Stroke FOUNDATION

National Stroke Audit

Rehabilitation Services Report 2018

strokefoundation.org.au

About the Stroke Foundation

The Stroke Foundation is a national charity that partners with the community to prevent, treat and beat stroke. We stand alongside stroke survivors and their families, healthcare professionals and researchers. We build community awareness and foster new thinking and innovative treatments. We support survivors on their journey to live the best possible life after stroke.

We are the voice of stroke in Australia and we work to:

- Raise awareness of the risk factors, signs of stroke and promote healthy lifestyles.
- Improve treatment for stroke to save lives and reduce disability.
- Improve life after stroke for survivors.
- Encourage and facilitate stroke research.
- Advocate for initiatives to prevent, treat and beat stroke.
- Raise funds from the community, corporate sector and government to continue our mission.

About the National Stroke Audit

The National Stroke Audit is a Stroke Foundation initiative and is part of its commitment to promote the delivery of evidence-based stroke care. The National Stroke Audit provides longitudinal data on clinical performance. The National Stroke Audit first commenced in 2007 and each alternate year the Stroke Foundation switches focus between acute stroke hospital services and inpatient rehabilitation services.

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Foreword

On behalf of the Stroke Foundation and our Clinical Council I present the National Stroke Audit Rehabilitation Service Report 2018. This biannual audit of Australian rehabilitation services has mapped stroke care in this country for a decade.

The National Stroke Audit Rehabilitation Service Report is the only report of its kind in Australia. More than 120 services participated, accounting for 92 percent of all patients who were provided with inpatient rehabilitation during 2018. The Audit is the cornerstone of our efforts to drive and support quality improvement across Australian hospitals.

Stroke strikes every nine minutes in this country (56,000 strokes annually). It attacks the human control centre – the brain – and strikes in an instant, changing the lives of the patient and their loved ones forever. There is no time to prepare for the often long, challenging and at times isolating journey of recovery ahead.

The potential for a meaningful recovery from stroke is why rehabilitation services are so important. Advancements in emergency stroke treatment, many of them led by Australian researchers, mean more people are surviving stroke. Now we must ensure survivors are supported, empowered and equipped to live well after stroke.

All stroke survivors need and deserve the opportunity to make the best recovery possible, to actively engage with the community and optimally to return to education, to work or retirement.

The message from the National Stroke Audit Rehabilitation Services 2018 is clear, we must do more and we must do better to help stroke survivors and their families live the best life possible after stroke.

This means, better supporting and resourcing our hard-working health professionals to deliver world-class stroke care in line with best practice clinical guidelines. Our rehabilitation system is designed to focus on the physical aspects of recovery. We recognise that learning to walk and talk after a stroke is vitally important but recovery from stroke extends well beyond the physical impairments with survivors often experiencing a range of cognitive and psychological challenges which, if left untreated, can impair their ability to actively engage with other aspects of their rehabilitation and recovery.

We must do also better to equip survivors and their loved ones with the knowledge to prevent further strokes – currently, four in 10 survivors will go on to experience another stroke within 10 years but we know four in 10 survivors leave hospital without the necessary information to reduce their risk factors.

A decade of Audit data shows us that focus and investment can lead to improvements. This year, for the first time, four services have achieved all 10 elements of the *National Rehabilitation Stroke Services Framework 2013*. I applaud all those teams who have demonstrated consistent improvement in performance. However, the Audit also highlights enormous variability in care and narrowing the gap between the best and the worst performing hospitals must be a priority.

The 2018 Audit provides an opportunity for clinicians, healthcare administrators and governments to improve the quality of care provided, to address system-wide issues and ensure all stroke survivors are provided with the world-class care they deserve, no matter where they live. Improving the quality of stroke care will improve outcomes for Australian stroke survivors, benefiting families, communities and the health system.

This Audit is the final one to be mapped against the 2010 Clinical Guidelines for Stroke Management – since superseded by the *2017 Clinical Guidelines for Stroke Management*. Thus, this audit provides an informed baseline for future audits and service improvement against updated evidence-based best practice clinical guidelines.

Finally, I want to thank the teams at each of the 120 sites who participated in the 2018 audit for their time and for their commitment to improving stroke rehabilitation services in Australia. This is your report and we hope it will help you to continue striving to prevent, treat and beat stroke.

I commend this report and its recommendations.

Sharon McGowan
Chief Executive Officer
Stroke Foundation

At a glance

120
Stroke Rehabilitation services

9,420
Patient admissions

3,651
Case notes

National Rehabilitation Framework

For the first time
4 services achieved all
10 elements

BUT

1 in 5 services
met less than half the
Framework elements

Gaps in management

50%

of patients experienced **mood impairment** or **disturbance**

1 in 3 services

No assessment for depression and anxiety

No access to clinical or neuropsychologists

1 in 2 patients

With **urinary incontinence** had no **management plan**

Insufficient therapy

Only **51%** of services

reported delivering 2 or more hours of **active therapy daily** as per guidelines

Unprepared for life after stroke

80%

NOT given information about intimacy after stroke

41%

NOT offered assistance to return to work (for those who wanted to)

40%

NOT given basic information about stroke rehabilitation **OR** lifestyle advice to prevent another stroke

26%

of carers **NOT** offered training to cope with physical and emotional aspects of caring

Executive Summary

Rehabilitation of people with a stroke is a process aimed at enabling survivors to reach and maintain their optimal physical, sensory, intellectual, psychological and social functional wellbeing. Rehabilitation provides people who have had a stroke with the tools they need to attain independence and self-determination – the tools survivors need to live well after stroke.

The 2018 National Stroke Audit Rehabilitation Services provides a vigorous and representative assessment of inpatient rehabilitation services in Australia. The Audit highlights areas where the system is working well and reports on areas where improvements or changes are needed. It is the only report of its kind in Australia, tracking the performance of stroke care against evidence-based Clinical Guidelines and the *National Rehabilitation Stroke Services Framework 2013*. The report also highlights changes in stroke treatment and care over the past decade since the Audit began.

Clinicians, healthcare administrators and governments alike utilise the data in this report to review services and clinical care in order to improve the quality of stroke management throughout Australia. This report maps stroke care against the *Clinical Guidelines for Stroke Management 2010*, which has now been superseded by the 2017 version. Thus, providing an informed baseline for future audits against the updated evidence-based, best practice guidelines.

The Audit collected data in two parts:

- Survey of resources, processes and infrastructure completed by 120 stroke rehabilitation services.
- Retrospective audit of 3,651 case notes (from 109 services).

Public and private services participating in the Stroke Foundation 2018 National Audit Rehabilitation Services reported 9,450 stroke patient admissions in the previous 12 months.

Organisation of rehabilitation services

The 2018 Audit finds that Australian stroke survivors are continuing to be denied the quality rehabilitation care as recommended in best practice guidelines. Reflective of the acute audit results, there were significant gaps in stroke care and inequalities in services across Australia.

It is important to note there was improvement since the last audit – small improvements have been made across most areas of the Audit. Most encouraging was for the first time four services achieved all 10 elements of the National Rehabilitation Services Framework. This means they had the recommended resources and systems to deliver best practice care, including but not limited to:

- using evidence-based clinical guidelines to inform practice.
- delivery of patient care within a dedicated stroke or neuro-rehabilitation unit.
- involving patients in their goal setting and delivering written care plans.
- systems for transfer of care, and follow-up care for patients and support for carers.

In shocking contrast, 25 services (21%) met less than half of the Framework elements, meaning many services were not resourced or organised to deliver optimal care.

This is unacceptable. It is a reasonable expectation for any service delivering stroke rehabilitation to meet the requirements of the Framework.

Supporting clinicians to deliver evidence-based care

Clinicians should be supported to continually gain knowledge and skills based on the best available evidence yet only 69% of sites offered education related to stroke management. It is concerning almost one-third of services have not embedded evidence-based stroke care as outlined in the guidelines and do not have systems to monitor evidence-based adherence.

The system must also be able to support enough therapy to give patients the best opportunity to recover. Only half (51%) of sites reported routinely providing two or more hours (16% reported 3+ hours) of daily therapy with updated guidelines recommending at least two hours of active practice. One-third of services also reported they had no documented process or system to ensure patients received recommended intensity of practice.

Other areas of concern within current services included:

- Only 13 (11%) of rehabilitation services reported providing care in specific, geographically defined stroke units. On the day of the Organisational Survey, 712 patients were admitted to a rehabilitation service, yet just 87 (12%) were cared for on a dedicated stroke rehabilitation unit. Further resources dedicated to neurological rehabilitation are warranted.
- Patients individual needs were not being identified when they entered rehabilitation, particularly depression and anxiety caused by the stroke, and around one-third of services did not have a standardised and early assessment for rehabilitation or effective links with acute services.
- Two-thirds of services reported no processes for the transfer or follow-up of patients following discharge – survivors and their families were on their own, despite 66% of patients being referred on for further rehabilitation after inpatient care.

Patient-centred, best practice care

Where the Organisation Survey looks at the resources and systems needed to deliver best practice care, the Clinical Audit maps patient care provided against best-practice, recommended Clinical Guidelines.

Rehabilitation services have made great gains in moving to a more patient centred approach to care. A total of 94% of services reported involving their patients in goal setting, increased from 79% in 2012. There was also excellent access or involvement of physiotherapists, occupational therapists and speech pathologists, social workers and dieticians to assist in achieving these goals.

This indicates an emphasis on patients' physical recovery and goals centred around areas such as walking, upper limb movement, communication and daily living activities.

