



strokefoundation

National Stroke Audit

Acute Services Report 2015

About the National Stroke Foundation

The National Stroke Foundation is a national not-for-profit organisation working with stroke survivors, carers, health professionals, government and the public to reduce the impact of stroke on the Australian community. We are the voice of stroke in Australia. Our mission is to stop stroke, save lives and end suffering.

We will achieve this by:

- Raising awareness about the risk factors and signs of stroke and promoting healthy lifestyles.
- Improving treatment for stroke to save lives and reduce disability.
- Improving life after stroke for stroke survivors.
- Encouraging and facilitating stroke research.
- Advocating for improved stroke prevention, treatment and support.
- Raising funds from the community, corporate sector and government to continue our mission.

Acknowledgements

The National Stroke Foundation would like to thank all who participated in the Audit – a list of all sites and participants is available online. We recognise the commitment to this process was significant and, in many cases, done with no financial recompense. We hope the information collected through this process provides valuable information that can be used at a local and national level. Thanks also to the advice provided by the National Stroke Foundation's Clinical Council.

Data analysis was undertaken by the Performance and Evaluation Unit of the National Stroke Foundation. The report was prepared by Kelvin Hill (National Manager, Clinical Programs), Erin Lalor (CEO), Patrick Young (National Data and Quality Coordinator) and Toni Aslett (Director, National Programs). We acknowledge the input of Sara Kavanagh (National Audit Coordinator) who coordinated the 2015 Audit.

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At a glance

185

hospitals surveyed

4,087

patient cases

87

hospitals with a stroke unit

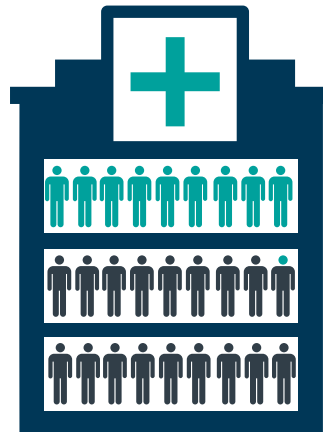


Stroke units

- 16** have no medical stroke lead
- 11** have 24/7 endovascular (clot retrieval) therapy
- 1** qualifies as a comprehensive stroke service

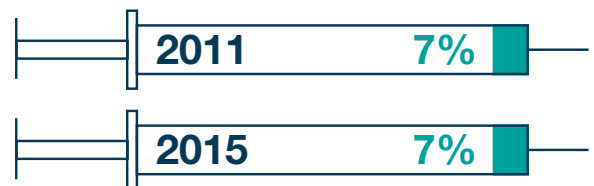
Patient care

30,000
patients



Almost **20,000** denied access to full benefits of stroke unit care

Thrombolysis



Ischaemic stroke patients receiving clot busting drugs through thrombolysis

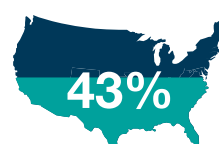
Leaving hospital



44% discharged with no care plan



1/3 discharged with no prevention medication



Patients receiving thrombolysis within 60 minutes of hospital arrival

Executive summary

The 2015 National Stroke Audit presents data central to understanding the nature of current acute stroke services in Australia. The Audit aims to highlight areas where the system for acute stroke care is working well and to report on improvements or changes which may be needed. It is the only report of its kind in Australia tracking the performance of Australia's stroke care against best practice guidelines; the *Acute Stroke Services Framework 2015* (the Framework) and for the first time the Australian Commission on Safety and Quality in Health Care (ACSQHC) *Acute Stroke Clinical Care Standard 2015* (the Standard). In addition the Audit highlights changes that have occurred over the previous cycles of the National Stroke Audit which commenced in 2007. Clinicians, health administrators and governments alike can use the valuable data provided in this report to review services and clinical care in order to improve the quality of stroke care in Australia.

This report provides a robust and representative snapshot of acute stroke care services in Australia. Data collected is comprised of two parts: the first is a survey of resources, processes and infrastructure completed by 185 hospitals; and the second is a retrospective audit of 4,087 patient case notes (from 112 hospitals). Participating hospitals reported admitting almost 30,000 acute stroke patients in the previous 12 months. The vast majority (28,566 or 96%) of patients were admitted to large hospitals – those providing care to over 100 stroke patients per annum. A total of 26,657 (90%) of patients were managed in hospitals with stroke units.

The Audit revealed acute stroke care and services in this country have stagnated. Despite significant advancements in the treatment and care guidelines for acute stroke and the best efforts of health professionals and hospitals, many patients are missing out on best practice care. Patients are continuing to suffer poorer outcomes and even death as a result.

Just one hospital in the survey was found to meet all the elements of a comprehensive stroke service including, but not limited to, the provision of hyperacute treatments (endovascular [clot retrieval] therapy and intravenous thrombolysis [clot busting] services) and stroke unit care 24 hours a day, seven days a week.

Stroke is a time-critical medical condition and endovascular therapy is among several interventions effective in the early stages of stroke. Australia played a key role in landmark endovascular therapy research. This life-saving therapy was reported to be available to stroke patients 24/7 in only 11 centres.

The administration of thrombolysis for ischemic stroke within 4.5 hours of symptom onset offers significant benefit for select patients compared to routine care. A total of 76% of hospitals participating in the Organisational Survey reported provision of thrombolysis, but overall thrombolysis rates in the Clinical Audit has stalled at only 7% over the last four years. Coordinated processes between emergency departments, ambulance and stroke units require integrated triage yet only 60% of hospitals reported organised pre-hospital services linked to their hospital. Efficiency of hospital services are critical to hyperacute care. This report reveals Australia is well behind in indicators of efficiency for patients accessing thrombolysis. Only 26% of appropriate patients received thrombolysis within 60 minutes of hospital arrival compared to the United States of America (43%)⁸ and the United Kingdom (56%).⁹

Stroke unit care is proven to deliver far improved outcomes for stroke patients. Encouragingly, the proportion of patients accessing stroke units had improved from 58% in 2013 to 67% on 2015 with increases in the number of stroke units. Stroke unit care varies considerably between states with significant improvements in Queensland and South Australia likely to be main drivers for this national change. Shockingly, around one-third of patients are missing out on stroke unit care all together and very few (39%) patients spend at least 90% of their hospital stay on the stroke unit which limits the benefits of this aspect of care. This compares poorly to the United Kingdom⁹ which has 83% of patients spending the majority of their stay in a stroke unit.

This report reveals variation in capacity in stroke unit care across states and hospitals of varying volumes of stroke patients. Importantly, even in hospitals with stroke units, bed management processes appear to be limiting access to stroke unit care. On the day of survey 187 stroke patients (32%) in stroke unit hospitals were not on the unit despite the availability of 257 stroke beds.

In addition it was reported 16 of Australia's stroke units did not have a medical lead with specialist stroke knowledge responsible for ensuring best quality care. Similarly, it is concerning 22% of the sites reporting regional responsibility did not have a medical stroke lead and 35% did not have a stroke care coordinator. It was, therefore, unclear what level of outreach support can be provided in these circumstances.

Coordination of care by a multidisciplinary team is critical to patient outcomes. Most hospitals recognised the importance of the coordination of care with rehabilitation services – 87% reported systemised coordination with rehabilitation services providers, 77% reported standardised tools to determine rehabilitation needs and goals and 98% reported involving carers

in this process. However, several hospitals, including three sites admitting 500 or more stroke patients a year, did not routinely provide early assessment of patients' rehabilitation needs. Furthermore, almost one-third of audited cases were not seen by a physiotherapist early after admission (48 hours).

Discharge care planning is integral for ensuring patients with stroke receive the support required to optimise outcomes when transitioning out of acute care. Despite this being an area of emphasis from previous Audits, the Framework (since 2007) and now the Standard, compliance has not improved with any significance. Less than half of hospitals reported routinely providing a discharge care (personal recovery) plan to patients. In the clinical audit just over half of patients (56%) were provided with a care plan and the same number were provided with risk modification advice. Around one-third of patients were not provided recommended secondary stroke prevention medications. Given four-in-10 stroke survivors are likely to suffer a recurrent stroke within 10 years these gaps in care have significant and at times devastating implications for individuals and the healthcare system.

This issue also translates to the management of transient ischemic attacks (TIAs). Despite repeated Audit recommendations and Framework updates only 41 hospitals (38%) reported providing services for the assessment of TIAs within 48 hours. There is recognition across the sector that patients are at higher risk of stroke soon after experiencing a TIA. Clearly more focus is needed to improve access to early investigations, specialist assessment and early treatment for those with TIA.

In summary the data reported revealed Australia's acute stroke care system has stalled in key areas to the detriment of patients and health services. Australia's acute stroke care system is at serious risk of waning under the increased pressure of an aging population

and subsequent increase in incidence of stroke. However, there is reason for hope, demonstrated by improvement in Queensland and South Australia which is encouraging. Opportunities exist for improvements across the country through tailored strategies which can impact on the quality of care provided. Australia is also championing significant advancements in treatment and care but the health system must now adapt to support health professionals in the delivery of these advancements. This includes concentrating

efforts on where they will have the greatest impact including ensuring comprehensive stroke services are available in every capital city. Stroke units must be appropriately resourced with the right multidisciplinary care teams, equipment and support to deliver high quality hyperacute, acute and ongoing care. It is vital stroke patients reach these services in a timely manner. We need to improve how resources are utilised to deliver the best possible outcomes for all Australians.

