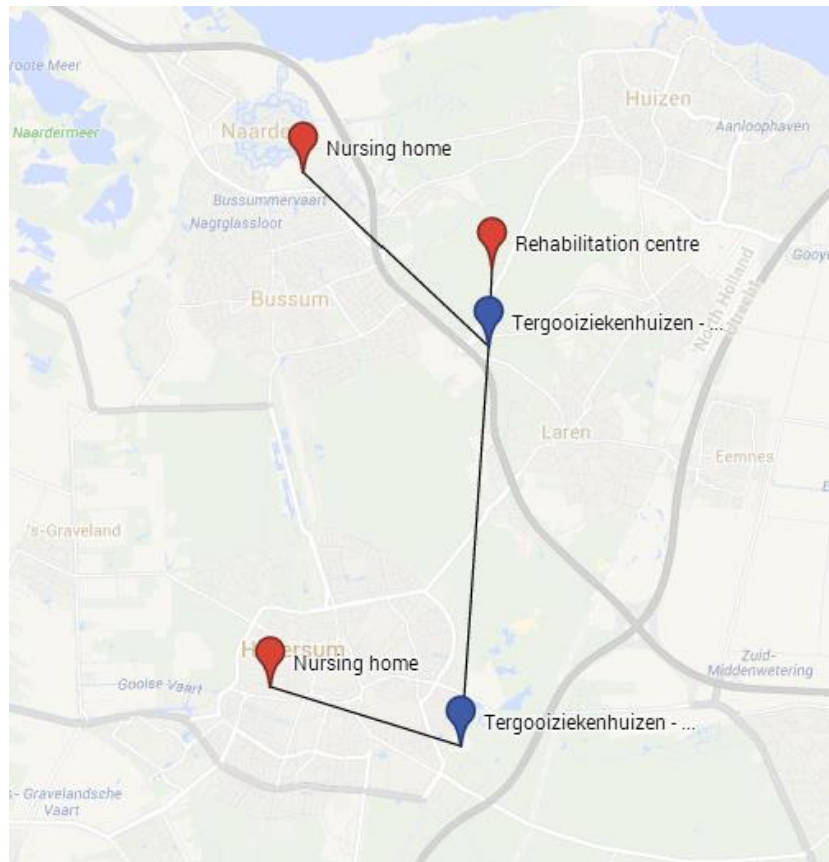
- Currently almost all hospitals provide stroke care
 - Stroke services are currently being provided by almost all (94) hospitals, with patients per hospital varying from only a few to over 1,000 a year
 - All hospitals delivering stroke care claim to have an ESO-compliant stroke unit, meeting standards such as at least 4 beds, 24/7 access to a CT and MRI, and a multidisciplinary treatment team
- Insurers are driving centralisation of care
 - In the first months of 2014 plans from the ZN to centralise stroke care in certain regions were met with resistance from physicians in smaller hospitals who did not want to lose activity
 - The ZN also wants to introduce a 350 patients per year minimum volume for stroke units
 - The ZN bases their arguments for centralised care on the London stroke reconfiguration
 - Hospitals managers have reacted by claiming that the reconfiguration in London has only managed to lift low levels of care to match the care quality already present in the Netherlands

Comparison to NHS

- Stroke care in the Netherlands is provided in all hospitals, while this has been centralised in England
- Stroke networks in the Netherlands centre around one hospital and create links with non-acute providers; rather than linking different hospitals like the English networks
- The Netherlands have shown interest in moving towards the English model of centralised care, but no concrete steps have been taken yet

Stroke networks in the Netherlands consist of a hospital organisation working closely with rehabilitation and other care providers