Recovery beyond the physical

A stroke attacks the brain, and its impact extends well beyond the physical. Mood changes, such as depression, frequently occurs following a stroke. Anxiety, emotional, personality and behavioural changes are also common, and can cause problems with community participation and in relationships with family and carers. Yet, patients' psychological wellbeing has been consistently under scrutinised since the Audit's inception.

One third of services reported no access to clinical or neuropsychologists in stroke rehabilitation. This was increasingly concerning when this Audit found around 50% of patients had some degree of mood impairment.

Assessment of mood has risen slowly from 34% in 2012 to 56% in 2018. However, the psychological needs of stroke survivors simply cannot be ignored.

Recovery is a journey

The ultimate aim of effective rehabilitation is to enable survivors to live a life of their choosing whether it be through education, returning to work, an active retirement, family or community life.

Further to above, Audit results indicated survivors were not being supported beyond their immediate needs. Indications included:

- One-in-five patients were discharged home without collaboratively developed plans for their ongoing recovery.
- 38% of patients were not being provided with tailored information to assist in their recovery. We know this information is available: 97% of services reported offering these resources but families were not receiving it.
- 41% of survivors were reported to have urinary incontinence, yet only half with identified problems had a documented management plan.
- Only 20% of patients were offered written information about the impact of stroke on intimate relationships.
- Almost half (41%) of survivors who worked prior to stroke were not offered assistance to return to work if they wanted to. In contrast 91% of survivors were provided with assistance to return to driving after stroke, indicating excellent care can be delivered nationally.

No survivor journeys alone

Stroke happens in an instant, changing the lives of the survivor and their loved ones forever. There is no time to prepare for the journey ahead. Carers, who are most often family members, play a critical role in every element of a survivor's recovery and life after stroke.

However, carers were too often forgotten in the transition home.

The number of carers receiving the relevant training has plateaued at 74%, probably in part due to the fact only 63% of carers had a documented assessment of their needs (down from 84% in 2014).

There must be increased recognition that stroke impacts well beyond the individual survivor – too many families continue to be devastated by this disease.

Stroke prevention

Four in 10 stroke survivors will go on to experience another stroke within a decade, yet research shows more than 80 percent of strokes may be prevented. Rehabilitation services play a critical role in secondary stroke prevention including lifestyle education and the importance of medication compliance.

Audit results indicated that services have acted in response to previous Audit recommendations and the Guidelines. More patients are now being prescribed vital medication to assist in the prevention of stroke (anti-clot 94%, blood pressure 79%, cholesterol 85%) on discharge from hospital. However, four in every 10 patients were still not being provided with education on lifestyle changes that may impact stroke risk. This has improved from the 2014 audit results, but it is still not good enough. Stroke survivors must be provided the opportunity to live well, including avoiding recurrent stroke.

The opportunity

International evidence indicates more Australians are set to experience stroke at younger ages. The good news is that advancements in stroke treatment mean more Australians are surviving stroke than ever before.

Therefore the role of rehabilitation in stroke is increasing in importance. The release of the Clinical Guidelines for Stroke Management 2017 shows what world-class, best practice stroke care looks like. Now, we must ensure all Australian patients with stroke have access to it.

The Audit provides a foundation for clinicians, healthcare administrators and government to build upon. The Australian healthcare system must adapt to support healthcare professionals in the delivery of best practice stroke care and improve how resources are utilised to deliver the best outcomes for all Australians. All Australians and their families need and deserve the opportunity to live well after stroke.

Recommendations

1. Review stroke service coordination and links to ensure a streamlined flow of care based on patient's individual needs.
2. Ensure clinicians receive ongoing, stroke-specific education and training in line with the Clinical Guidelines for Stroke Management.
3. Ensure services are organised to provide more therapy during and after inpatient rehabilitation to maximise the opportunity for recovery.
4. Ensure the psychological wellbeing of all patients is assessed and appropriate support is provided, recognising stroke recovery extends beyond the physical.
5. Prepare survivors for the life of their choosing through education, support, service linkages and planning for recovery within and beyond inpatient rehabilitation.
6. Provide more recognition of the role of carers in the recovery journey, including assessments and training.

Table 1. National adherence to recommended processes of care

Process of care	Eligible to receive process of care (known N)	Number receiving process of care (n)	Adherence to process of care (%)
Patient assessment and management			
Patient met team to discuss management*	3,425	3,058	89
Goal setting with the patient*	3,426	3,208	94
Mood assessed during admission	3,651	2,057	56
Secondary prevention			
Patient received education about behaviour change for modifiable risk factors prior to discharge†	3,613	2,178	60
Patient prescribed antithrombotic medication on discharge+	2,551	2,407	94
Patient prescribed lipid-lowering treatment on discharge†	2,461	2,100	85
Discharged on blood pressure-lowering medication+	3,494	2,775	79
Discharge planning and support for life after stroke			
Patient and/or family received information covering stroke, hospital management, secondary prevention and recovery (e.g. *My Stroke Journey* booklet)	3,651	2,254	62
Discharge care plan outlining post-discharge care in the community developed with the input from the team and the patient†	3,334	2,666	80
Patient offered written information addressing issues relating to sexuality post-stroke†	3,613	715	20
Post-discharge contact provided to stroke survivor or family†	3,613	2,410	67
Carer received training^	988	731	74
Carer received a support needs assessment (e.g. physical, emotional and social)^	988	619	63

* Set with patient, therefore those without severe cognitive and /or communication difficulties

† Patients discharged alive

+ Eligible patients discharged, without contraindications for drug

^ Included carers of stroke survivors discharged to a private residence

120 Stroke Rehabilitation Services

CHAPTER 1

Introduction

Stroke is one of Australia's biggest killers and a leading cause of disability.[1] Stroke kills more women than breast cancer and more men than prostate cancer.[1] In 2017 it was estimated that 56,000 new and recurrent strokes occurred – that is one stroke every nine minutes.[2] In addition, approximately 475,000 people were living with the effects of stroke in the community.[2] This is predicted to increase to one million by 2050.

Approximately 30% of stroke survivors are of working age (under the age of 65) and 65% of stroke survivors suffer a disability that impedes their ability to carry out daily living activities unassisted.[3] Almost half of all stroke survivors will experience another stroke within 10 years.[4] The financial cost of stroke in Australia is estimated to be $5 billion each year.[3]

1.1 Clinical Guidelines and the National Stroke Audit

The Stroke Foundation has coordinated the development of national clinical guidelines for stroke care since 2003. Clinical guidelines are an important tool that empowers clinicians in understanding the best evidence-based interventions to help people recover from stroke. The *Clinical Guidelines for Stroke Management 2017*[5] present evidence-based recommendations for clinical stroke care and are approved by the National Health and Medical Research Council (NHMRC). The Clinical Guidelines help to form the basis of the National Stroke Audit, determining what key data are collected.

Clinical guidelines are only useful when they are used to guide clinical practice. Audit and feedback are important parts of the quality improvement cycle to encourage change in clinical practice. In the absence of a standardised national dataset in Australia, the National Stroke Audit was designed by the Stroke Foundation to measure adherence to best practice recommendations outlined in the Clinical Guidelines. As well as monitoring stroke care at nation-wide and state-wide levels, the National Stroke Audit promotes quality improvement by providing a report back to individual participating services. These individualised reports enable teams to compare their performance against aggregated averages, achievable benchmarks, and other stroke services managing similar stroke volumes. The National Stroke Audit commenced in 2007 and provides longitudinal data to track changes over time, allowing hospitals to understand where they have, and have not, improved between each National Stroke Audit cycle.

The new *Clinical Guidelines for Stroke Management 2017* have recently been published (September 2017). The 2017 version updates and supersedes the 2010 version.[6] However, due to timing of when the audit was conducted, the current rehabilitation Clinical Audit has been mapped against the 2010 version.

1.2 The National Stroke Audit program

The National Stroke Audit – Rehabilitation Services comprises:

- An Organisational Survey of stroke rehabilitation services across Australia. The Organisational Survey assesses the resources required to deliver evidence-based stroke care such as the availability of stroke units, treatment, goal setting and interdisciplinary staff. The Organisational Survey questions specifically reflect the *Stroke Rehabilitation Services Framework 2013.*

- A Clinical Audit involving the retrospective review of up to 40 consecutive patients admitted to participating inpatient rehabilitation services during a defined time frame. The Clinical Audit is used to measure adherence to evidence-based processes of care such as timely assessment, interdisciplinary care and discharge planning, in providing evidence that these care practices are provided.

The *National Stroke Audit – Rehabilitation Services* is conducted biennially to provide cross-sectional data on clinical performance. Each alternate year, the Stroke Foundation undertakes an audit of acute services for patients with stroke.

1.3 Structure of the report

For this report 'rehabilitation care' refers to services providing inpatient rehabilitation care for stroke patients.

The Organisational Survey and Clinical Audit were developed in tandem and the results are presented collectively. This is because areas of excellence and areas of need identified in the Clinical Audit may be better understood in association with information about the available resources obtained from the Organisational Survey.

This report outlines the adherence to the *Clinical Guidelines for Stroke Management 2010* in hospital services providing inpatient rehabilitation care for patients with stroke. It reports resources available within these rehabilitation services and the quality of care provided. It also outlines resources and structures available at these Rehabilitation services mapped to the *Stroke Rehabilitation Services Framework 2013*.[7]

- Chapter 2 includes details of the methodology used to undertake the National Stroke Audit.
- Chapter 3 includes details of the participating inpatient rehabilitation services.
- Chapter 4 includes the responses to the Organisational Survey. Responses are analysed at a hospital level.
- Chapter 5 provides results of the Clinical Audit, which reflects individual patient care.
- Chapter 6 includes data changes noted since 2012.
- Chapter 7 includes discussion and recommendations regarding the data from this year's National Stroke Audit.