Table 1. National adherence to Acute Stroke Clinical Care Standard indicators

| | Australia n (%) |
|---|--------------------|
| Assessment in the emergency department (N=3416) | 1294 (38) |
| Transport by ambulance to hospital able to provide thrombolysis (N=1401) | 918 (66) |
| Thrombolysis in ischaemic stroke (with exclusions) (N=2854)* | 231 (8) |
| Thrombolysis in ischaemic stroke for those who arrive within 4.5 hours of symptom onset (N=837) | 198 (24) |
| Thrombolysis within 60 minutes of hospital arrival (N=231) | 59 (26) |
| Time from onset of symptoms to thrombolysis | 2:50 (2:03-3:39) |
| Admission into a stroke unit (N=4087) | 2724 (67) |
| 90% of acute hospital care on a stroke unit (N=4087) | 1579 (39) |
| Assessment for rehabilitation by a physiotherapist within 24-48 hours of hospital admission# (N=4079) | 2761 (68) |
| Rehabilitation therapy within 48 hours of initial assessment (N=2936) | 2399 (82) |
| Treatment for a rehabilitation goal commencing during an acute hospital admission (N=3047) | 2648 (87) |
| Discharged on antihypertensive medication (haemorrhagic stroke) (N=207) | 137 (66) |
| Discharge on statin, antihypertensive and antithrombotic medications (ischaemic stroke) (N=1750) | 1120 (64) |
| Discharge on oral anticoagulants for atrial fibrillation (ischaemic stroke) (N=492) | 304 (62) |
| Risk factor modification advice before leaving the hospital (N=2273) | 1273 (56) |
| Carer support needs assessment (N=459) | 271 (59) |
| Carer training (N=454) | 219 (48) |
| Written care plan (N=2636) | 1486 (56) |

Reported as <48hrs

* Thrombolysis rates not incorporating exclusions, as historically reported by the National Stroke Audit and by the Australian Stroke Clinical Registry (AuSCR) is 7% of all ischaemic stroke patients

Recommendations

The results demonstrate only small improvements on many aspects of best practice stroke care with small shifts in some indicators such as stroke unit access and care planning. We continue to see many stroke patients denied access to stroke unit care and are seeing no difference in thrombolysis rates nationally although there are marked differences in the quality of care provided by state and by hospital volume. In light of limited improvement the following recommendations are made:

1. Review the organisation of stroke services in each jurisdiction to ensure more patients receive care according to the Acute Stroke Clinical Care Standard. This should include identification of:

- a. Appropriate hospital/s to ensure comprehensive stroke services (including thrombolysis and 24/7 endovascular care) are available across the country and to more stroke patients;
- b. Mechanisms to improve stroke unit access including improved bed management processes and systems to ensure all stroke patients are admitted to a stroke unit hospitals (either establishing/redistributing beds to new units or bypassing non-stroke unit centres).

2. Appoint stroke coordinators in all stroke units with a focus on:

- a. Ensuring all stroke patients are admitted to the stroke unit through improved bed management processes;
- b. Facilitating delivery of high quality care including discharge planning processes such as care planning and secondary prevention;
- c. Supporting the routine monitoring of stroke care.

3. Develop other multidisciplinary processes to support higher rates of care planning and secondary prevention management.

4. Drive greater improvements in stroke care quality by enhancing the way in which the quality of stroke care is monitored by more regularly reporting on the seven Quality Statements in the Acute Stroke Clinical Care Standard (e.g. reperfusion, stroke unit access, early rehabilitation, etc).

Chapter 1

Introduction

1.1 Background

Stroke is one of Australia's biggest killers and a leading cause of disability. It is estimated there were almost 50,000 new and recurrent strokes in Australia in 2012¹ and 35,300 hospital admissions due to stroke.² The cost burden of stroke is estimated to be around \$5 billion per year.³

Clinical Guidelines and the National Stroke Audit

The *Clinical Guidelines for Stroke Management 2010*⁴ present evidence-based recommendations for clinical care and are approved by the National Health and Medical Research Council (NHMRC). These guidelines form the basis of the National Stroke Audit, determining what data is collected. This Audit is a National Stroke Foundation initiative and is part of its commitment to promoting the delivery of evidence-based care for stroke.

1.2 The National Stroke Audit

The National Stroke Audit – Acute Services comprises:

- An Organisational Survey of stroke services across Australia. The survey is used to examine the resources available locally such as stroke units, imaging and multidisciplinary staff.
- A Clinical Audit involving the retrospective review of case notes of 40 or more consecutive patients admitted to participating hospitals during a defined time frame. The Clinical Audit examines adherence to processes of care outlined in the *Clinical Guidelines* – such as diagnostic procedures (e.g. CT, MRI and Carotid Doppler), early interventions (e.g. rt-PA and aspirin), multidisciplinary care and compliance with the nationally endorsed evidence-based recommendations. Timing of the delivery of

various aspects of care and discharge outcomes is also measured.

For this report acute care refers to care provided in hospital from arrival at hospital to discharge from hospital or transfer to inpatient rehabilitation. Usually this care occurs in the first week of hospital admission.

The National Stroke Audit – Acute Services commenced in 2007 and is conducted biennially to provide longitudinal data on clinical performance. Each alternate year the National Stroke Foundation undertakes an audit of in-patient rehabilitation services for patients with stroke.

1.3 Structure of the report

This report outlines the adherence to the Australian Commission of Safety and Quality in Health Care (ACSQHC) Acute Stroke Clinical Care Standard⁵ and the *Clinical Guidelines for Stroke Management 2010* in hospitals providing acute care for stroke survivors. This report also outlines resources and structures available at these centres mapped to the *Acute Stroke Services Framework 2015*.

Chapter 4 focuses on the response to the Organisational Survey. Responses are analysed at a hospital level and do not reflect patient level practice per se. Chapter 5 provides results of the Clinical Audit which does reflect individual patient care and is grouped by state and hospital volume.

Each participating hospital receives an individual report that provides feedback on their audit results. The individual reports include information on national benchmarks so the participant can make informed decisions on where improvements should be focussed to improve care delivered to patients with stroke. The results of the audit may also be used to inform planning at a local, state or national level to improve patient outcomes.

Chapter 2

Methods

2.1 Determining the data to be collected and reported: Organisational Survey and Clinical Audit

Organisational Survey

Data collected through the National Stroke Audit enables reporting of stroke services against each required element of stroke services outlined in the *Acute Stroke Services Framework 2015*⁶ (the 'Framework'). As the Framework had been updated since the 2013 National Stroke Audit, the National Stroke Foundation and its Clinical Council reviewed questions for the National Stroke Audit – Acute Services Organisational Survey 2015 using the 2013 survey questions in conjunction with the updated Framework. The number of individual survey questions was reduced and minor changes were made to reflect the updated Framework.

Feedback in previous audits identified a need to adjust the survey for very small sites admitting fewer than 50 stroke patients per annum, as they do not require the same resources and infrastructure as the larger sites. The Organisational Survey was, therefore, delivered in two forms – a short form (with two questions focussed on protocols for emergency department assessment and transfer protocols) and a long form (with 115 questions considering available services in the context of the Framework). Copies of the survey questions are available from www.strokefoundation.com.au/what-we-do/treatment-programs/stroke-data-collection

The data reported in Chapter 4 only includes Organisational Survey data provided by hospitals admitting 50 or more stroke patients per annum unless stated otherwise.

Clinical Audit

The data collected through the Clinical Audit is designed to report on adherence to recommendations outlined in the Clinical Guidelines. The indicators reported against were based on the Australian Stroke Coalition (ASC) agreed data framework and the Australian Council on Healthcare Standards' (ACHS) clinical indicator set for stroke.

Since the 2013 Audit, considerable work has been undertaken to ensure standardised data collection and reporting in Australia. This has included the development of a National Stroke Data Dictionary through the ASC and the release of the ACSQHC Acute Stroke Clinical Care Standard (the 'Standard') with associated indicators.⁵ The ACHS clinical indicator set for stroke had also been reviewed and found to be no longer consistent with the ACSQHC indicators. Feedback from auditors in 2013 also requested a reduction in the amount of data collected.

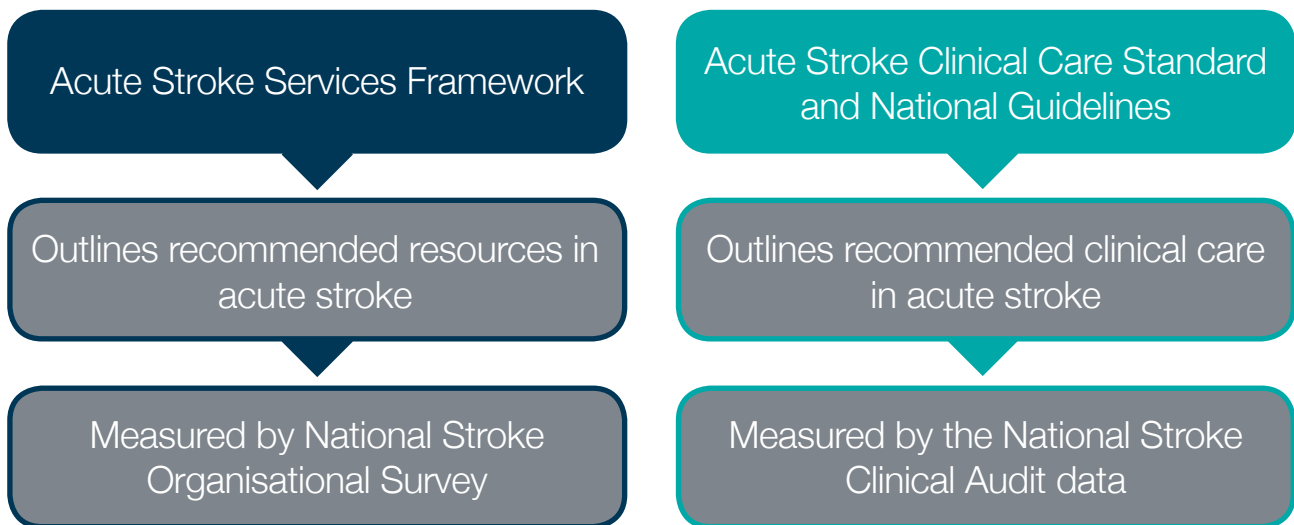
Given this work, the data collected through the Clinical Audit was reviewed and a number of data elements removed (reducing data entry by 25%). Some data elements were added to enable reporting against the ACSQHC indicators. A subset of the ACSQHC indicators was also selected for reporting state breakdowns based on a review of indicators collected and reportable through national stroke programs (e.g. National Stroke Audit and Australian Stroke Clinical Registry) and to ensure reporting against each of the quality statements in the Standard.