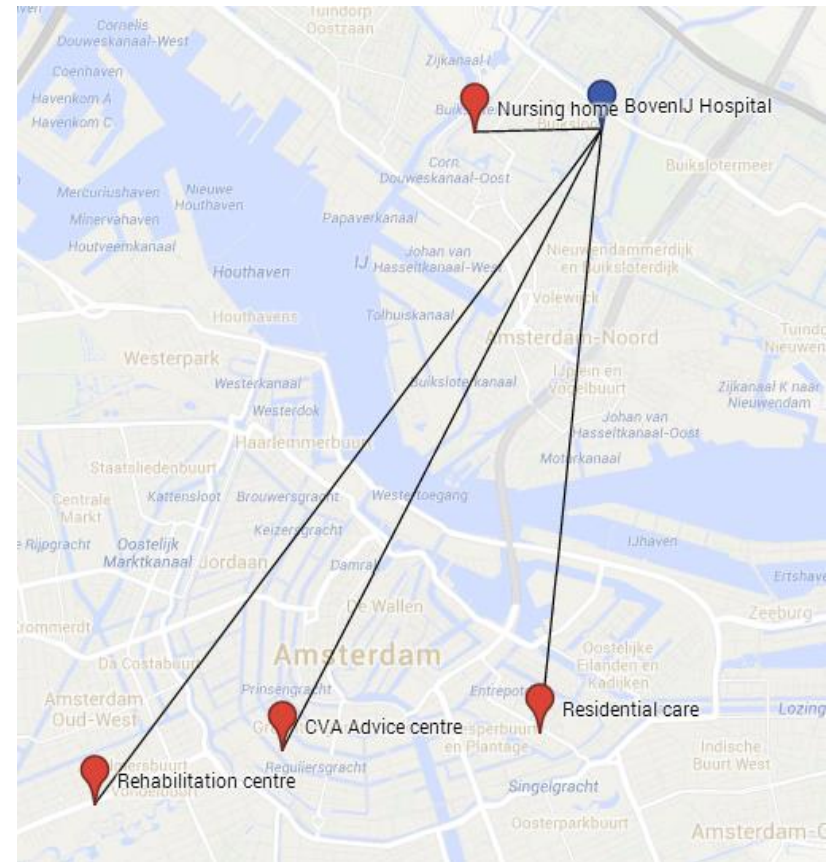
CVA network TBCricum – Tergooi Hospitals



Plus:

- Home care organisation
- Regional GP association

CVA network North Amsterdam – BovenIJ Hospital



Acute stroke services in Ontario

Service line definition

- The Ontario Stroke System provides care for patients with all types of stroke (TIA, ischaemic, haemorrhage, undefined) across the full pathway of care from primary prevention through to rehabilitation and secondary prevention
- Secondary stroke (where stroke is not the primary diagnosis) may fall outside of standard stroke guidance and as a consequence may not be transferred to a stroke centre
- The focus of this document is the care in the acute phase for adults