› 9,420 Patient admissions

CHAPTER 2

Methodology

2.1 Development of the National Stroke Audit questions

The National Stroke Audit was first developed under the guidance of a National Advisory Committee including national representation from medical, nursing, allied health and clinical research groups.[8]

Some items contained in the National Stroke Audit have been refined over time based on feedback from previous years and changes in national reporting standards. However, the majority of items have remained consistent from year to year to allow comparisons over time. Data collected include:

- Demographic characteristics;
- Admission and transfer information;
- Stroke severity measures;
- 20+ evidence-based processes of care, and
- Discharge outcomes.

Organisational Survey

Data collected through the Organisational Survey enables reporting of services against each required element outlined in the *Stroke Rehabilitation Services Framework 2013*. The Organisational Survey questions have been reviewed based on the Framework and comments received from previous National Stroke Audits. All feedback has been discussed and changes approved by the Stroke Foundation Clinical Council. Some changes were made to the Organisational Survey to better align it with Framework Element 1 and the updated *Clinical Guidelines for Stroke Management* 2017.

Changes to questions in the Organisational Survey include:

- A new response variable was added to assist services to best describe their rehabilitation service: Comprehensive Stroke Unit
- The wording was changed from '*therapy in a group setting*' to specifically focus on group circuit classes and in addition, multiple choice options to the amount of therapy were added.
- A new question, *"are there regular meetings between acute and rehabilitation services?"* as well as a new sub-question on the number of meetings to better align with Framework Element 1.
- Changing the focus from services offered on-site to access to these services by altering the wording and also simplifying the answer options to *"Does your site have access to provide the following community rehabilitation services"*.

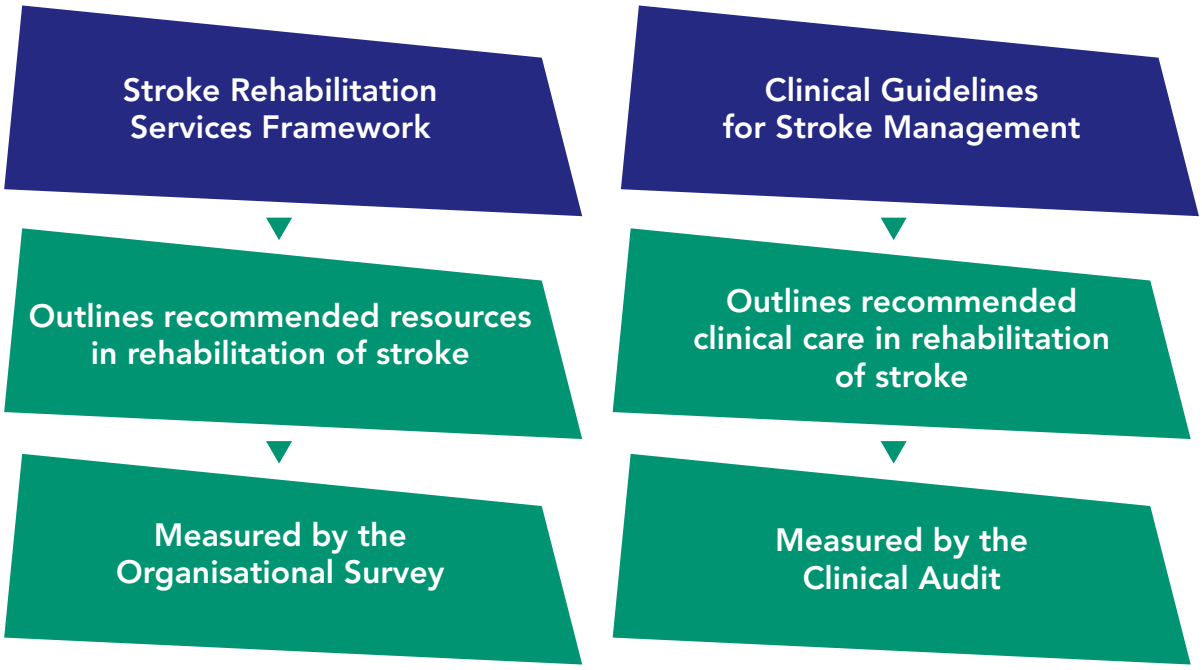
Clinical Audit

The Clinical Audit involves a systematic process of abstracting data from patient medical records. The data collected through the Clinical Audit are designed to report on adherence to recommendations outlined in the *Clinical Guidelines for Stroke Management 2010*. The Clinical Audit questions have been reviewed in line with feedback and comments received from previous National Stroke Audits. All feedback has been discussed and changes approved by the Stroke Foundation Clinical Council.

Aside from minor alterations to the Driving, Return to Work and Incontinence sections, the Clinical Audit questions were unchanged from the previous cycle. In addition, a new item was added to the *'complications during admission'* list; New Onset Atrial Fibrillation diagnosed during admission. This Clinical Audit was based on patients who undertook inpatient rehabilitation during 2017.

To ensure standardised data collection and reporting in Australia, the *National Stroke Data Dictionary (NSDD)*[9] is used to define the variables for the National Stroke Audit. The NSDD is regularly reviewed and updated in accordance with the Australian Stroke Data Tool (AuSDaT) *National Stroke Data Dictionary Operational Policy*.[10]

Figure 1: Components of rehabilitation care reflected in this report



Feedback from auditors in previous years included a request to reduce the amount of data collected for this audit. For the first time, participating services that collect data for the Australasian Rehabilitation Outcomes Centre (AROC) were able to reduce the burden of data entry in the current National Stroke Audit through cooperation via de-identified data importation (approximately 10% of data elements overlapped).

Definitions of the indicators reported (including numerators and denominators, and exclusion criteria) are available in the report supplement at **informme.org.au/stroke-data**.

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

2.2 Recruitment

To be eligible for participation in the National Stroke Audit – Rehabilitation Services 2018, hospitals were required to provide an inpatient rehabilitation service and have admitted at least 5 patients with stroke for rehabilitation care in 2017. Eligible services were identified through communication with the AROC, previous participation in the National Stroke Audit, partnerships with state-based clinical networks and relationships with key health providers.

Rehabilitation services were recruited between December 2017 and February 2018, when chief executives and the main contacts from both public and private rehabilitation services were sent a letter of invitation. Services were asked to complete and return a consent form to confirm participation. Services were also requested to give permission for the Stroke Foundation to share summarised data with relevant state-based clinical networks or Departments of Health, to promote transparency and facilitate support for quality improvement. Each participating service nominated a Coordinator to receive all correspondence during the National Stroke Audit period. This Coordinator was responsible for data completion and data quality at their service.

2.3 Training

The Australian Stroke Data Tool (AuSDaT) and the associated NSDD were used for the National Stroke Audit Rehabilitation Services. This is a purposefully designed, integrated, web-based data collection and management platform. The audit program transitioned from the Stroke Foundation to this integrated data collection system known as the AuSDaT in 2015. The AuSDaT has been designed to reduce the data entry burden and time for data collection. All auditors were required to complete standardised training regarding the

AuSDaT and the NSDD was made available, providing a rationale for each question as well as definitions and help notes. The Stroke Foundation Project Team was available for questions at all times leading up to, and during, the data collection period.

2.4 Data collection

All respondents from participating services completed the Organisational Survey via the AuSDaT between 5 March and 30 March 2018. The full list of Organisational Survey questions is presented online in the report supplement (**informme.org.au/stroke-data**).

Between 5 March and 8 June 2018, those services participating in the Clinical Audit component completed a retrospective case note audit of up to 40 consecutive stroke admissions to their service. To minimise selection bias, data are extracted for the first 40 consecutive rehabilitation stroke admissions over a pre-defined time period. For the vast majority of these episodes, admission and discharge dates had to fall between 1 January and 31 December 2017.

Patients with an ICD-10 code of I61.0-I61.9 (intracerebral haemorrhage), I63.0-I63.9 (cerebral infarction), I64 (stroke not specified as haemorrhagic or infarction) and I62.9 (intracerebral haemorrhage unspecified) were eligible for inclusion. The specificity for diagnosing stroke (any type) using these ICD-10 codes is >95%.[11] The full list of Clinical Audit questions is presented online in the report supplement (**informme.org.au/stroke-data**).

Auditors at participating services were required to log in to access the AuSDaT and carry out data collection. Each auditor had an individual account, with email and password specific to them which allowed them to enter data on the AuSDaT to ensure security and confidentiality was maintained. No patient-identifying data were collected by the Stroke Foundation. However, to facilitate data checking and quality as part of verification processes, services were asked to keep a list of the cases they entered into AuSDaT.

2.5 Data quality checks

The AuSDaT contains pre-defined data fields with inbuilt programmed logic checks. Manual re-auditing of 3–5 cases by another auditor are performed to check data reliability.

This helps to identify whether a case note audited independently by two people provides the same responses to ensure data is being reliably collected. A total of 452 reliability records were completed. Coordinators were also asked to check their data at completion of the data collection period to maximise the accuracy of the data and minimise missing items. The results of this data quality procedure are not reported here, but the information gathered will be used to refine future cycles of the *National Stroke Audit – Rehabilitation Services*.