Definitions of the indicators reported here (including numerators and denominators, and exclusion criteria) are available at www.strokefoundation.com.au/what-we-do/treatment-programs/stroke-data-collection

The ACSQHC indicators were reported using the definitions included in the ACSQHC Standard www.safetyandquality.gov.au/our-work/clinical-care-standards/acute-stroke-clinical-care-standard

The basis of the Organisational Survey and Clinical Audit is represented in Figure 1.

Figure 1: Components of acute care reflected in this report



2.2 Recruitment

Any hospital admitting at least three acute stroke patients was eligible to participate in the Organisational Survey component of the National Stroke Audit. Those with 50 or more admissions per year were invited to complete the long form, those with less than 50 admissions were asked to complete the short form.

Hospitals admitting 50 or more stroke patients per year were invited to participate in the Clinical Audit. Smaller hospitals were able to participate by request but were not actively recruited.

The list of eligible hospitals was developed by looking at previous participants in the audit and in correspondence from clinical leads or state based clinical network managers. Eligible hospitals were invited to formally participate in the National Stroke

Audit (the Clinical Audit and Organisational Survey). The hospital recruitment period was 1 December 2014 to 1 August 2015.

2.3 Data collection tool and training

A new data collection tool was introduced in 2015 – the Australian Stroke Data Tool (AuSDaT). It was designed to reduce data entry burden and time for data collection. All participants in the full Audit (completing both the Organisational Survey [long form] and the Clinical Audit) were required to complete standardised training regarding the AuSDaT. A data dictionary was provided to all participating sites completing the long Organisational Survey and Clinical Audit.

2.4 Data collection

Hospitals completed the long form of the Organisational Survey between 1 June and 28 August 2015. Participants were asked to answer questions as at June 2015. Contact was made by phone and/or email to the sites completing the short form to seek participation between 1 August and 30 September 2015.

Security and confidentiality were maintained by assigning hospitals with a hospital identification code and password, each of which had to be entered to access the AuSDaT.

Clinicians at hospitals participating in the Clinical Audit were asked to enter data on at least 40 consecutive cases admitted from 1 September 2014 and discharged by 28 February 2015. Data was entered from 1 June 2015 to 31 August 2015.

Sites were asked to complete reliability checks by having a second person re-audit up to five cases. In this audit 405 case notes were reaudited (data not presented in this report).

2.5 Data verification

Programmed data logic checks using statistical software were implemented to ensure responses to questions that were sub-categories of a primary question were consistent with the primary question (e.g. if an answer was 'no' then no further subcategories should have been completed). Other more specific logic checks undertaken included cross-referencing the number of patients admitted with stroke and the number admitted to the stroke unit in the previous year. This data was verified with each of the participating hospitals.

Each participating hospital was asked to review their completed data to check their responses before undertaking the final analysis.

2.6 Data analysis

Staff from the Performance and Evaluation Unit of the National Stroke Foundation analysed the data. The data was analysed using computer programs including SPSS and Microsoft Excel 2007. The data was exported from the web-based database as an Excel spread sheet and transferred into SPSS. Data was then recoded into variable definitions recording Yes=1, No=0 and Unknown=9.

Analysis was conducted based on the state and volume of patients with stroke. Hospital volume was divided into hospitals that admitted 50-75, 75-199, 200-349, 350-499 and >500 stroke patients per year.

Chapter 3

Participating hospitals

This year 375 public and private hospitals were eligible to participate in the National Stroke Audit Organisational Survey – 127 (119 public and eight private) hospitals were invited to complete the long form and 248 hospitals were invited to complete the short form.

A total of 110 public hospitals (92%) and eight private hospitals admitting 50 or more stroke patients per annum completed the long form. A total of 77 sites admitting less than 50 stroke patients per annum participated: 67 sites completed the short form and 10 sites completed the long form (as they had admitted more than 50 stroke patients per annum in 2013 but had reductions in stroke admission numbers, dropping admissions to less than 50 in 2015).

Of the 127 sites invited to participate in the Clinical Audit, 112 did so. Of these, nine sites admitted fewer than 50 stroke patients per annum. Data from a total of 4,087 patient case notes was entered in the Clinical Audit.

The 185 hospitals participating in both forms of the Organisational Survey reported 29,712 admissions of acute stroke patients in the previous year. Of these, 26,657 (90%) were managed in hospitals with stroke units. Sites that reported less than 50 annual stroke admissions (N=77) accounted for 1,184 (4%) of all reported admissions. Hospitals admitting more than 500 stroke patients per year (n=17) admitted 11,620 (39% of all patients). Hospitals participating in the Clinical Audit accounted for 28,566 admissions (96% of all reported).

Table 2. Participating hospitals (full Audit) by location

| State | Organisational Survey | | | Clinical Audit | | |
|--------------------|-----------------------|------------|----------|----------------|------------|----------|
| | Total | Public | Private | Total | Public | Private |
| ACT | 2 | 1 | 1 | 2 | 1 | 1 |
| NSW | 43 | 42 | 1 | 41 | 40 | 1 |
| NT | 1 | 1 | 0 | 1 | 1 | 0 |
| QLD | 25 | 22 | 3 | 24 | 21 | 3 |
| SA | 6 | 6 | 0 | 5 | 5 | 0 |
| TAS | 3 | 3 | 0 | 3 | 3 | 0 |
| VIC | 27 | 25 | 2 | 26 | 25 | 1 |
| WA | 11 | 10 | 1 | 10 | 10 | 0 |
| AUS (total) | 118 | 110 | 8 | 112 | 106 | 6 |

Table 3. Participating hospitals completing the Organisational Survey (long and short forms) by stroke patient admission volumes

| State | Total reported stroke admissions previous year | | | | | | Total |
|------------------|--|-----------|-----------|-----------|----------|-----------|------------|
| | <50 | 50-74 | 75-199 | 200-349 | 350-499 | 500+ | |
| ACT | 0 | 0 | 1 | 1 | 0 | 0 | 2 |
| NSW | 20 | 5 | 16 | 11 | 4 | 3 | 59 |
| NT | 0 | 1 | 0 | 0 | 0 | 0 | 1 |
| QLD | 10 | 2 | 7 | 10 | 2 | 2 | 33 |
| SA | 16 | 1 | 1 | 0 | 1 | 2 | 21 |
| TAS | 2 | 0 | 1 | 2 | 0 | 0 | 5 |
| VIC | 15 | 3 | 8 | 5 | 1 | 7 | 39 |
| WA | 14 | 4 | 4 | 0 | 0 | 3 | 25 |
| AUS Total | 77 | 16 | 38 | 29 | 8 | 17 | 185 |

Chapter 4

Results of the Organisational Survey

Resources and processes to support best practice stroke care: Adherence to the Framework

Capacity to plan, deliver and evaluate high quality acute stroke services is essential for improvement of health care delivery and patient outcomes. The *Acute Stroke Services Framework* aims to improve the quality of Australian acute stroke services by outlining recommended structures, networks, settings and criteria for monitoring. This section of the report describes the current resources available in Australia to support best practice stroke care and is mostly data based on the Organisational Survey (long form) for hospitals that reported over 50 annual stroke admissions.

4.1 Overall adherence to the Framework

Among hospitals admitting 50 or more stroke patients per year only one was found to have all 24 elements of the Framework and, therefore, meet the criteria for a comprehensive stroke service (CSS). There were ten hospitals who had ten or fewer of the Framework elements – the median number of elements was 18. The median number of elements met increased with the volume of stroke patients admitted ranging from 12 for small volumes through to 20 for the larger volume hospitals (refer to Table 4). As some elements of the Framework are arguably more important than others, components of the Framework were analysed in more detail on the next page.

4.2 Adherence to specific aspects of the Framework

4.2.1 Rapid transfer, assessment and investigations

Services for suspected stroke need to cover aspects of emergency assessment including pre-hospital services, emergency department (ED) processes and critical investigations such as brain imaging. These systems and processes are designed to ensure rapid transfer to hospitals able to deliver appropriate care and to ensure rapid diagnosis and intervention. Aspects related to these areas of the Framework are listed in Table 4.