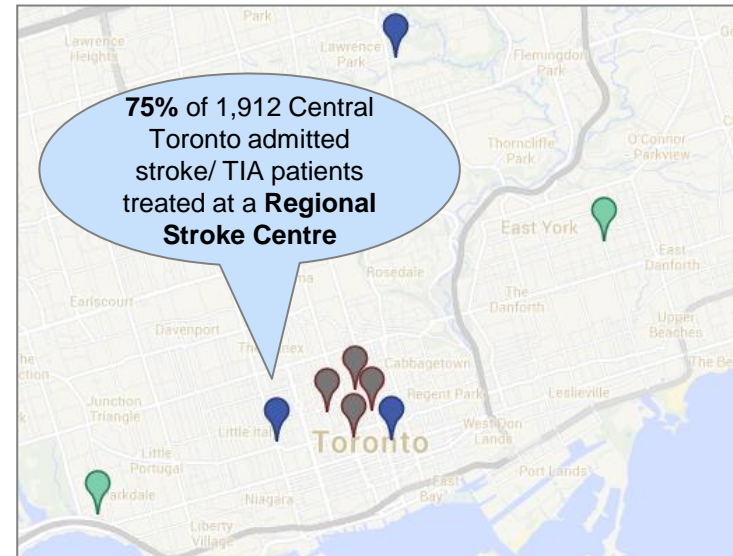
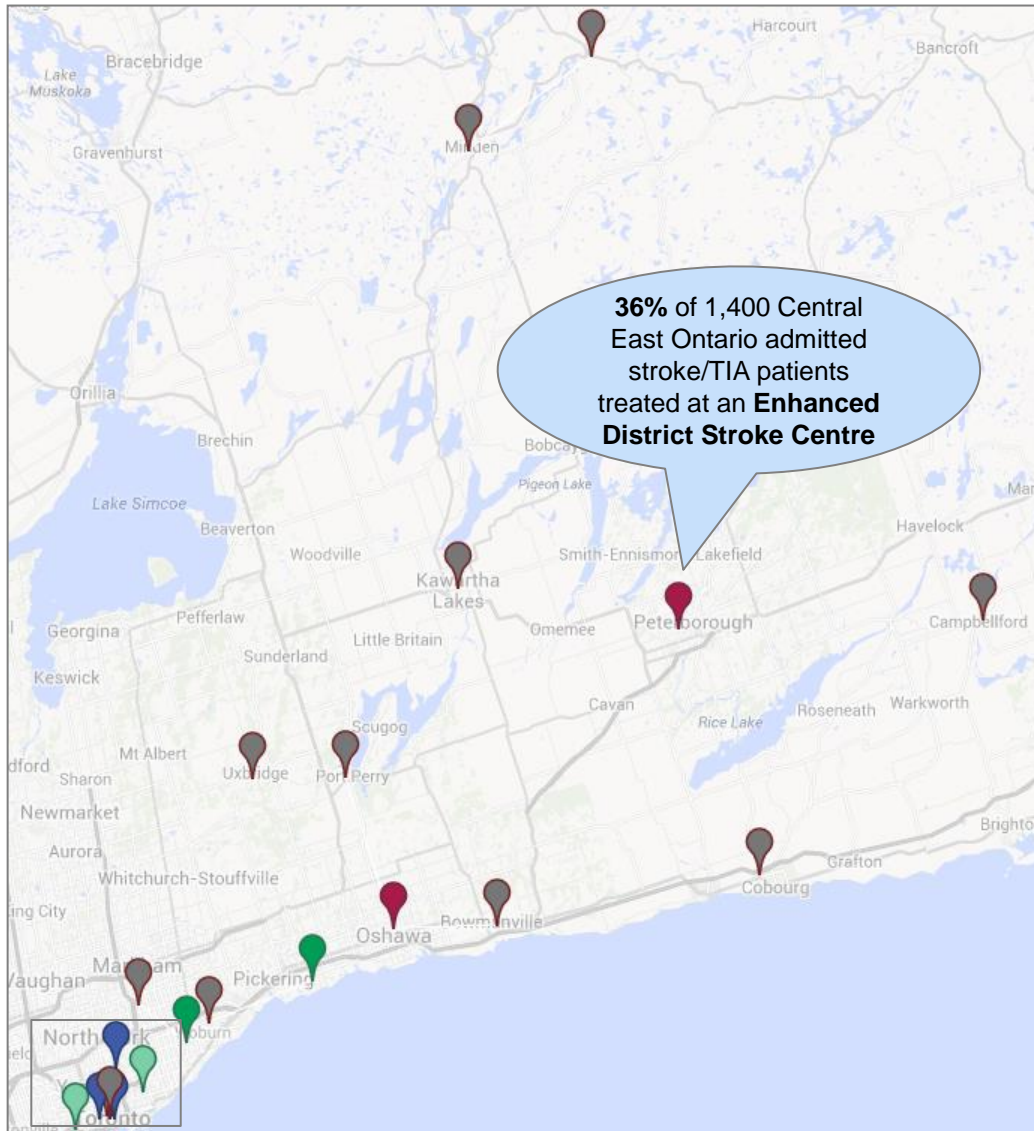
Service delivery model

- The Ontario Stroke System organises care for the entire province
 - Stroke services in Ontario are organised as a single “system” (the Ontario Stroke System) which is made up of 11 regional integrated clinical networks (supporting patients in 14 LHINs)
 - Each region serves approx 1m patients
 - The stroke networks are a collaborative partnership that span the full stroke pathway (from primary prevention through to post-stroke rehabilitation and secondary prevention) with a remit that includes providing equitable access and improvement in outcomes
- Within each region acute care is organised into three tiers
 - A regional stroke centre offering 24/7 access to a specialist stroke team and services including brain imaging, thrombolysis, interventional radiology and neurosurgery. The regional hub also provides expert advice (including interpretation through telemedicine), transfer coordination, and leadership to lower tiers
 - One or more district/enhanced district stroke centres offering thrombolysis on-site, including through use of telemedicine to access expert interpretation and advice not available on site, or through established transfer protocols
 - Secondary prevention centres
 - Plus partnership agreements with community hospitals and rehabilitation units

Comparison to NHS

- The Ontario Stroke System is broadly similar to NHS Stroke Networks with designated Regional Stroke Centres (and Enhanced District Stroke Centres) playing a similar role to NHS Hyper Acute Stroke Units, with a cascade of lower-tier and follow-on services operating as a single Network subject to a regular audit which is used to drive performance improvement
- Stroke strategy implementation is uneven with patients in urban areas twice as likely to be cared for in the most specialist acute units than patients in rural areas (75% vs 36%)