2.6 Data verification

Auditors were able to correct or change their data up until 15 June 2018, at which point all data were locked. Programmed logic checks of the data were then conducted and used to validate data from the Organisational Survey and the Clinical Audit. Queries were sent back to services where assumptions about true values could not be made. Where data appeared incorrect, further changes were permitted. The final, cleaned data were then used for the analysis.

2.7 Data analysis

Staff from the Translational Public Health and Evaluation Division, Monash University, independently analysed the anonymised data. Names of services were excluded from the data submitted to Monash University; only the site identification number was provided.

The data were analysed using computer programs including Stata (StataCorp. 2017. - *Stata Statistical Software: Release 15.* College Station, TX: StataCorp LLC) and Excel (Microsoft Excel 2016). The data were exported from the web-based data entry terminal as an Excel spreadsheet and transferred into Stata.

All Organisational Survey and Clinical Audit data were aggregated to provide national estimates. Subcategories for analyses included breakdown by state, urban/rural status, public/private status, admission volume and presence of a stroke unit. The Northern Territory (NT) had one service which participated in the Clinical Audit and therefore no state level reporting was undertaken and No services participated from the Australian Capital Territory (ACT).

The term 'Urban' is used to describe urban areas, as well as large rural centres or regional areas with a population greater than 25,000. Rural includes many types of geographical regions which vary from remote rural centres to small urban centres (but not metropolitan) with a population less than 25,000.[12]

A small number of cases (eight) were recorded with the primary diagnosis as transient ischaemic attack (TIA) within AuSDaT. As TIA was not an inclusion criteria these cases were assumed to be minor stroke and included in the cohort given there is uncertainty in TIA/minor stroke differentiation and are clinically managed in a comparative manner.

For medical history and impairment data, only valid responses (i.e. Yes/No) were included in the analysis. 'Not documented' responses to these questions have been reported in a separate column, but were excluded from the denominator. For data relating to processes of care, i.e. received advice about risk factor modification, 'not documented' and 'unknown' responses have been assumed to be negative (i.e. a care process not provided) and were included in the denominator.

Adherence to processes of care was generally calculated on the entire sample. When reporting adherence to care, 'Known N' refers to all eligible patients. In some instances, eligibility criteria for processes of care were specified. For example, adherence to the process of care relating to the use of antithrombotics on discharge was calculated only for patients presenting with ischaemic stroke who were discharged back into the community.

Derived variables relating to outcomes of care, such as length of stay, were calculated based on admission and discharge dates.

The median (50th percentile) and first (Q1) and third (Q3) quartiles (25th percentile and 75th percentile) were reported for skewed (i.e. data that is not normally distributed) continuous data from questions such as the number of stroke admissions each year.

The Achievable Benchmark of Care (ABC™) methodology was used to create benchmarks for several nationally relevant clinical care indicators based on the average performance of the top 15% of hospitals for each indicator.[13]

2.8 Supplementary data

In addition to this report, a supplement containing details of questions from the Organisational Survey and Clinical Audit is available. This also contains further detail regarding the framework and indicators, and is available at **informme.org.au/stroke-data**.

2.9 Site specific feedback

Feedback to participants is an essential component of the National Stroke Audit program, considering the evidence that audit and feedback can influence and change clinical practice.[14] Therefore, each participating rehabilitation service receives a site-specific report highlighting their performance compared to state, national and benchmarked data so that sites can identify gaps in care, review local reasons for these gaps (barriers and enablers) and tailor a plan to reduce the gap and improve patient care and outcomes. Reports (full and summary) along with the national reports are made available at **informme.org.au**.

› 3,651 Case notes

CHAPTER 3

Participating inpatient rehabilitation services

3.1 Response rates and characteristics of participating rehabilitation services

Two hundred and thirty-five rehabilitation services were identified as potentially eligible to participate in the National Stroke Audit Rehabilitation Services, with 171 public services deemed eligible. The number of eligible private services was unknown; however, based on previous participation and partnerships with state-based clinical networks, 64 private services were identified as potentially eligible.

The eligible services were targeted with active recruitment procedures that included phone calls and emails. In total, 103 public services and 17 private services completed the Organisational Survey and, among these, 95 public services and 14 private services participated in the Clinical Audit. This represents a 60% participation rate in the Organisational Survey and a 55% participation rate in the Clinical Audit by eligible public services.

A total of 69 eligible public services did not agree to participate for various reasons ranging from resource issues and transitioning staff, to a small number of strokes reported in the previous year.

Urban versus rural

Classification of participating rehabilitation services as urban or rural was based on the local government area population size definition of 25,000 residents for rural and above 25,000 residents for urban.[12]

Table 2: Participating rehabilitation services by location and rurality

	Organisational Survey			Clinical Audit		
	Total	Public	Private	Total	Public	Private
Australia	120	103	17	109	95	14
ACT	0	0	0	0	0	0
NSW	40	35	5	36	31	5
NT	1	1	0	1	1	0
QLD	23	20	3	23	20	3
SA	8	6	2	8	6	2
TAS	4	3	1	3	3	0
VIC	33	28	5	29	26	3
WA	11	10	1	9	8	1
Rurality						
Urban	114	98	16	103	91	13
Rural	6	5	1	6	4	1

Stroke service size

The 120 services that completed the Organisational Survey reported a total of 9,450 admissions for patients requiring inpatient rehabilitation services for stroke in 2018. Services that reported 29 or fewer annual inpatient stroke rehabilitation admissions (N=19) accounted for 394 (4%) of all reported admissions. Rehabilitation services admitting 80 or more patients with stroke per year (N=39) admitted 5,800 (61% of all patients).

The 109 services participating in the Clinical Audit accounted for a total of 8,657 admissions or 92% of the reported caseload for 2018.

The number of patients with stroke admitted per year to the 120 rehabilitation services in 2018 ranged from 11 to 503 (median: 63; Q1: 36; Q3: 96), with just over half the services (52%) reporting between 30 and 79 stroke rehabilitation admissions in 2018 (Table 3).

Table 3: Number of stroke admissions per annum by rurality and volume

	Australia (N=120)	Rurality		Reported annual stroke admissions		
		Urban (N=114)	Rural (N=6)	≤29 (N=19)	30-79 (N=62)	≥80 (N=39)
Total number of stroke admissions per annum reported in survey	9,450	9,206	244	394	3,256	5,800

Figure 2: Number of stroke admissions per annum for participating services

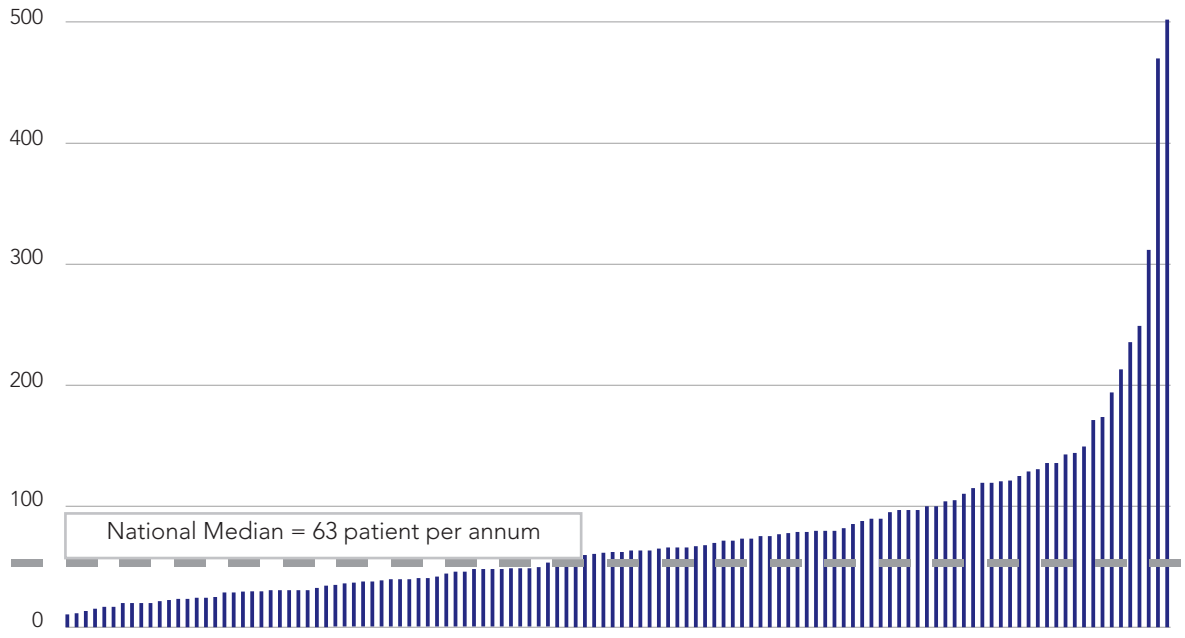


Table 4: Participating rehabilitation services by location, rurality and setting, and number of rehabilitation beds and annual stroke admissions

	Median number of beds (Q1, Q3)	Median number of annual stroke admissions (Q1, Q3)	Reported annual stroke admissions		
			≤29	30-79	≥80
Location					
Australia (N=120)	25 (18, 40)	63 (36, 96)	19 (16%)	62 (52%)	39 (32%)
NSW (N=40)	22 (17, 36)	61 (31, 79)	8	23	9
QLD (N=23)	24 (16, 32)	64 (49, 85)	1	15	7
SA (N=8)	50 (6, 65)	63 (23, 133)	3	2	3
TAS (N=4)	22 (13, 35)	47 (43, 58)	0	4	0
VIC (N=33)	30 (20, 43)	66 (33, 121)	5	13	15
WA (N=11)	30 (15, 76)	77 (48, 129)	2	4	5
Rurality					
Urban (N=114)	26 (20, 40)	64 (38, 97)	17	58	39
Rural (N=6)	6 (6, 8)	37 (25, 48)	2	4	0
Setting					
Public (N=103)	23 (16, 32)	65 (38, 101)	14	50	39
Private (N=17)	46 (36, 64)	40 (29, 61)	5	12	0