Table 4. Reported adherence to recommended pre-hospital, emergency department and imaging services within hospitals (N = 108) according to hospital volume

| | Australia (all hospitals) (N=108) | Hospitals admitting 50–74 strokes (N=16) | Hospitals admitting 75–199 strokes (N=38) | Hospitals admitting 200–349 strokes (N=29) | Hospitals admitting 350–499 strokes (N=8) | Hospitals admitting 500+ strokes (N=17) |
|--|---|---|--|---|--|--|
| Total number of stroke admissions per annum reported in survey | 28528 | 984 | 5090 | 7505 | 3329 | 11620 |
| Median number of elements met | 18 | 12 | 16 | 18 | 20 | 20 |
| Element of service – pre hospital and ED | n (%) | n (%) | n (%) | n (%) | n (%) | n (%) |
| Organised pre-hospital services (includes use of validated screening tools by paramedics, appropriate pre-notification systems) | 65 (60) | 5 (31) | 20 (53) | 16 (55) | 8 (100) | 16 (94) |
| Coordinated regional stroke systems (includes protocols for hospital bypass, transfer from non-stroke hospital to primary stroke service [PSS] or CSS, and between a PSS and CSS) | 73 (68) | 7 (44) | 23 (61) | 19 (66) | 8 (100) | 16 (94) |
| Coordinated emergency department systems (includes use of validated screening tools, agreed triage categories, protocols for rt-PA intervention e.g. “Code Stroke”, pathways to facilitate urgent access to imaging, etc.) | 96 (89) | 12 (75) | 32 (84) | 27 (93) | 8 (100) | 17 (100) |
| Element of service – imaging | n (%) | n (%) | n (%) | n (%) | n (%) | n (%) |
| Onsite CT brain (24/7) including CT angiography | 104 (96) | 15 (94) | 35 (92) | 29 (100) | 8 (100) | 17 (100) |
| Carotid imaging within 24 hours | 95 (88) | 12 (75) | 33 (87) | 25 (86) | 8 (100) | 17 (100) |
| Advanced imaging capability (e.g. MRI/MRA, catheter angiography) | 95 (88) | 9 (56) | 34 (89) | 27 (93) | 8 (100) | 17 (100) |

4.2.2 Hyperacute service

Acute stroke services should provide access to recommended hyperacute therapy including thrombolysis and endovascular therapy. Hyperacute therapies are those that are time dependent and are provided within the first few hours after stroke. For many years intravenous tissue plasminogen activator (rt-PA) has been recognised as an important

early intervention but requires early arrival and rapid assessment. In 2015 large clinical trials demonstrated an almost doubling of beneficial outcomes from clot retrieval interventions for large artery obstruction compared with standard intravenous thrombolysis.⁷ All reperfusion therapy requires a high degree of ongoing monitoring after the treatment. Table 5 outlines elements of hyperacute stroke services.

Table 5. Reported adherence to recommended hyperacute services within hospitals (N=108) by hospital volume

| | Australia (all hospitals) (N=108) | Hospitals admitting 50-74 strokes (N=16) | Hospitals admitting 75-199 strokes (N=38) | Hospitals admitting 200-349 strokes (N=29) | Hospitals admitting 350-499 strokes (N=8) | Hospitals admitting 500+ strokes (N=17) |
|--|---|---|--|---|--|--|
| Element of service – hyperacute treatments | n (%) | n (%) | n (%) | n (%) | n (%) | n (%) |
| Onsite endovascular stroke service (24/7) | 11 (10) | 0 (0) | 0 (0) | 2 (7) | 3 (38) | 10 (59) |
| Onsite neurosurgical services (e.g. for hemicraniectomy due to large middle cerebral artery infarcts) | 28 (26) | 0 (0) | 0 (0) | 12 (41) | 4 (50) | 12 (71) |
| Delivery of intravenous rt-PA | 82 (76) | 8 (50) | 25 (66) | 24 (83) | 8 (100) | 17 (100) |
| Ability to provide acute monitoring (telemetry and other physiological monitoring) for at least 72 hours | 100 (93) | 15 (94) | 37 (97) | 28 (97) | 6 (75) | 14 (82) |

While the Framework recommends endovascular services be available 24/7 in CSS, eight stroke services did not provide 24/7 access. Four of these hospitals admitted more than 500 stroke patients a year, one hospital admitted 350–499 stroke patients per year and three sites admitted 200–349 stroke patients a year. Proximity of hospitals providing endovascular services to each other was not determined through this survey.

Key findings:

- 19 hospitals (admitting more than 200 stroke patients per annum) provided endovascular services, which reported to be available 24/7 in 11 of these.
- 82 hospitals provided thrombolysis with this service available in all hospitals admitting more than 350 people with stroke (N=25).
- There was large variability in thrombolysis rates across states and hospitals of varying stroke patient volumes and thrombolysis rates appeared lower in private hospitals.

Table 6. Access to onsite endovascular services per state

| | Australia (N=108) | ACT (N=2) | NSW (N=43) | QLD (N=25) | SA (N=6) | TAS (N=3) | VIC (N=27) | WA (N=11) |
|---|----------------------|--------------|---------------|---------------|-------------|--------------|---------------|--------------|
| Hospitals with onsite endovascular services n (%) | 19 (18) | 1 (50) | 5 (12) | 4 (16) | 1 (17) | 1 (33) | 5 (19) | 2 (18) |
| 24/7 Access n (%) | 11 (10) | 0 (0) | 2 (5) | 3 (12) | 1 (17) | 1 (33) | 4 (15) | 0 (0) |

Table 7. Annual thrombolysis numbers by hospital volume (Organisational Survey)

| | Australia (all hospitals) | Hospitals admitting 50–74 strokes | Hospitals admitting 75–199 strokes | Hospitals admitting 200–349 strokes | Hospitals admitting 350–499 strokes | Hospitals admitting 500+ strokes |
|--|------------------------------|---|--|---|---|--|
| Median number of patients receiving thrombolysis in the last year from 82 hospitals offering thrombolysis n, (IQR) | 14 (8–32) | 3 (1–6) | 8 (4–12) | 14 (10–20) | 43 (31–50) | 52 (33–73) |

All hospitals offering thrombolysis reported providing this to at least one patient although nine sites reported thrombolysing only one or two patients during the last year. Thrombolysis rates reported based on all reported stroke admissions in private hospitals offering thrombolysis was 3.9% (48 out of 1,246 patients) with the majority of hospitals (four out of six) admitting between 200–349 stroke patients each year with a median of 5 patients in the last 12 months (IQR 3–11).

The Framework is based on a recommendation that all patients with expected stroke should be transported to a hospital with a stroke unit. Stroke units are not recommended for small sites, where numbers are insufficient to justify dedicated resources or ensure appropriate skill. Instead, these smaller hospital services need to have appropriate systems in place to rapidly screen but then transfer stroke patients to the nearest dedicated stroke service where access to hyperacute and stroke unit services are available.

Hospital services that admit low stroke patient volumes each year were asked if there were established protocols for ED assessment and transfer of suspected stroke patients. Of the 77 hospitals admitting less than 50 patients a year, 54 (70%) of them had ED protocols for rapid triage of stroke patients and 59 (77%) of them had ED transfer protocols. This included sites reporting an agreement to bypass their hospital for another stroke specific service.

4.2.3 Organised stroke services

Organisation of acute stroke services with dedicated personnel and processes is fundamental to maximise patient outcomes. Stroke unit care is the cornerstone of stroke management and is characterised by provision of care in one location or ward and a multidisciplinary team (medical, nursing and allied

health) with expertise in stroke care who meet regularly to plan patient care and develop expert knowledge by ongoing professional development specific to stroke. Table 8 outlines aspects of organised services, including the reported presence of a stroke unit.

Table 8. Reported adherence of hospitals to recommended organised services by hospital volume

| | Australia (all hospitals) (N=108) | Hospitals admitting 50–74 strokes (N=16) | Hospitals admitting 75–199 strokes (N=38) | Hospitals admitting 200–349 strokes (N=29) | Hospitals admitting 350–499 strokes (N=8) | Hospitals admitting 500+ strokes (N=17) |
|---|---|---|--|---|--|--|
| Element of service – organised stroke services | n (%) | n (%) | n (%) | n (%) | n (%) | n (%) |
| Stroke unit | 87 (81) | 5 (31) | 30 (79) | 28 (97) | 8 (100) | 17 (100) |
| Acute stroke team | 96 (89) | 10 (63) | 34 (89) | 27 (93) | 8 (100) | 17 (100) |
| Routine use of guidelines, care plans and protocols | 45 (42) | 4 (25) | 16 (42) | 14 (48) | 6 (75) | 5 (29) |
| Dedicated stroke coordinator position | 59 (55) | 7 (44) | 24 (63) | 16 (55) | 4 (50) | 8 (47) |
| Dedicated medical lead | 74 (69) | 4 (25) | 21 (55) | 24 (83) | 8 (100) | 17 (100) |
| Access to HDU / ICU (for complex patients) | 103 (95) | 13 (81) | 36 (95) | 29 (100) | 8 (100) | 17 (100) |
| Access and collaboration with other specialist services (cardiology, palliative care, vascular) | 71 (66) | 7 (44) | 16 (42) | 23 (79) | 8 (100) | 17 (100) |

Nine hospitals admitting over 75 stroke patients per year did not report having a stroke unit: two of these admitted 75-100 stroke patients and six admitted between 100-199 stroke patients. One hospital with over 200 stroke patients reported not having a stroke unit.

Of the 87 sites reporting the presence of a stroke unit 14 sites did not fulfil all of the minimum stroke unit requirements. Six of these sites did not have access to stroke specific education and all 14 sites did not have

a dedicated medical lead as part of the specialised multidisciplinary team. The majority of these units (nine of the 17) were in smaller hospitals (admitting less than 200 stroke patients) and five were in larger centres (admitting more than 200 stroke patients per annum).