Stroke care is configured around designated regional centres with ambulance protocols to ensure transfer to the most appropriate setting



- **Regional stroke centre:**
 - Stroke protocols (for transport and triage, thrombolysis, neuroimaging)
 - Stroke experts
 - Network for rehab and secondary prevention
 - Neurosurgical facilities
 - Interventional radiology
- **Enhanced district stroke unit:**
 - Local stroke leadership
 - Stroke protocols for transport and triage, thrombolysis, and neuroimaging (including through telestroke)
 - Stroke experts
 - Network for rehab and secondary prevention
- **Acute stroke unit:**
 - Post-hyper acute care including early rehabilitation assessment and mobilisation
- **Acute stroke unit with telestroke**
- **No stroke care**

Acute stroke services in Sweden

Service line definition

- Hospitals in Sweden are required to have a stroke unit to be able to treat stroke patients, which require personnel with expertise in stroke and rehabilitation, multidisciplinary teams with specific competencies, defined care programmes for registration and for interventions in the acute phase and in the rehabilitation phase, and clear procedures for disseminating information to patients and their relatives¹

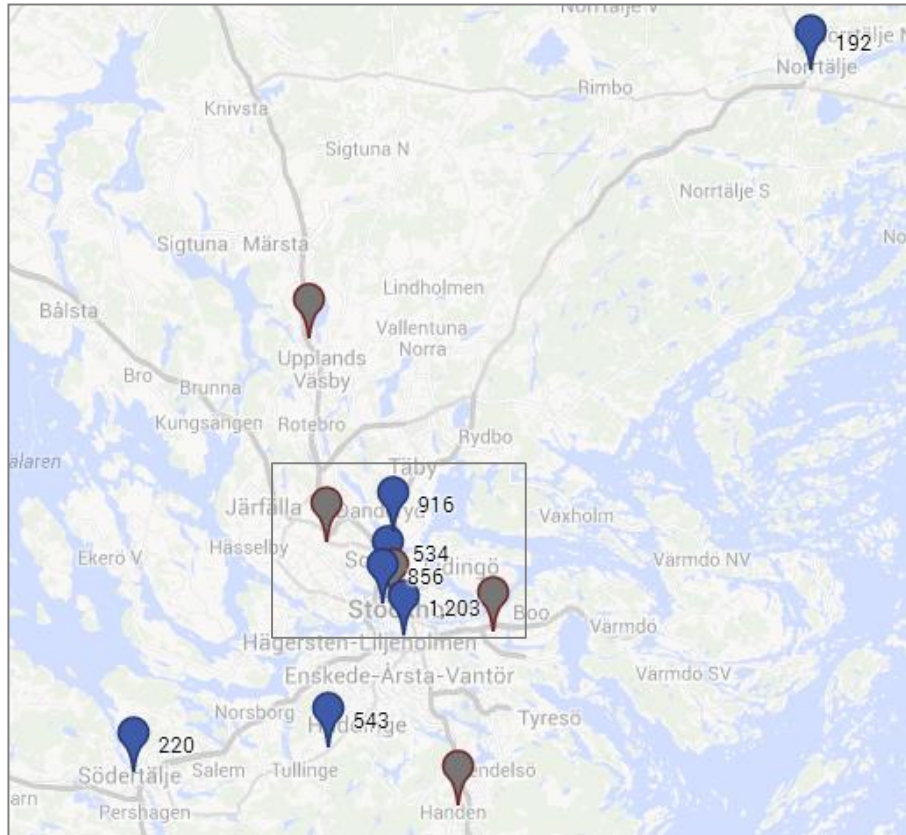
Service delivery model

- Most acute hospitals in Sweden have stroke units and provide stroke care
 - In Stockholm Country, all the acute hospitals provide stroke care
 - Of the 72 hospitals in Sweden that receive stroke patients, 90% complies with the national guidelines for stroke units²
- The use of thrombolysis alerts by ambulances, aimed at streamlining care, is low
 - Ambulances can alert the receiving hospitals of a suspected stroke through a thrombolysis alert, which can give the hospital time to prepare¹
 - However, the alarm was used only in 23% of eligible cases in 2012³, and increasing the use is recommended by the National Board of Health and Welfare to improve stroke care²

Comparison to NHS

- Sweden has introduced guidelines for stroke units and reviews performance of the units nationally, like the NHS
- However, there is no centralisation of stroke care yet as is happening in parts of England