Rehabilitation stroke unit beds

Thirteen rehabilitation services (11%) reported having co-located stroke beds within a geographically defined unit. Stroke units that have been shown to deliver highly effective stroke care share a number of characteristics, including:

- Location in a geographically discrete unit;
- Co-located beds within a geographically defined ward. Beds must be those set aside for the rehabilitation of stroke patients only. Beds don't necessarily need to be located within the same bay/room but do need to be located within one ward;
- A dedicated multidisciplinary team with an interest in stroke or rehabilitation;
- Staff with a special interest and expertise in the management of stroke, and access to ongoing professional education and training;
- Clear communication, with regular team meetings to discuss management (including discharge planning) and other meetings as needed (e.g. family conferences); and
- Active encouragement of stroke survivors and their carers/families to be involved in the rehabilitation process.[15]

Auditors were asked to report on the number of beds in the 13 rehabilitation stroke units. A total of 130 dedicated stroke unit rehabilitation beds were reported by rehabilitation stroke units (median per rehabilitation stroke unit: 10; Q1: 4; Q3: 16), this is 3% of the number reported by all participating services (3,773 beds). On the day of completion of the Organisational Survey, 712 patients with stroke were admitted to an inpatient rehabilitation service. Among these, 87 patients (12%) were being cared for on a dedicated stroke rehabilitation unit.

National Rehabilitation Framework

For the first time
4 services achieved all
10 elements

BUT

1 in 5 services
met less than half the
Framework elements

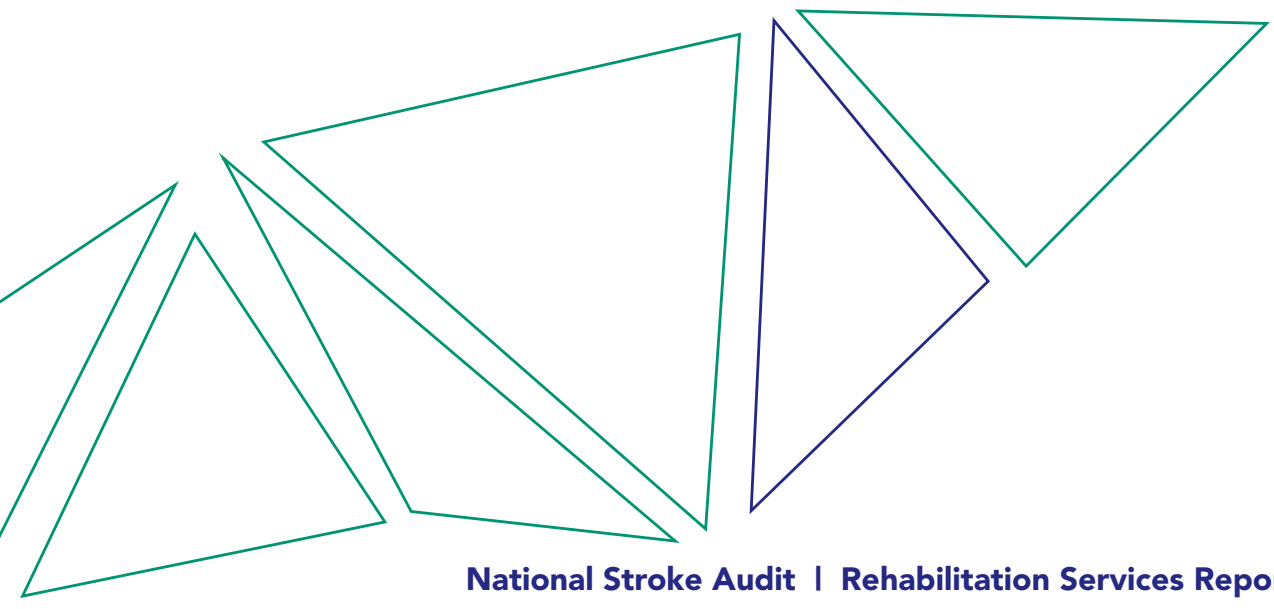
CHAPTER 4

Results of the Organisational Survey and adherence to the Rehabilitation Stroke Services Framework

Capacity to plan, deliver and evaluate high quality stroke rehabilitation services is essential for improvement of healthcare delivery and patient outcomes. The aim of the *Stroke Rehabilitation Services Framework 2013*[7] is to improve the quality of Australian stroke rehabilitation services by outlining the 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 based on data from the Organisational Survey.

The Framework comprises 10 recommended elements that all rehabilitation services should be actively ensuring they meet.



4.1 Individual elements of the Framework

Table 5. Adherence to the individual elements of the Framework by location

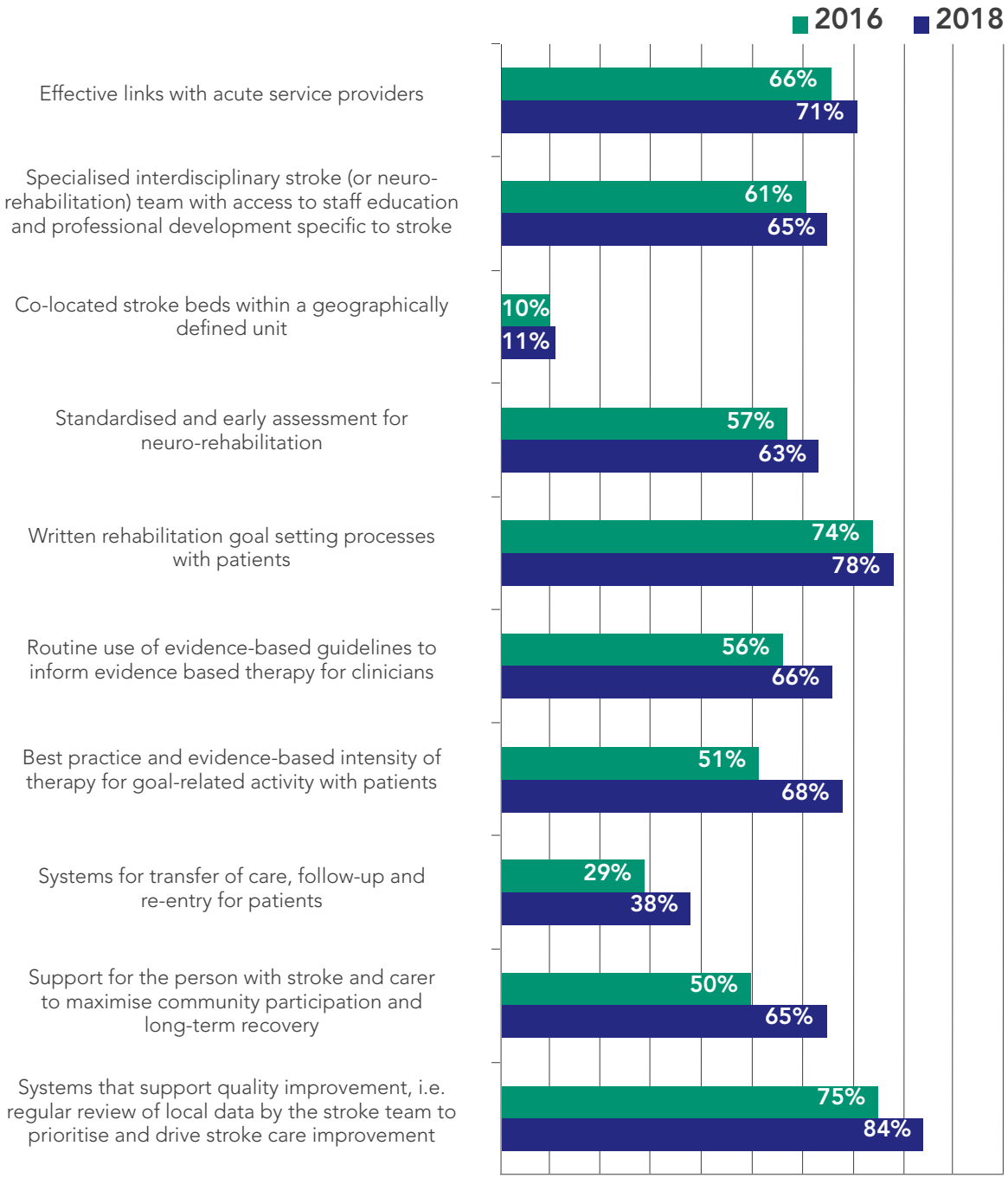
Elements of the Framework	Australia (N=120) n (%)	NSW (N=40) n (%)	QLD (N=23) n (%)	SA (N=8) n (%)	TAS (N=4) n (%)	VIC (N=33) n (%)	WA (N=11) n (%)
Effective links with acute service providers	85 (71%)	30 (75%)	17 (74%)	8 (100%)	1 (25%)	23 (70%)	5 (45%)
Specialised stroke (or neuro-rehab) team	78 (65%)	20 (50%)	18 (78%)	4 (50%)	3 (75%)	24 (73%)	8 (73%)
Co-located stroke beds	13 (11%)	2 (5%)	3 (13%)	1 (13%)	0 (0%)	2 (6%)	5 (45%)
Standardised and early assessment	75 (63%)	26 (65%)	14 (61%)	7 (88%)	0 (0%)	22 (67%)	5 (45%)
Written rehabilitation goal setting processes	93 (78%)	29 (73%)	16 (70%)	8 (100%)	3 (75%)	28 (85%)	8 (73%)
Routine use of evidence-based guidelines	79 (66%)	27 (68%)	15 (65%)	7 (88%)	1 (25%)	24 (73%)	5 (45%)
Best practice and evidence- based intensity of therapy	82 (68%)	23 (57%)	20 (87%)	8 (100%)	2 (50%)	23 (70%)	6 (55%)
Systems for transfer of care, follow-up and re-entry for patients	46 (38%)	12 (30%)	8 (35%)	4 (50%)	0 (0%)	19 (58%)	3 (27%)
Support for community participation and long-term recovery	78 (65%)	25 (63%)	14 (61%)	8 (100%)	4 (100%)	22 (67%)	5 (45%)
Systems that support quality improvement	101 (84%)	30 (75%)	21 (91%)	6 (75%)	2 (50%)	31 (94%)	10 (91%)