On the day of survey 187 stroke patients (32%) in stroke unit hospitals were not on the unit despite the availability of 257 stroke beds.

Table 9. Stroke unit (SU) size and capacity by state and hospital volume for hospitals completing the long form (N=118)

| Location | On day of survey | | | | | |
|--------------------|------------------------|---|---------------------------------------|------------------------------------|---|---|
| | Stroke unit beds total | Dedicated beds per SU hospital median (IQR) | Patients with stroke in all hospitals | Patient to bed ratio all hospitals | Patients with stroke in hospitals with a SU | Patient to bed ratio in hospitals with a SU |
| ACT | 8 | 4 | 21 | 2.63 | 21 | 2.63 |
| NSW | 175 | 4 (4-6) | 196 | 1.12 | 185 | 1.06 |
| QLD | 155 | 4 (4-10) | 118 | 0.76 | 112 | 0.72 |
| SA | 60 | 17 (9-20) | 59 | 0.98 | 56 | 0.93 |
| TAS | 19 | 10 | 12 | 0.63 | 9 | 0.47 |
| VIC | 189 | 5 (3-14) | 146 | 0.77 | 139 | 0.74 |
| WA | 42 | 6 (6-12) | 65 | 1.55 | 56 | 1.33 |
| 50-74 admissions | 19 | 4 (3-8) | 17 | 0.89 | 8 | 0.42 |
| 75-199 admissions | 145 | 4 (4-5) | 140 | 0.97 | 115 | 0.79 |
| 200-349 admissions | 188 | 4 (4-9) | 177 | 0.94 | 174 | 0.93 |
| 350-499 admissions | 50 | 6 (4-8) | 67 | 1.34 | 67 | 1.34 |
| 500+ admissions | 226 | 14 (8-18) | 197 | 0.87 | 197 | 0.87 |
| Australia | 648 | 4 (4-9) | 625 | 0.96 | 578 | 0.89 |

Stroke unit capacity at a single point in time was established by analysing the number of stroke patients in hospital on the day of survey compared with the number of dedicated stroke unit beds across the state (all hospitals) and in stroke unit hospitals (Table 8). This demonstrated there was variability in the availability of dedicated stroke unit beds to manage stroke patients. Capacity was particularly low in Western Australia and in hospitals with 200–349 admissions. Capacity was high in the Australian Capital Territory.

Stroke coordinators were only present in 50 (57%) of the 87 stroke units.

Routine admission directly to a stroke unit from the emergency department was reported in only 67 sites (62%) with general medical ward (19%), medical assessment unit (7%) and neurology ward (7%) the next commonly reported wards.

4.2.4 Rehabilitation, quality improvement, regional support and transient ischemic attack (TIA) services

Acute services must coordinate with rehabilitation services to facilitate seamless transfer of care for people with stroke. Acute services should also ensure there are services that allow rapid assessment and management for people with suspected TIA along with a commitment to monitor and improve the quality of care provided. Acute services may also have links to regional or 'spoke' sites to support acute clinical care and provide education to non-specialist staff. Table 10 outlines aspects of these aspects of acute care.

Key findings:

- More than a quarter of the smaller sites (less than 50 stroke admissions per year and no stroke unit) did not have protocols in place to ensure rapid transfer of stroke patients to a larger site or bypass protocols.
- There were 87 stroke units in Australia with a median size of four beds. However, 14 of these did not meet minimum criteria for a stroke unit largely because of the absence of a dedicated medical lead or because the stroke team could not access stroke specific education.
- Nine hospitals admitting over 75 patients per annum (of which seven admitted over 100 stroke patients per year) did not have a stroke unit.
- Stroke unit size (number of beds) did not increase with increasing number of stroke admissions with similar stroke unit sizes in hospitals admitting less than 200 strokes to those admitting 200–349 stroke patients per annum.
- Stroke patients were denied access to a stroke unit despite the availability of stroke unit beds. On the day of the survey, 187 (32%) of the 578 stroke patients in hospitals with a stroke unit were not on the stroke unit despite the availability of 257 stroke beds.
- Stroke unit capacity varied. The number of patients exceeded the number of available beds in some parts of the country and in hospitals admitting 350–499 patients per annum but the number of beds was equal to or greater than the number of stroke patients in many other sites on the day of survey.
- Only around half (55%) of hospitals had a dedicated stroke coordinator position and almost one-third (31%) did not have a dedicated medical lead for stroke. Fewer small centres (admitting less than 200 strokes) had a medical lead than the larger centres.
- Most hospitals (98%) reported routinely involving carers in the rehabilitation process although one-quarter of sites (23%) did not routinely undertake early assessment for rehabilitation needs and goals.

Table 10. Reported adherence to recommended rehabilitation services, data and quality, telehealth and TIA services within hospitals (N=108) by hospital volume

| | Australia (all hospitals) (N=108) | Hospitals admitting 50-74 strokes (N=16) | Hospitals admitting 75-199 strokes (N=38) | Hospitals admitting 200-349 strokes (N=29) | Hospitals admitting 350-499 strokes (N=8) | Hospitals admitting 500+ strokes (N=17) |
|---|--|--|---|--|---|---|
| Element of service – rehabilitation | n (%) | n (%) | n (%) | n (%) | n (%) | n (%) |
| Coordination with rehabilitation service providers (this should include a standardised process and/or a health professional to assess suitability for further rehabilitation) | 94 (87) | 13 (81) | 34 (89) | 26 (90) | 7 (88) | 14 (82) |
| Early assessment using standardised tools to determine individual rehabilitation needs and goals (ideally within 24–48 hours). There should also be standardised processes ensuring ALL stroke patients are assessed for rehabilitation | 83 (77) | 11 (69) | 27 (71) | 25 (86) | 6 (75) | 14 (82) |
| Routine involvement of carers in the rehabilitation process | 106 (98) | 15 (94) | 38 (100) | 28 (97) | 8 (100) | 17 (100) |
| Element of service – data and quality improvement | n (%) | n (%) | n (%) | n (%) | n (%) | n (%) |
| Regular data collection and stroke specific quality improvement activities | 87 (81) | 10 (63) | 30 (79) | 26 (90) | 6 (75) | 15 (88) |
| Element of service – telehealth and regional responsibility | n (%) | n (%) | n (%) | n (%) | n (%) | n (%) |
| Provision of telehealth services for acute assessment and treatment | 45 (42) | 8 (50) | 15 (39) | 11 (38) | 4 (50) | 7 (41) |
| Regional responsibility (e.g. coordination across a local health district) | 55 (51) | 5 (31) | 15 (39) | 13 (44) | 6 (75) | 16 (94) |
| Element of service – TIA services | n (%) | n (%) | n (%) | n (%) | n (%) | n (%) |
| Rapid (within 48 hours) TIA assessment clinics/services | 41 (38) | 3 (5) | 10 (26) | 12 (41) | 5 (63) | 11 (59) |

There were 55 sites reporting they had regional responsibility for stroke treatment. However, medical leads were absent in 12 of these sites (22%) and stroke coordinators were absent in 19 (35%). Four of the sites reporting they had regional responsibility did not have stroke units. Three of these four hospitals were

smaller sites (admitting less than 100 stroke patients per annum) and one other site admitted more than 200 stroke patients per annum.

Only 47 of 108 hospitals (44%) reported routinely providing a discharge care plan.

Chapter 5

Results of the Clinical Audit

Adherence against national stroke performance indicators.

The Standard, released in June 2015 by ACSQHC, outlines 19 suggested process indicators covering seven quality statements in stroke treatment. While many of the indicators are based on existing national performance indicators for stroke, this report provides, for the first time, all indicators, except for assessment by ambulance services. This section of the report describes the baseline of performance against the Standard's indicators as the timing of patient care in this Audit precedes the launch of the Standard.

Key findings

- Early assessment, starting with screening using a validated screen in the ED, was poor with only just over one-third (38%) of patients screened.
- One-third of people arriving by ambulance were not transported to hospitals offering thrombolysis and only 24% of ischaemic stroke patients arriving within 4.5 hours of their stroke received thrombolysis. Just over one-quarter of those who received thrombolysis were treated within 60 minutes of arrival to hospital.
- Whilst 67% of patients nationally received stroke unit care, only 39% of stroke patients nationally spent at least 90% of their time on a stroke unit.
- Early assessment by a physiotherapist was achieved in 68% of cases. Other measures monitoring early rehabilitation appear encouraging (87% of patients reported to have started rehabilitation during the acute admission).
- Secondary prevention measures were relatively poor – one-third of patients with ischemic stroke and more than one-third of patients with atrial fibrillation were not discharged on recommended secondary prevention medication.
- Provision of risk factor modification advice (56%) and care plans (56%) were poor nationally and across all states.
- Quality of care varied by state. Whilst there appeared to be differences in the quality of care in hospitals of differing sizes, this appeared to be related to whether or not a stroke unit was present in the small to medium hospitals.
- Hospitals with stroke units delivered similar quality of care regardless of size.