All acute hospitals in Stockholm County provide stroke care



- Stroke unit
- No stroke unit (community hospital/treatment centre)
- # Stroke admissions per year

Acute stroke services in Germany

Service line definition

- Stroke unit designation relates to acute treatment of stroke only and covers all types of stroke (no explicit exclusions)

Service delivery model

- There are >250 certified acute stroke units across Germany organised into 2 tiers with minimum volume, size and service thresholds for each:
 - 101 Comprehensive Stroke Centres
 - 157 Primary Stroke Centres
- Patients end up in stroke centres due to the referral process with the ambulance rather than strict requirements
 - Designated stroke units are required to have established a referral process for ambulance services (in the region) to deliver the patient directly to the most appropriate unit
 - Consequently, while hospitals without a stroke designation can in theory provide acute stroke, in practice it would be unusual for care to take place outside of the designated centres
- Post-acute care is delivered by a much broader group of providers
 - Some regions and providers may have established networks for post-acute care but there is wide variation and no national standard
- In some areas, ambulance services (staffed with physicians and specialist equipment) provide extensive pre-hospital care for acute stroke

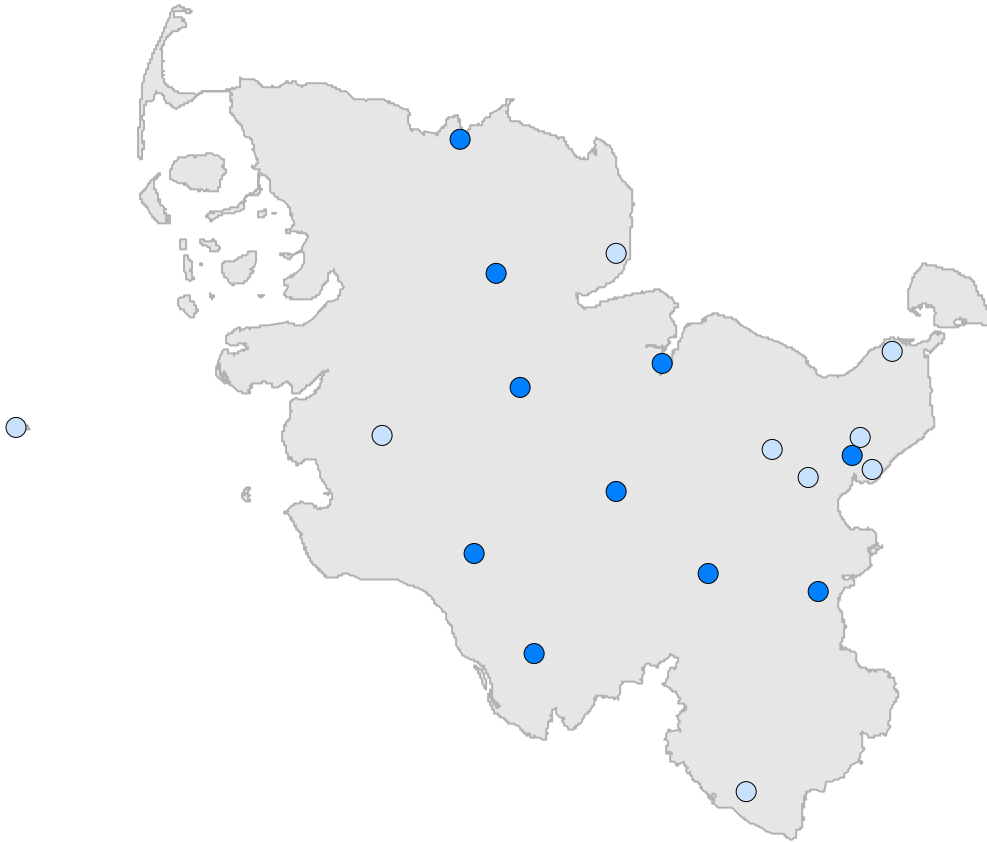
Comparison to NHS

- While Germany has defined comprehensive stroke centres like in England, there is no definite protocol that patients need to go there
- Germany has a large focus on the pre-hospital setting, with ambulances staffed with consultants delivering on-site care

10 out of 19 clinics with neurology department have a certified stroke unit

Hospitals with neurology departments and certified stroke unit

- Certified stroke unit
- No certified stroke unit



- Currently, stroke treatment is linked to approval in hospital plan, i.e., not depending on certification status
- In Schleswig-Holstein, 10 out of 19 neurology departments are certified stroke units
- In Schleswig-Holstein there are only 2 AMC sites with Comprehensive Stroke Centres, in Kiel and Lübeck