In order to make Framework Element 1 (effective links with acute service providers) more robust, two new questions were added in 2018 to assess this element. The analysis showed the results for regular meetings as surprisingly low (44%) which directly impacted Framework Element 1 and the overall total elements-met calculations. Framework Element 1 was then recalculated using the questions used in previous audits, that increased the median number of elements met as shown below:

- Framework Element 1 using new questions showed 39 services (33%) met Element 1, with the median (Q1, Q3) total elements met = 6 (4, 8). The new questions in 2018 were *'Is there a dedicated person liaising between acute and rehabilitation services'* and *'Are there regular meetings between acute and rehabilitation services'* and (If yes) *'How often are these meetings held per month?'*
- The recalculated Framework Element 1 using questions from previous audits found 85 services (71%) met Element 1 and the median (Q1, Q3) total elements met = 7 (4, 8). Previous assessment questions were *'Is there a dedicated person liaising between acute and rehabilitation services'* and *'Is there a standardised process for assessing suitability for inpatient rehabilitation at your hospital?'*

Figure 3 on the following page shows the progress in Australia's aggregated adherence to the 10 individual elements of the Framework since the 2016 National Stroke Audit.

Figure 3. Australia's aggregated adherence to the 10 elements of the Framework, 2016 and 2018



There was an increase across all of the Framework elements, especially best practice and evidence-based intensity of therapy for goal-related activity, support to maximise community participation and long-term recovery, and routine use of evidence-based guidelines. This shows a commitment to improved resources for stroke rehabilitation services throughout Australia between 2016 and 2018.

4.2 Overall adherence to the Framework

Among the 120 rehabilitation services completing the Organisational Survey, the median number of Framework elements met nationally was seven.

- 4 services (3%) from different states were found to meet all **10 elements**,
- 11 services (9%) met **9 elements**,

- 28 services (23%) met **8 elements**,
- 20 services (17%) met **7 elements**, and
- 13 services (11%) met **6 elements**.

The largest proportion of services (28 services, 23%) met eight elements.

This is a good improvement as previously no rehabilitation services achieved all 10 elements in the 2016 National Stroke Audit. Figure 4 below shows the progress in Australia's adherence to the Framework overall since the 2014 National Stroke Audit.

Please note: 111 rehabilitation services participated in the 2014 Organisational Survey, 121 in 2016 and 120 rehabilitation services in the 2018 Organisational Survey.

Figure 4 below displays a gradual increase in services achieving six or more elements of the Framework, rising from 47% in 2014 to 63% in 2018. This is a good result but it is still important to note that 25 services (21%) met less than half the Framework elements (<4 elements):

- 43 services (36%) met **8+ elements**,
- 52 services (43%) met **4-7 elements**, and
- 25 services (21%) met **<4 elements**.

Figure 4. National adherence to the Stroke Rehabilitation Framework overall

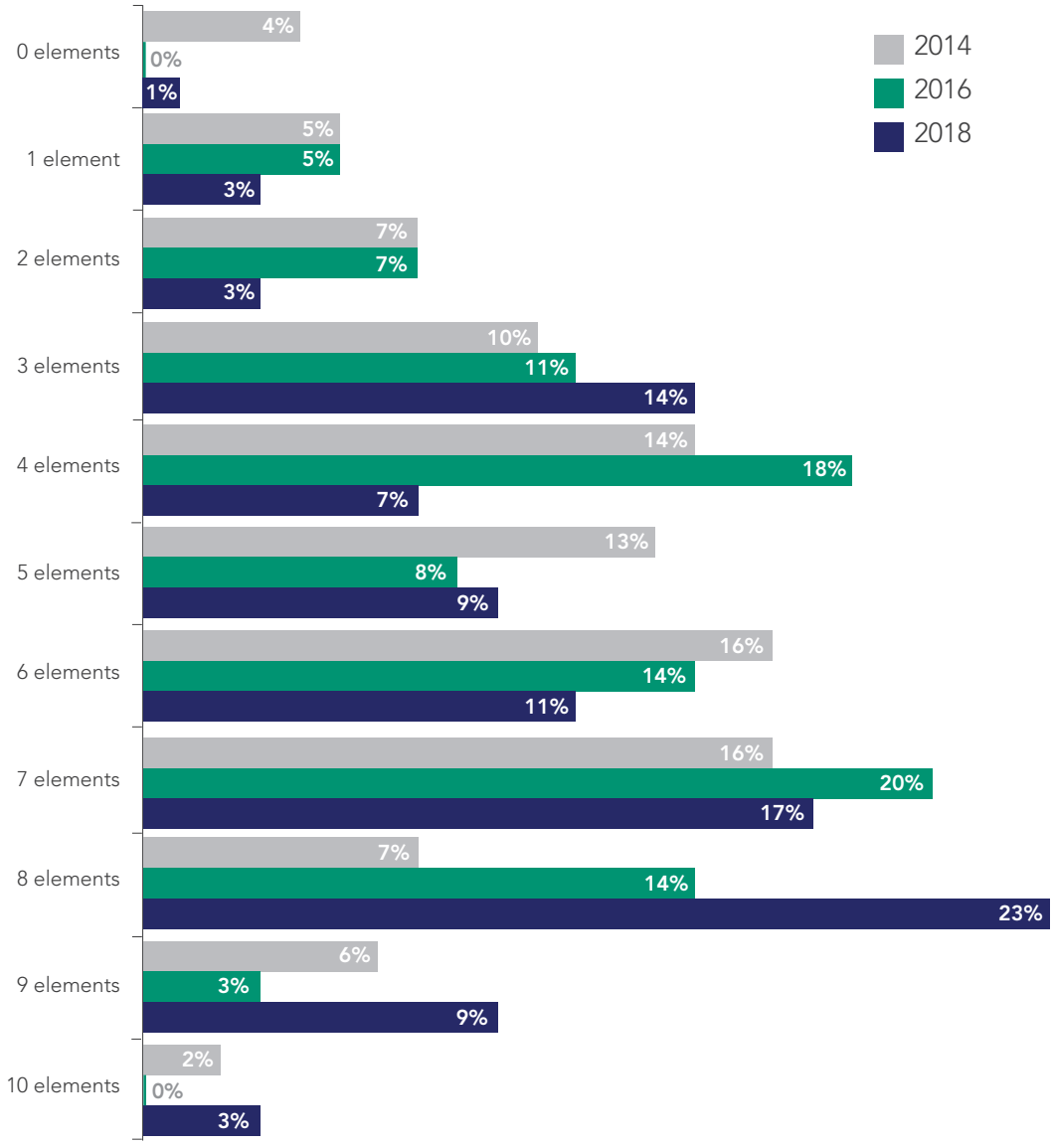


Table 6. Median number of Framework elements by rurality and stroke volume

	Australia (N=120)	Rurality		Reported annual stroke admissions		
		Urban (N=114)	Rural (N=6)	≤29 (N=19)	30-79 (N=62)	≥80 (N=39)
Median number of Framework elements met (Q1, Q3)	7 (4, 8)	7 (4, 8)	8 (7, 9)	6 (3, 8)	6 (4, 7)	8 (5, 9)

Q1: 1st quartile; Q3: 3rd quartile

The median number of elements met increased slightly for:

- Rehabilitation services with a dedicated stroke unit (with a stroke unit median: eight elements; without a stroke unit median: six elements), and
- Services with a larger volume of patients with stroke admitted (80+ stroke admissions per annum median: eight elements, <30 stroke admissions per annum median: six elements).

4.3 Stroke rehabilitation team

4.3.1 Composition of stroke rehabilitation team

An important component of rehabilitation is a specialised interdisciplinary team of health professionals that provides a coordinated program and includes individual assessment, treatment, regular review, discharge planning and follow-up. The rehabilitation team may include many disciplines, combining and coordinating the use of medical, nursing and allied health skills, along with social, educational and vocational services.

Respondents were asked to describe the composition of their rehabilitation team including the specialisation of the medical leader.

Results

For 103 rehabilitation services (86%), the medical leadership for stroke was formally recognised. Responsibility for management mostly fell to rehabilitation physicians (72%) or geriatricians (18%), with more geriatricians represented throughout rehabilitation services in WA & QLD.