5.1 Characteristics of patients in the Clinical Audit

Table 11. Patient demographics

| Demographic | Australia (N=4087) n (%) |
|--|--------------------------------|
| Male | 2244 (55) |
| Median age (Q1, Q3)* | 76 (65-84) |
| Patients identifying as Aboriginal and/or Torres Strait Islander background [^] | 109 (3) |
| Non-English speaking background with requirement for interpreter | 238 (6) |
| Ischaemic stroke | 3213 (79) |
| Intracerebral haemorrhage | 550 (14) |
| Unknown stroke type | 324 (8) |
| Independence prior to admission (mRS 0-2) | 3274 (80) |
| Independence within 72 hours of admission (mRS 0-2) | 1443 (35) |
| In-hospital stroke | 151 (4) |

*Q1, Q3 - first quartile, third quartile

[^] % excludes not stated/inadequately described

5.2 National Performance on the ACSQHC Acute Stroke Clinical Care Standard indicators

Seventeen of the 19 national indicators were reported in Figure 2. One indicator (assessed by ambulance services) is not able to be reported through the National Stroke Audit. The median time from onset of symptoms to thrombolysis was two hours 50 mins (IQR 2:03-3:39).

Figure 2. Performance against ACSQHC Acute Stroke Clinical Care Standard indicators

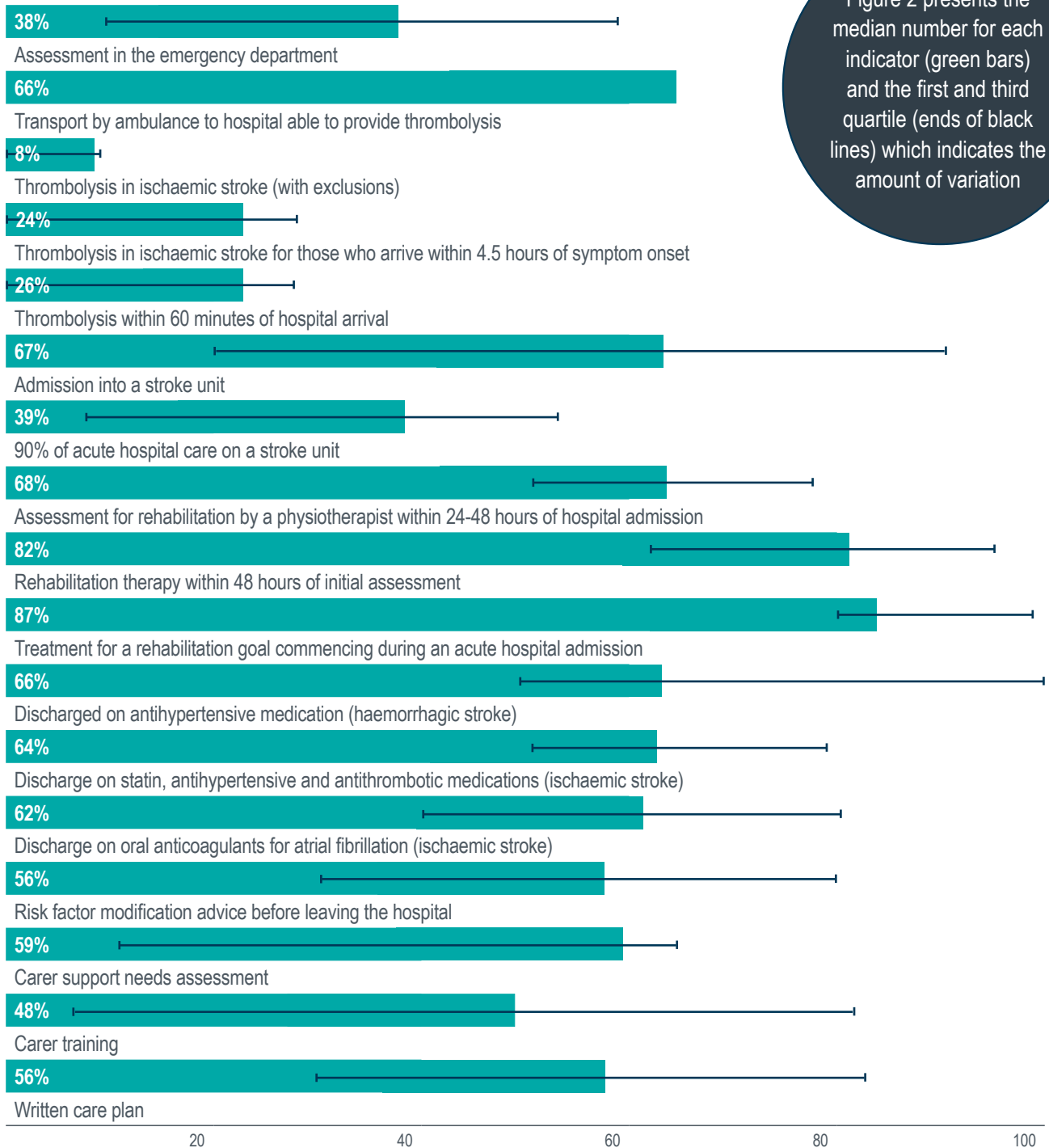


Figure 2 presents the median number for each indicator (green bars) and the first and third quartile (ends of black lines) which indicates the amount of variation

Whilst most patients (82%) received rehabilitation within 48 hours of arrival only 50% of patients had a documented assessment for ongoing need for rehabilitation.

There is a high degree of variation across states and hospitals with varying volume of admissions (Table 12).

Table 12. Performance by state on selected ACSQHC Acute Stroke Clinical Care Standard indicators

| | Australia n (%) | ACT n (%) | NSW n (%) | QLD n (%) | SA n (%) | TAS n (%) | VIC n (%) | WA n (%) |
|--|--------------------|--------------|--------------|--------------|-------------|--------------|--------------|-------------|
| Assessment in the emergency department | 1294 (38) | 20 (35) | 467 (41) | 242 (34) | 85 (53) | 25 (25) | 391 (44) | 64 (19) |
| Thrombolysis in ischaemic stroke patients | 231 (8) | 4 (7) | 70 (7) | 31 (5) | 24 (20) | 5 (5) | 83 (11) | 14 (6) |
| Thrombolysis in ischaemic stroke patients who arrive within 4.5 hours of symptom onset | 198 (24) | 3 (30) | 63 (26) | 29 (14) | 24 (57) | 4 (12) | 71 (32) | 6 (7) |
| Thrombolysis within 60 minutes of hospital arrival | 59 (26) | 1 (25) | 12 (17) | 5 (16) | 9 (38) | 1 (20) | 27 (33) | 4 (29) |
| Admission into a stroke unit | 2724 (67) | 70 (88) | 904 (65) | 655 (77) | 148 (82) | 72 (60) | 703 (66) | 172 (44) |
| 90% of acute hospital care on a stroke unit | 1579 (39) | 28 (35) | 480 (35) | 366 (43) | 99 (55) | 28 (23) | 461 (43) | 117 (30) |
| Assessment for rehabilitation by a physiotherapist within 24–48 hours of hospital admission# | 2761 (68) | 60 (75) | 925 (67) | 608 (72) | 102 (56) | 80 (67) | 730 (69) | 251 (64) |
| Discharged on antihypertensive medication (haemorrhagic stroke) | 137 (66) | 4 (100) | 44 (65) | 32 (70) | 6 (67) | 4 (50) | 29 (62) | 17 (71) |
| Discharge on statin, antihypertensive and antithrombotic medications (ischaemic stroke) | 1120 (64) | 29 (73) | 380 (60) | 234 (66) | 64 (78) | 33 (61) | 270 (66) | 104 (62) |
| Risk factor modification advice before leaving the hospital | 1273 (56) | 27 (57) | 419 (51) | 320 (69) | 61 (61) | 32 (48) | 273 (54) | 136 (53) |
| Carer support needs assessment | 271 (59) | 3 (60) | 90 (60) | 65 (72) | 5 (33) | 4 (50) | 76 (57) | 27 (50) |
| Written care plan | 1486 (56) | 29 (55) | 568 (60) | 344 (65) | 51 (41) | 19 (22) | 345 (57) | 124 (43) |

Reported as <48hrs. Full details including denominators for each indicator can be downloaded at: www.strokefoundation.com.au/what-we-do/treatment-programs/stroke-data-collection

Table 13. Performance by hospital volume on selected ACSQHC Acute Stroke Clinical Care Standard indicators

| | Australia n (%) | <74 n (%) | 75-199 n (%) | 200-349 n (%) | 350-499 n (%) | 500+ n (%) |
|--|--------------------|--------------|-----------------|------------------|------------------|---------------|
| Assessment in the emergency department | 1294 (38) | 149 (32) | 318 (30) | 419 (46) | 75 (27) | 333 (49) |
| Thrombolysis in ischaemic stroke patients | 231 (8) | 20 (5) | 42 (5) | 48 (6) | 30 (13) | 91 (17) |
| Thrombolysis in ischaemic stroke patients who arrive within 4.5 hours of symptom onset | 198 (24) | 10 (9) | 37 (16) | 43 (19) | 27 (37) | 81 (46) |
| Thrombolysis within 60 minutes of hospital arrival | 59 (26) | 3 (15) | 8 (19) | 7 (15) | 7 (23) | 34 (37) |
| Admission into a stroke unit | 2724 (67) | 147 (25) | 812 (62) | 857 (81) | 241 (73) | 667 (83) |
| 90% of acute hospital care on a stroke unit | 1548 (38) | 104 (18) | 516 (40) | 421 (40) | 126 (38) | 412 (51) |
| Assessment for rehabilitation by a physiotherapist within 24–48 hours of hospital admission# | 2761 (68) | 352 (60) | 914 (70) | 742 (70) | 215 (65) | 538 (67) |
| Discharged on antihypertensive medication (haemorrhagic stroke) | 137 (66) | 26 (63) | 37 (74) | 43 (65) | 8 (73) | 23 (59) |
| Discharge on statin, antihypertensive and antithrombotic medications (ischaemic stroke) | 1120 (64) | 163 (67) | 340 (67) | 318 (61) | 90 (67) | 209 (61) |
| Risk factor modification advice before leaving the hospital | 1273 (56) | 167 (47) | 383 (56) | 410 (64) | 83 (50) | 230 (54) |
| Carer support needs assessment | 271 (59) | 53 (55) | 76 (56) | 78 (74) | 23 (68) | 41 (47) |
| Written care plan | 1486 (56) | 223 (57) | 466 (58) | 367 (51) | 131 (65) | 299 (59) |