Acute stroke care in Arkansas - Introduction

Service line definition

- The Arkansas telestroke network covers the acute treatment of stroke and TIA
- Post-acute care and stroke rehabilitation are covered by separate certification requirements and are not directly linked to the telestroke programme
- The state-level Acute Stroke Task Force is developing improvement initiatives across the stroke pathway

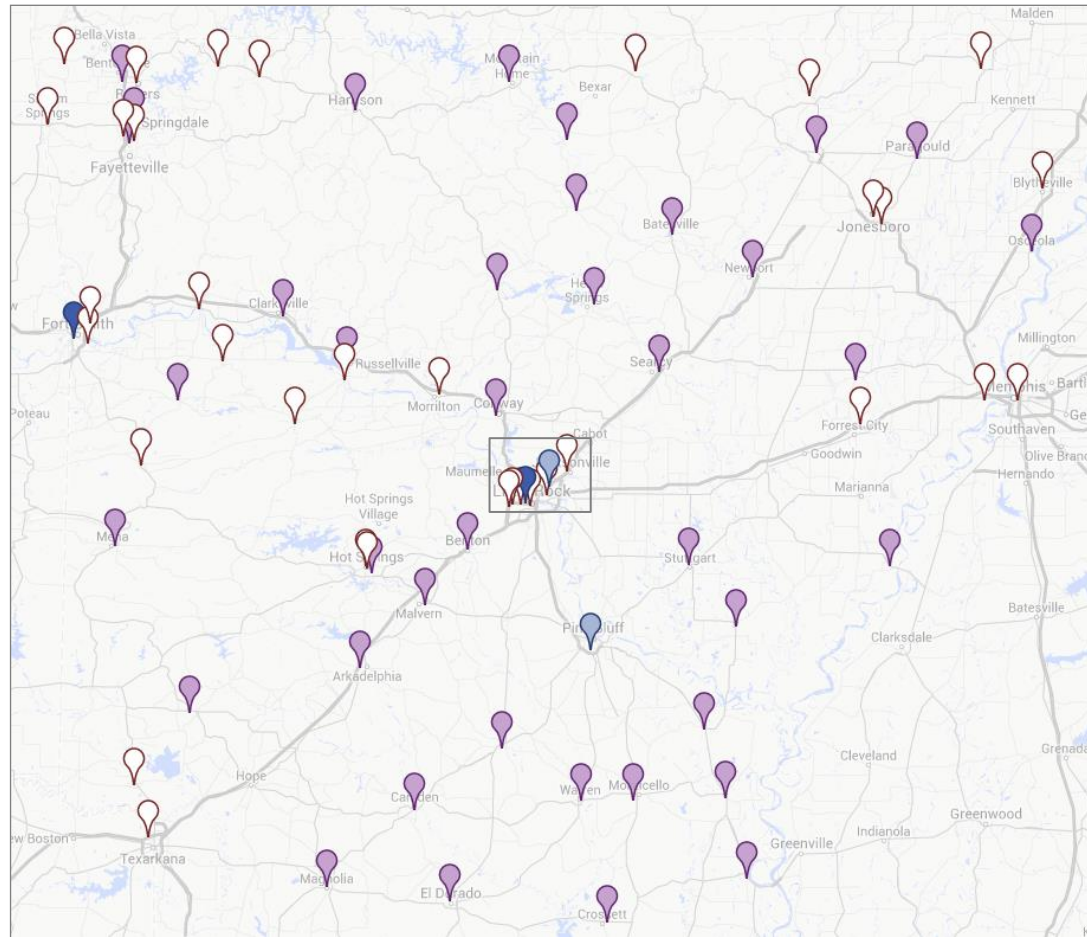
Service delivery model

- Acute stroke care is delivered by a state-wide and state-sponsored telestroke network which connects smaller and more remote acute hospitals across the state with specialist tertiary centres. The network offers 24/7 stroke triage via telemedicine to support rural Emergency Departments delivering stroke care. Neurologists at two tertiary hospitals interview patients and review CT scans using real-time video conferencing. (See next page for details).
- The network is led by 4 Joint Commission certified Advanced Primary Stroke Centers. These sites must meet standards, as defined by the Joint Commission, follow approved Clinical Practice Guidelines, and systematically measure performance and participate in performance improvement
- Arkansas has four Joint Commission certified Stroke Rehabilitation centers. These are all based at specialist rehabilitation hospitals, and not at acute hospitals
- The state Acute Stroke Task Force is tasked with improving stroke care. The state has not enacted state Primary Stroke Center legislation (as recommended by the CDC), but has completed the following improvement initiatives
 - Developed a model stroke program in the state covering prevention, acute care, rehabilitation and follow-up care
 - Initiated discussions on the status of the current level of stroke provision including gaps in stroke care and barriers to change
 - Working to develop a stroke registry