Allied health staff were well represented in the make-up of specialised interdisciplinary teams across Australia, with 100% of rehabilitation services reporting access to physiotherapists, occupational therapists and speech pathologists; with 99% having a dietitian, 98% having a social worker and 97% having allied health assistants. The lowest number of services provided access to recreational therapists (12, 10%) and diversional therapists (14, 12%).

Clinical psychologists were present at 60 services (50%) and 49 services had access to a neuropsychologist (41%) with 77 services having either a clinical or neuropsychologist actively involved in the management of stroke patients. Therefore one third of participating services do not have access to psychological services for the patient during their inpatient rehabilitation stay.

4.3.2 Team communication

Regular communication among the interdisciplinary team is vital to address in a timely manner the various issues that may arise. Case conferences and team meetings facilitate coordinated communication. Respondents were asked to report the frequency of case conference meetings.

Results

Regular team meetings (case conferences) occurred at all 120 rehabilitation services. Of these, 81 (68%) reported meeting once per week and 39 (32%) reported meeting more frequently.

Overall, 95 (79%) services reported having a dedicated person liaising between acute and rehabilitation services, with 53 (44%) of these services meeting at least monthly and of these 43 services were meeting at least once per week.

4.3.3 Professional development

Embedding a culture of evidence-based practice can be facilitated by providing targeted education and collaborative involvement in data collection and quality improvement. Access to regular stroke-specific education is a core component of organised stroke care. Respondents were asked to report on staff access to continuing education related to stroke management.

Results

A total of 83 rehabilitation services (69%) reported access to a program of continuing education for staff relating to stroke management. There was variability across states, ranging from 55% to 78%, and it appears that staff in larger services are more likely to have opportunities for professional development (85%).

Table 7. Staff development

	Location	Volume		
	Australia (N=120) n(%)	≤29 (N=19) n(%)	30-79 (N=62) n(%)	≥80 (N=39) n(%)
Rehabilitation services with access to a program of continuing education for staff relating to stroke management	83 (69%)	10 (53%)	40 (65%)	33 (85%)

4.3.4 Assessment for rehabilitation

Access to rehabilitation, and the case mix of rehabilitation inpatients, is dependent on the assessment for suitability and acceptance for rehabilitation. Consideration for further rehabilitation needs is done in the acute setting but may involve rehabilitation team members. Respondents were asked to describe how patients were assessed for admission to the rehabilitation service.

Results

The decision on suitability and acceptance for rehabilitation was most often made by the post-acute physicians (80%). However, respondents also indicated that suitability was commonly assessed by the acute physician (71%) or in conjunction with the full acute interdisciplinary team (70%) or by joint acute and rehabilitation team members (61%).

In all, 109 services (91%) reported using a standardised process for assessing suitability for rehabilitation admission. Of those services that had a standardised process this usually occurred within the first week of acute admission (71%).

4.4 Intensity of therapy

The amount and intensity of rehabilitation provided to stroke survivors greatly affects their outcomes. Looking forward, the new *Clinical Guidelines for Stroke Management 2017* recommend that patients be provided as much therapy as possible, with a minimum of three hours of scheduled practice, involving at least two hours of actual active practice each weekday (increased from one hour recommended in the 2010 Guidelines) for physical therapy and as much therapy for dysphagia or communication difficulties as can be tolerated. Group therapy is suggested as one strategy to increase the amount of practice.

Results

Half of all services (49%) reported providing on average less than two hours of active therapy per day (at least five times per week), with 36% of services providing active therapy for two hours per day on average and only 16% of services providing 3 or more hours of active therapy per day. The number of services that reported providing at least one hour of active therapy per day decreased from 93% in 2016 to 69% in this survey.

One third of services reported not having any documented process or system to ensure patients receive recommended intensity of practice.

Group circuit classes were provided by 92 services (77%). There was variation across the states, with SA reaching 100% and QLD reporting only 65%. Larger volume services reported a higher use of group classes.

4.5 Community Rehabilitation Services

Centre-based rehabilitation (e.g. outpatient rehabilitation or day hospital) was provided at 105 services (88%) and community-based rehabilitation provided in the home is accessible at 60% of services.

There was a significant increase in reported stroke-specific early supported discharge (ESD) services with 47% of services providing this in 2018 compared to 17% in 2016. This may be due to definition and understanding of 'transitional care programs' by the auditors labelling such programs as ESD.

Gaps in management

of patients experienced mood impairment or disturbance

1 in 3 services

No assessment for depression and anxiety

No access to clinical or neuropsychologists

CHAPTER 5

Results of the Clinical Audit

The results of the Clinical audit specifically relates to the uptake of the *Clinical Guidelines for Stroke Management 2010*. As previously mentioned, the 2017 Clinical Guidelines were not released until later in the year of the audit (September) and therefore it was not appropriate to conduct the Clinical Audit against the new guidelines.

Key findings 2016 to 2018:

Improved performance was noted on the majority of Rehabilitation Stroke Care Indicators, including:

- Goals set with input from the team and patient (89% to 94%),
- Patient's mood assessed during admission (53% to 56%),
- Care planning (78% to 80%),
- Providing information on stroke, hospital management, secondary prevention and recovery (50% to 62%)
- Education about behaviour change and risk factors (51% to 60%), and
- Discharged on an antihypertensive (78% to 79%)

However indicators related to supporting carers stagnated. This includes carer training (75% vs 74%), post-discharge needs assessed (65% vs 63%), and provision of information related to peer support (44% vs 43%).

5.1 Characteristics of patients from the Clinical Audit

A total of 3,651 patient case notes were audited; this is 38% of the total number of episodes reported in the AROC State of Nations 2017 report (9,517 AROC episodes).[16] The majority of these patients were managed in urban rehabilitation services: 3,508 urban cases (96%) compared with 143 cases from rural locations (4%). Details are located in Table 8.

The median age of patients was 76 years, 55% of patients were male, only 2% of patients were identified as being of Aboriginal and/or Torres Strait Islander background and 6% required an interpreter. Demographics were similar to that reported by AROC, except the patients in this audit are slightly older (AROC median age 73.4 year).

Table 8. Patient demographics

Patient demographics	Australia (N=3,651) n (%)	Urban (N=3,508) n (%)	Rural (N=143) n (%)
Age – median (Q1, Q3)	76 (66, 83)	76 (66, 83)	80 (70, 86)
Sex – male	1,995 (55%)	1,924 (55%)	71 (50%)
Patient identifying as Aboriginal and/or Torres Strait Islander background	83 (2%)*	78 (2%)*	5 (4%)*
Patient requiring interpreter	231 (6%)	225 (6%)	6 (4%)
Stroke type			
Ischaemic stroke	2,620 (72%)	2,547 (73%)^	73 (51%)^
Haemorrhagic	605 (17%)	581 (17%)^	24 (17%)^
Undetermined stroke type	238 (7%)	194 (6%)^	44 (31%)^
Post-stroke information			
Independence within 72 hours of admission to rehabilitation (mRS 0-2)	348 (10%)†	314 (9%)†	34 (24%)

Q1: 1st quartile, Q3: 3rd quartile
*Australia N=3,556; Urban N=3,416; Rural N=140
^ Categories do not total 100% as 'OTHER' responses are excluded
mRS: modified Rankin Scale
†Australia N=3,648; Urban N=3,505

5.2 Specialist inpatient rehabilitation

The majority of the audited episodes were managed in general rehabilitation wards. Less than one-third (30%) of the cases audited were treated in either a specialist stroke or neuro-rehabilitation unit. The benefits of stroke unit care have been attributed to the expertise of staff (particularly nursing staff) due to greater experience and specific interest in stroke rehabilitation. Three trials included in the Cochrane review indicate that dedicated stroke rehabilitation units may reduce death and disability compared to general/mixed rehabilitation services.[15] However, these trials are all more than 20 years old and numbers are small, so no firm conclusions can be made.

Table 9. The ward patients were treated on during inpatient rehabilitation

Location	Australia (N=3,651) n (%)
Dedicated stroke rehabilitation unit	354 (10%)
Neurorehabilitation unit	301 (8%)
Combined acute/rehabilitation unit	423 (12%)
Mixed rehabilitation ward	2,573 (70%)

5.3 Patient assessment

Respondents were asked to provide the dates of assessment by members of the interdisciplinary team on each audited case. Eligibility for an assessment by allied health was determined from the medical record. Reporting of assessment rates for dietitians and psychologists took into account the presence of nutrition complications and mood impairment respectively.

Results

The majority of patients were assessed by most members of the interdisciplinary team at some point during their admission (Table 10). Some patients were not seen by some allied health disciplines because the particular therapist was not on staff. This was most prevalent for patients with mood impairment where clinical psychology was not available.

Less than 50% of patients were assessed by psychology if a mood impairment was reported and in 8% of cases there was no psychologist or neuropsychologist on staff as reported in the Organisational Survey.

Table 10. Multidisciplinary Team (MDT) assessment

	Eligible for assessment N	Eligible for assessment N
Physiotherapy	3,636	3,632 (100%)
Occupational therapy	3,641	3,630 (100%)
Speech pathology	3,110	2,966 (95%)
Social work	3,303	2,909 (88%)
Dietetics	1,222*	1,142 (93%)
Psychology	871†	414 (48%)

*Known N includes patients with nutrition complications identified on admission

†Known N includes patients with mood impairment identified on admission

5.4 Management of impairments

Participants were asked to audit impairments on admission and management of consequences for selected topics. Management options were based on common therapy recommended in the *Clinical Guidelines for Stroke Management 2010*.