Reported as <48hrs. Full details including denominators for each indicator can be downloaded at: www.strokefoundation.com.au/what-we-do/treatment-programs/stroke-data-collection

Table 14. Performance by hospital volume (stroke unit hospitals only) on selected ACSQHC Acute Stroke Clinical Care Standard indicators

| | <74 n (%) | 75-199 n (%) | 200-349 n (%) | 350-499 n (%) | 500+ n (%) |
|--|--------------|-----------------|------------------|------------------|---------------|
| Assessment in the emergency department | 84 (50) | 301 (35) | 401 (45) | 75 (27) | 333 (49) |
| Thrombolysis in ischaemic stroke | 16 (11) | 36 (5) | 48 (6) | 30 (13) | 91 (17) |
| Admission into a stroke unit | 147 (72) | 812 (79) | 857 (84) | 241 (73) | 667 (83) |
| 90% of acute hospital care on a stroke unit | 95 (47) | 494 (48) | 421 (41) | 126 (38) | 412 (51) |
| Assessment for rehabilitation by a physiotherapist within 24–48 hours of hospital admission# | 141 (69) | 749 (73) | 721 (71) | 215 (65) | 538 (67) |
| Discharge on statin, antihypertensive and antithrombotic medications (ischaemic stroke) | 69 (73) | 288 (66) | 313 (61) | 90 (67) | 209 (61) |
| Written care plan | 90 (76) | 419 (63) | 355 (50) | 131 (65) | 299 (59) |

Reported as <48hrs

Analysis was undertaken to explore performance on a subset of the indicators relating to the Standard for stroke unit hospitals to understand if there were differences in stroke unit hospitals of varying volumes (Table 14). The results demonstrated stroke unit hospitals of varying sizes appeared to deliver a similar quality of care. However, hospitals admitting 350–499 stroke patients per annum had lower stroke unit access and fewer patients spending at least 90% of their time on the stroke unit compared with other large hospitals (more than 200 stroke admissions per year). They also had fewer patients screened for stroke in the emergency department.

Comparisons between stroke unit and non-stroke unit hospitals admitting less than 200 stroke patients per year identified improvements in the quality of care when a stroke unit was present. Stroke unit hospitals provided assessments in the emergency department to a larger proportion of patients (37% compared with 16%), had higher thrombolysis rates (6% compared with 2%) and discharged a greater proportion of ischaemic stroke patients on appropriate secondary prevention (67% compared with 55%). They also had a greater proportion of patients assessed within 48 hours by a physiotherapist (72% compared with 58%) and more provided with a written care plan (65% compared with 43%).

Chapter 6

Changes over time (Clinical Audit data)

Changes in key performance indicators over time provide a useful comparator to assess changes in clinical practice. While some indicators appear to have improved, such as access to stroke unit care, others remain unchanged, such as thrombolysis and some have even dropped further, such as carer training.

Table 15. Comparison of adherence to national indicators of care since 2009 (Clinical Audit data)

| Recommended care | 2009 (%) | 2011 (%) | 2013 (%) | 2015 (%) |
|--|----------|----------|----------|----------|
| Received stroke unit care (all hospitals) | 49 | 59 | 58 | 67 |
| Swallow screened or assessed before food or drink, or oral medication | 52 | 57 | 52 | 48 |
| Received intravenous thrombolysis (all ischaemic stroke with no exclusions)* | 3 | 7 | 7 | 7 |
| Door to needle time for those who received intravenous thrombolysis within 4.5 hours of stroke onset (median, minutes) | 85 | 80 | 85 | 78 |
| Assessed by physiotherapy within 48 hours | 60 | 65 | 69 | 68 |
| Discharged on antihypertensives (all stroke) | 77 | 81 | 77 | 75 |
| Antithrombotics on discharge (if ischaemic stroke) | 95 | 97 | 95 | 95 |
| Received behaviour change education | 43 | 47 | 46 | 56 |
| Received carer training | 50 | 44 | 37 | 48 |
| Care plan provided | 53 | 51 | 50 | 56 |

*A different indicator to that reported for the ACSQHC tPA Indicator where a number of exclusions are applied

Chapter 7

Discussion and recommendations

Characteristics of participating hospitals and audited cases

Important changes to the methods used in the National Stroke Audit occurred in 2015 with the use of a short and long form of the Organisational Survey. Overall slightly more sites participated this year (N=185) than the last audit in 2013 (N=177) with similar numbers of medium to large sites (N=108 in 2015; N=112 in 2013). Therefore, while the completion rates in smaller sites was low the results are comparable to previous years. Participation rates remained very strong in larger sites (90%) for the Organisational Survey and Clinical Audit with the largest number of stroke patient cases ever audited (N=4087). Characteristics of patients in this Audit remained consistent from previous years.

Organisation of stroke services: hyperacute services

It is widely recognised stroke units provide a superior standard of care to all patients with stroke. The benefits of thrombolysis for ischaemic stroke patients presenting within 4.5 hours has also been recognised. Efforts to improve stroke outcomes have, therefore, focussed on improving stroke unit access and thrombolysis rates. In 2015 large clinical trials demonstrated the effectiveness of endovascular interventions for stroke, which have significant implications for the organisation of stroke services in Australia.

In 2015, the Framework was updated to reflect the systems changes required to facilitate access to new treatments. It proposed comprehensive stroke services (CSS) be established in each jurisdiction and these be strategically placed to ensure optimal access for as many patients as possible. The Audit has demonstrated only one hospital in Australia meets all criteria of a CSS.

The main differentiating criteria between a primary stroke service (PSS) and CSS is the provision of 24/7 hyperacute treatments (endovascular and thrombolysis services). While 19 of the larger hospitals reported the availability of endovascular services it was not available 24/7 in just under half of these hospitals and not at all in some states. Whether or not these centres are in hospitals that will ensure greater access to the most patients and, therefore, warrant upgrading to deliver comprehensive stroke services is unknown.

Systems to support diagnosis and transfer for hyperacute therapies were largely available where needed. Access to advanced imaging needed to detect large vessel clots which may be amenable to endovascular therapy (CT angiography) was high (88% of sites admitting more than 50 patients per annum) and the majority of smaller sites reported protocols for rapid assessment and transfers for people with suspected stroke.

The number of hospitals actively providing thrombolysis remained steady (79 in 2013 and 82 in 2015) but the Clinical Audit demonstrated there was no improvement in the national thrombolysis rate. Door to needle times were poor in Australia compared to international benchmarks. The median time in Australia was 78 minutes (27% within 60 minutes of arrival) compared with America⁸ where the median is 67 minutes (43% within 60 minutes of arrival) and the UK⁹ with a median of 56 minutes (56% within 60 minutes of arrival). A reduction in door to needle times has been demonstrated as possible in Australian hospitals with times of less than 30 minutes reported in some sites.¹⁰

The Clinical Audit demonstrated variability in the effectiveness of thrombolysis services in smaller hospitals and in private hospitals where relatively few patients were thrombolysed. As well as having lower

thrombolysis rates smaller hospitals were likely to have fewer key elements of the Framework such as a stroke unit, routine use guidelines, care plans and protocols, or a dedicated stroke coordinator position.

Smaller hospitals also appeared to deliver recommended care to fewer patients with only 25% admitted to a stroke unit and 5% receiving thrombolysis (compared with 83% and 17% respectively in the largest centres). However, analysis demonstrated that poorer performance in smaller hospitals was driven largely by non-stroke unit hospitals which delivered care prescribed in the Standard to fewer patients than similar sized hospitals with stroke units. Small hospitals with stroke units performed similarly to the larger stroke unit hospitals and in fact provided more patients with care plans (65% compared with 59%).

Organisation of stroke services: stroke units

Stroke unit access appeared to be improving with only one-third of patients currently missing out on stroke unit care. This varied considerably between states with significant improvements in Queensland (49% in 2013 increased to 77% in 2015) and South Australia (43% in 2013 increased to 82% in 2015)¹¹ likely to underpin the improvement in national access.

The Organisational Survey provides important data around stroke unit size which may be influencing stroke unit access and, while it reports admissions only on the day of survey, it is an important snapshot of stroke unit capacity. It demonstrated there had been growth in the number of stroke units and an increase in the number of stroke unit beds across Australia from 429 in 2007 to 648 in 2015. Nationally there were more stroke unit beds than stroke patients suggesting access to

a stroke unit bed should be possible for all patients. However, the Clinical Audit demonstrated this was not the case with one-third of stroke patients denied access. There were several factors thought to be contributing to this outcome.

In some areas there were sufficient stroke beds but stroke patients were not accessing these beds and receive care in other parts of the hospital. Better bed management is needed to ensure beds on the stroke unit are made available to stroke patients and this may be facilitated by a stroke coordinator (missing from over half of stroke unit hospitals).