Comparison to NHS

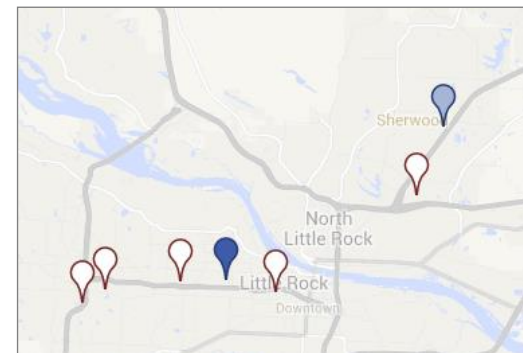
- Acute stroke care is delivered via a well-organised hub and spoke model, where even very small/remote acute hospitals are able to deliver thrombolysis using telemedicine to attain expert review of brain images and to make treatment decisions, which are delivered by on-site Emergency Room physicians
- Efforts to improve stroke care are focused on making best practice care available as broadly as possible through technology, rather than through centralisation and transfer

Acute stroke care is delivered via a state-wide telestroke network



- Core hub
- Affiliate/hybrid hub
- Spoke site
- Acute hospital with no stroke certification or connection to the AR SAVES network

- The Arkansas telestroke network (AR SAVES) connects 42 spoke sites to 4 certified Advanced Primary Stroke Centers
- Expertise is primarily delivered by 2 core hub sites in Little Rock and Fort Smith, supported by 2 further sites in North Little Rock and Pine Bluff
- Many spoke sites are very small – e.g. 25-bed critical access hospitals
- The main objective of the network is to increase access to thrombolysis by connecting Emergency Room doctors (at spoke sites) to specially-trained vascular neurologists (at hub sites) via live, two-way video available 24/7
- The program is led by UAMS (University of Arkansas AMC) Center for Distance Health
- Spoke hospitals participating in the program are equipped with telemedicine technology, training for personnel, support for dedicated telestroke coordinator and ongoing education
- Additionally, specialist stroke rehabilitation is offered at four dedicated sites across the state



Acute stroke services in Victoria, Australia

Service line definition

- Framework for regional acute stroke services in Australia is focused on care of patients with acute stroke symptoms (ischaemic or haemorrhagic), and specifically excludes:
 - Patients with suspected or definite subarachnoid haemorrhage
 - Patients with ischaemic stroke transferred to a tertiary referral centre for neurosurgical intervention
 - Patients transferred to a comprehensive stroke centre for intra-arterial therapy

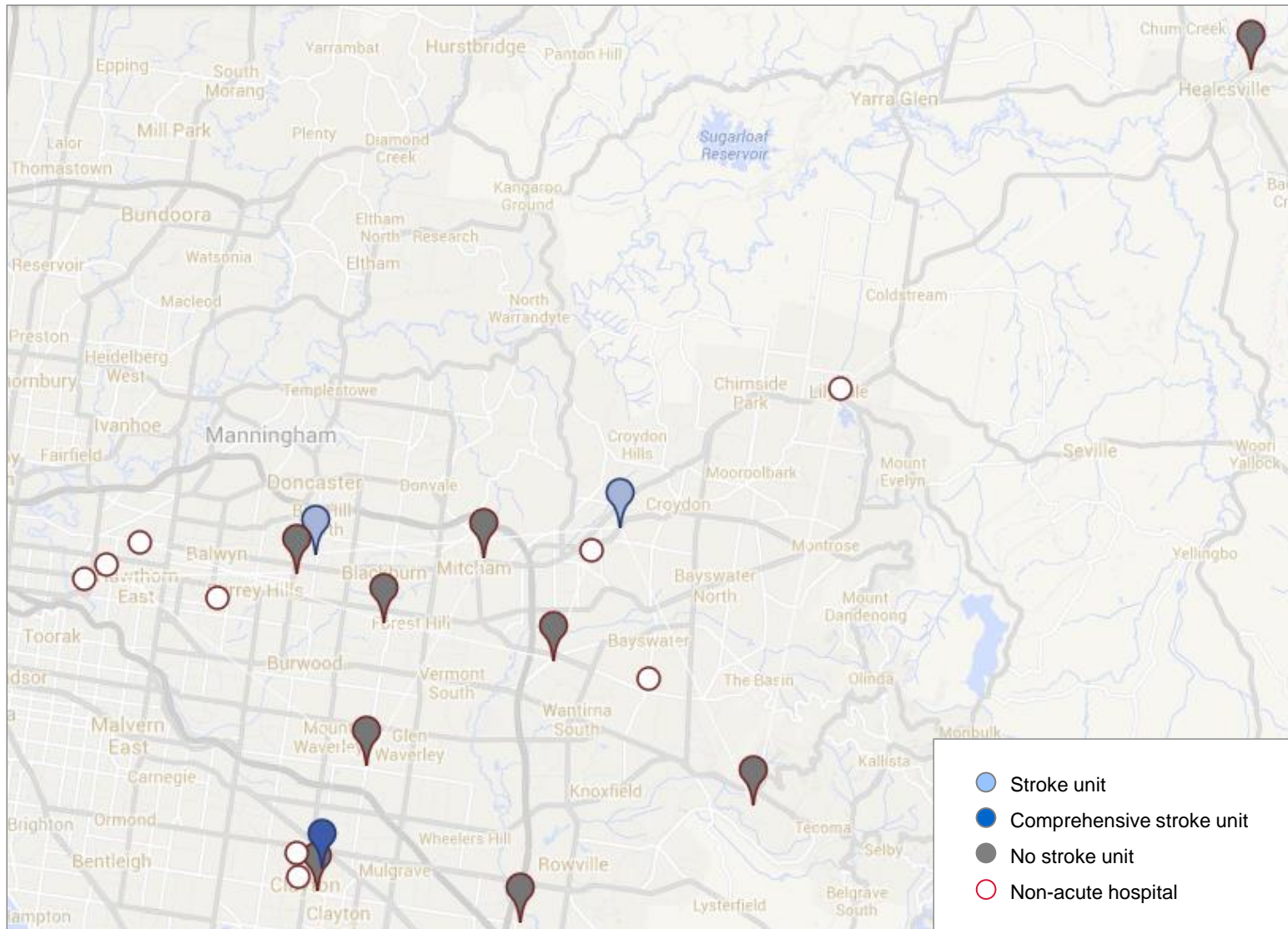
Service delivery model

- Acute stroke services are currently often sub-scale with many hospitals offering acute stroke care, with low volumes of patients and limited expertise/facilities
- Victoria is in the middle of implementing a regional strategy to create three distinct service tiers
 - Comprehensive stroke centres: provide regional leadership and referral pathways (with primary centres and adjacent regions); >350 acute strokes/yr; specialist stroke unit; 24/7 CT, thrombolysis and neurosurgery¹
 - Primary stroke centres: >100 acute strokes/yr; 24/7 CT and thrombolysis¹
 - Basic hospital service: <100 acute strokes/yr; have clear transfer arrangements
- Victoria (state Dept of Health) is encouraging the development of different strategies to address historically poor access in remote areas
 - Access to an acute stroke centre (with imaging and thrombolysis) within 60 mins by ambulance from all areas of the state (94% achieved)
 - Clear transfer protocols to get patients to higher tier services as soon as possible
 - Use of telemedicine to facilitate the delivery of brain imaging and thrombolysis in remote areas where volume of patients and on-the-ground expertise is more limited

Comparison to NHS

- Victoria is currently in the process of centralising stroke care, similar to the NHS
- The Victorian Stroke Strategy aims to fully integrate all stroke services in the state, and create clear networks, but this is still under development

Currently, there are 3 official stroke units in the Eastern Met area, with one being a comprehensive unit



Victoria is currently piloting a Stroke Telemedicine programme to provide stroke services to remote areas

The Victorian Stroke Telemedicine Program

- The Victorian Stroke Telemedicine program is **funded by the Victorian and Australian government**
- VST is a virtual system which links doctors at **rural Victorian hospitals to a network of Melbourne-based neurologists** who provide treatment advice about patients with stroke symptoms
- Neurologists have high quality **audio-visual communication, real-time access to vital patient data and brain imaging** to facilitate remote consultations