Secondly, some hospitals admitting stroke patients did not provide stroke unit care. While this was the case more often for small sites admitting less than 75 patients per annum, nine hospitals admitting more than 75 patients per annum (of which seven admitted over 100 stroke patients per year) did not have a stroke unit. Establishing stroke units in larger hospitals and processes to bypass small non-stroke unit hospitals where the quality of care is poorer than stroke unit hospitals, may address this contributing factor.

Lastly, stroke unit capacity appeared to be limiting access in some areas. This was particularly evident in Western Australia and among hospitals with 350-499 stroke admissions per annum. Excluding hospitals with the highest stroke patient volume, the size of stroke units did not increase relative to the number of stroke admissions per annum, reinforcing the theory that units may be too small in some hospitals — particularly in those admitting between 350 and 499 stroke patients. Increasing the capacity of units in these sites, either through resource re-allocation (moving beds from those areas with an oversupply to those with an undersupply) or additional stroke unit beds, may assist in increasing stroke unit access.

Difficulty accessing stroke units is also manifesting as a problem when we look at the proportion of patients spending most of their time on the stroke unit. In the United Kingdom where there has been a considerable focus on consolidating stroke services and using data to drive improved care, 83% of patients spend at least 90% of their time on the unit⁹ compared with 39% in Australia. The proportion of patients spending at least 90% of their time on the unit has not changed since the last audit in 2013. More work needs to be done to increase access to stroke units and to ensure stroke patients spend the majority of their hospitalisation on a unit to ensure they receive the best possible care.

The Organisational Survey also highlights many of the stroke units in Australia did not meet stroke unit minimum criteria, mainly due to the absence of a dedicated medical lead and, therefore, an incomplete specialised multidisciplinary team. The factors contributing to the absence of a medical lead, whether these sites were supported by a specialist medical lead from a larger centre, and the consequences of this in relation to quality of care was not explored in this report. This aspect of stroke unit care in Australia warrants further investigation.

Regional responsibilities and telehealth

Half of all hospitals reported they had regional responsibility for stroke service coordination (e.g. across a local health district or through the provision of support to local, smaller centres). While the exact nature of the regional responsibility was not reported, the level of specialisation in these centres was concerning. Almost one-quarter (22%) did not have a dedicated medical lead and four of the sites reporting regional responsibility (mostly the smaller centres) did

not have a stroke unit. Five of the regionally responsible sites were in small hospitals, admitting only 50–74 stroke patients per year.

The nature of responsibility in centres reporting regional responsibility was not provided. Just under half of all sites reported the use of telehealth services for acute assessment and treatment and it is likely it was used to provide assistance by the larger sites and to receive assistance in the smaller sites. The impact of telehealth support (provided and received) on the quality of care, particularly in smaller centres, would provide valuable information to assist in the improvement of stroke care to regional patients.

Rehabilitation

Early rehabilitation and appropriate assessment of ongoing rehabilitation needs is a critical component of best practice stroke care. Most hospitals (87%) have coordination with rehabilitation service providers and reported, in the Organisational Survey, they routinely did early assessment of rehabilitation needs using standardised tools. However, only half of all patients had a documented assessment of the need for ongoing rehabilitation demonstrating a significant gap in planning processes for ongoing care. Without documentation of the assessment and its outcome it is impossible to determine whether patients are receiving the ongoing rehabilitation they need, a problem consistently reported by stroke survivors.

Only two in three of all eligible stroke patients had been assessed by a physiotherapist early after stroke (within 48 hours) and, as noted above, several hospitals, including three large sites admitting 500 or more patients a year, did not routinely provide early assessment of rehabilitation needs. It is, therefore, surprising nearly all patients (87%) had started

rehabilitation within 48 hours. The way in which this indicator and the indicator describing rehabilitation within the acute setting are interpreted and reported requires further examination to ensure accurate monitoring of the availability of rehabilitation in the early stages of stroke.

Care planning

Stroke survivors and their families report the transition home after stroke is a crucial time in their recovery and comprehensive planning to facilitate their return to the community is critical. Despite this, and although a readily-available stroke-specific care plan has been developed by the Australian Stroke Coalition, the provision and negotiation of a routine care plan for stroke patients is still unacceptably low. The proportion of hospitals routinely providing a care plan for patients has dropped from a high of 60% in 2011 to 44% in 2015. While the Clinical Audit demonstrated a slight increase in the proportion of patients receiving a care plan only just over half of patients discharged to the community went home with a written care plan. Given the complexity of stroke needs upon discharge care plans provide an essential service and are recommended for all patients in the *Clinical Guidelines for Stroke Management 2010*.

The poor provision of care plans may be linked to the limited availability of stroke care coordinators in hospitals providing stroke care. This role is recommended in the *Acute Stroke Services Framework 2015* for all stroke services and is critical in coordinating care, facilitating patient involvement within that care, assisting in discharge planning and providing support for data collection and quality improvement activities.

Secondary prevention

Aspects of care planning address education on secondary prevention and we can see from the clinical indicator results this was also poor with less than half of patients receiving risk factor modification advice before leaving hospital. One-third of ischaemic stroke patients and one-quarter of haemorrhagic stroke patients did not receive recommended secondary prevention medications. Given the high rates of recurrent stroke and the proven effects of secondary prevention strategies in reducing recurrent stroke risk, these gaps in care have significant implications for both the individual and the health system. Review of systems and processes (including the role of a stroke coordinator in providing education before discharge) is warranted.

TIA management and services

Despite recent recommendations within the Framework around services and systems for TIA management, at the time of the survey, just 41% of hospitals across Australia provided services or clinics for the assessment of TIAs within 48 hours. Early assessment and management of TIA is required given the high rate of stroke occurring shortly after TIA. While we have no data to demonstrate the low number of services and clinics is translating into poor management of patients with possible TIA (as TIA services may also sit in primary care), better access to systems within the hospital services is required to manage and respond to patients presenting with TIA according to best practice guidelines.

Limitations of the data

The 2015 National Stroke Audit provides an excellent cross-sectional overview of stroke services in Australia. However, the data must be interpreted with caution. Participation in the National Stroke Audit is voluntary. The survey data was self-reported and may be subject to reporting bias or misinterpretation of the question. Furthermore, the accuracy of the responses may be dependent on the respondent's knowledge of their hospital's stroke services.

As noted previously the data from the Organisational Survey was reported against each element of the Framework. However, elements were not weighted according to their importance or contribution to high quality stroke care. Work to consider how these elements might be weighted would add value to the ongoing interpretation of this data and provide an improved picture of the nature of stroke services in Australia.

This year the focus during the Organisational Survey was on hospitals admitting over 50 stroke patients per annum. While similar numbers of small, medium and larger hospitals participated in this Audit as in previous years, the short form of the Organisational Survey used in the smaller sites did not ask how many patients were in the hospital on the day of survey. Therefore, these hospitals were excluded from stroke unit capacity calculations among all hospitals reported in Table 8. It is also important to note stroke unit hospitals were over-represented in the sample as many of the smaller hospitals (admitting <50 strokes per year) did not participate.

The Audit data is collected once every two years and although the patient cohort sample size was over 10% of all admitted patients it was relatively small in some

larger hospitals. Application of exclusion criteria and missing data also reduced the sample size for indicator level analysis. Audit and feedback is a key driver of clinical behaviour change and having representative data will strengthen its effect. Larger samples and/or more frequent monitoring of the key indicators in the Standard would provide an improved picture of the quality of stroke care in Australian hospitals. However, the value of data to improve quality of care must be balanced with the time required to collect and report on it. The launch of the AuSDaT provides a mechanism for more frequent audits. Using the AuSDaT and taking a modular approach to data collection (allowing snapshots of the Standard indicators rather than the full Audit) would facilitate this.

The data from the Clinical Audit has not been subject to detailed statistical analysis and there are many opportunities to further test hypotheses about how elements of stroke care may impact on quality. In 2016, the National Stroke Foundation will release 'highlight' reports exploring key clinical questions in more detail to further understand what could drive improved quality of stroke care in Australian hospitals.

Conclusion and recommendations

The results of the 2015 National Stroke Audit represent the first time the new Framework (incorporating endovascular services) and the ACSQHC Standard have been reported against.

The results demonstrate minor improvements on many aspects of best practice stroke care with small shifts in some indicators such as stroke unit access and care planning. Many stroke patients continue to be denied access to stroke unit care and there remains no difference in thrombolysis rates nationally, although there are marked differences in the quality of care provided by state and by hospital volume. In light of limited improvement the National Stroke Foundation recommends the following actions:

1. Review the organisation of stroke services in each jurisdiction to ensure more patients receive care according to the Standard. This should include identifying:

- Appropriate hospital/s to ensure comprehensive stroke services are available to more stroke patients across the country.
- Mechanisms to improve stroke unit access including improved bed management processes and systems to ensure all stroke patients are admitted to a stroke unit hospital (either establishing/redistributing beds to new units or bypassing non-stroke unit centres).

2. Appoint stroke coordinators in all stroke units with a focus on:

- Ensuring all stroke patients are admitted to the stroke unit through improved bed management processes.
- Facilitating delivery of high quality care including discharge planning processes such as care planning and secondary prevention.
- Supporting the routine monitoring of stroke care.

3. Develop other multidisciplinary processes to support higher rates of care planning and secondary prevention management.

4. Drive greater improvements in the quality of stroke care by enhancing how stroke care is monitored and more regularly reporting on the seven quality statements in the Standard (e.g. reperfusion, stroke units access, early rehabilitation, etc).

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