Results

The impairments found on admission varied. Most patients (87%) had difficulties with activities of daily living (ADLs), 76% were unable to walk, and 73% experienced an arm deficit. Again, the use of therapies or management strategies varied (Table 11). Therapy provision is consistent with, or in many cases slightly higher than, the 2016 audit.

3,022 patients (83%) were assessed for urinary incontinence within 72 hours of their admission to rehabilitation; this percentage is unchanged over the last two audit cycles. In 2018, 1,497 patients (41% of those assessed) were incontinent of urine during their rehabilitation care. Of those who were incontinent, 52% had a documented management plan (improved from 42% in 2016). Of those with identified urge incontinence, 56% had a documented prompted, scheduled, voiding regime. Of those with urinary retention, 51% documented intermittent catheterisation.

Table 11. Management of impairments

	Assessment documented N*	'Not documented' response n (%)	Impairment Present n (%)*	Type of therapy/ management	Therapy provided n (%)*
Difficulty walking independently	3,648	(<1%)	2,785 (76%)	Tailored, repetitive practice of walking	2,559 (92%)
				Cueing of cadence	1,217 (44%)
				Mechanically assisted gait	479 (17%)
				Joint position biofeedback	381 (14%)
				Other therapy	1,699 (61%)
Difficulties with ADLs	3,642	(<1%)	3,168 (87%)	Task-specific practice	2,911 (92%)
				Trained use of appropriate aids	1,876 (59%)
				Other	1,290 (41%)
Aphasia	3,498	(4%)	1,208 (35%)	Alternative means of communication	708 (59%)
				Phonological and semantic interventions	873 (72%)
				Constraint-induced language therapy	134 (11%)
				Supported conversation techniques	970 (80%)
				Delivery of therapy programs via computer	220 (18%)
				Group therapy	355 (29%)
				Other therapy	532 (44%)
Neglect/ inattention	3,315	(9%)	1,050 (32%)	Visual scanning with sensory stimulation	678 (65%)
				Prism adaption	20 (2%)
				Eye patching	25 (2%)
				Simple cues	899 (86%)
				Mental imagery training	163 (16%)
				Other therapy	367 (35%)
Nutrition complication	3,452	(5%)	1,259 (36%)	Ongoing monitoring by dietitian	1,142 (91%)
				Nutritional supplementation	938 (75%)
				Alternative feeding	225 (18%)
Mood impairment	2,004†	(3%)	1,022 (51%)	Antidepressants	596 (58%)
				Psychological (e.g. cognitive-behavioural) interventions	420 (41%)
				Other therapy	414 (41%)
Upper limb difficulty	3,604	1%	2,646 (73%)	Constraint-induced movement therapy (in selected people)	327 (12%)
				Repetitive task-specific training	2,251 (85%)
				Mechanically assisted training	349 (13%)
				Other therapy	1,524 (58%)

*Known N includes all patients with assessment recorded (excludes not documented responses)

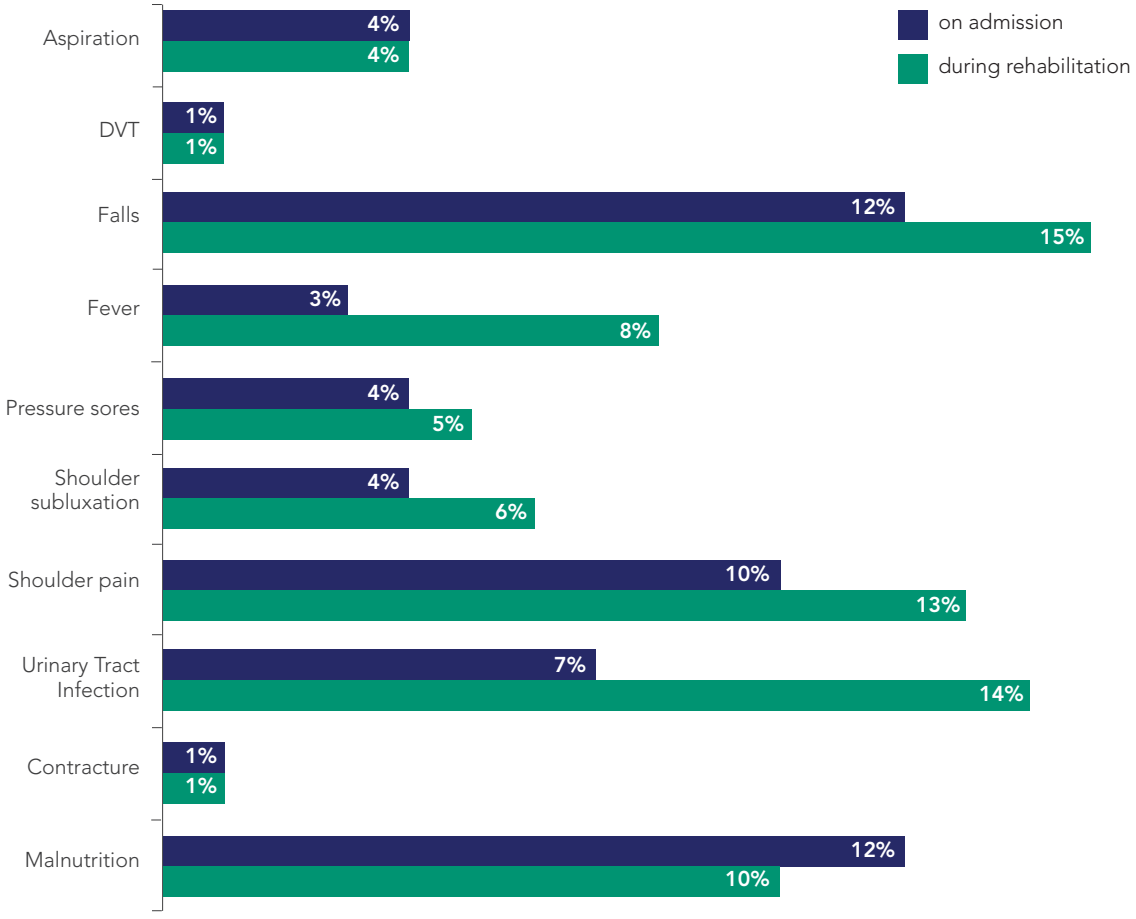
† Known N includes only those who had their mood assessed

+N (denominator) is all patients with impairment present

5.5 Complications during inpatient admission

Figure 4 depicts the proportion of patients with complications present on admission to rehabilitation and the proportion of those that developed complications during the rehabilitation stay. Of note, 538 (15%) of the audited patients had a fall, 291 (8%) developed a fever and 511 (14%) developed a urinary tract infection (UTI) during the rehabilitation admission. Importantly only 52% of those who had a UTI had a documented incontinence management plan. Atrial fibrillation was newly diagnosed in 135 patients (4%) during admission.

Figure 4. National adherence to the Stroke Rehabilitation Framework overall



5.6 Communication with patients

Communication with the patient is an integral component of stroke rehabilitation. It is important that the patient is provided the opportunity to discuss their desired goals for rehabilitation with the multidisciplinary team (MDT). Goal setting is performed with the team to ensure that the goals are relevant to the stroke survivor, and enables the team to evaluate the progress of the patient throughout their admission.

Respondents were asked to describe how goal setting was performed and to audit the practice of goal setting in the clinical case notes. Respondents were also asked to report the numbers of patients meeting with the team to discuss their management and goal setting.

Results

A high number of services (85% in the 2018 Organisational Survey) had a formal process in place for developing and documenting goals with patients. The processes used for establishing goals are outlined in Table 12. The most common practice for goal setting was an interview with the patient by individual disciplines followed by a review at the MDT meeting (62%); none of the participating services reported setting goals that were not patient-directed.

In total, 3,058 patients without severe cognitive and/or communication difficulties had the opportunity to meet and discuss their management with the MDT. In addition, 226 family members met with the team in lieu of the patient to discuss their management, leaving 10% of patients with no documented evidence of discussing their management with the team.

Overall, 3,208 patients without cognitive or severe communication difficulties (94%) were central to the process of setting their goals with input from the MDT, and 225 patients with severe cognitive or communication difficulties had goals set by their family/carer with input from the MDT.

Table 12. Patient involvement in goal-setting processes and methods that goals are usually established (combined Clinical Audit and Organisational Survey data)

	Australia n (%)
Clinical Audit	
Patients met with team to discuss management*	3,058 (89%)
Patients/family received information regarding stroke	2,254 (62%)
Organisational Survey – patient-directed goals usually established:	
Patient interviewed by each discipline only	9 (8%)
Goals discussed and reviewed at team meeting after patient meets with each discipline separately	74 (62%)
Patient and full multidisciplinary team set goals together	27 (23%)
Ad hoc (no consistent processes used)	7 (6%)
Other	3 (3%)

*Patients without cognitive/communication difficulties

N.B. percentages do not total 100% due to rounding of numbers for this report

5.7 Secondary prevention

There is almost 50% risk of a further stroke within 10 years.[4] Hence, there are clear recommendations in the Clinical Guidelines for Stroke Management 2010 for the use of blood pressure-lowering, cholesterol-lowering and antiplatelet or anticoagulation pharmacotherapy to prevent further vascular events. All stroke survivors should also be assessed and educated on lifestyle risk factor modification.

Results

Table 13 summarises the secondary prevention measures provided on discharge. Ninety-four percent of patients with an ischaemic stroke were prescribed antithrombotics, while under two-thirds (60%) received advice about risk factor modification. Few patients had a documented contraindication to antithrombotics (2%) or antihypertensives (3%) on discharge.

Table 13. Secondary prevention measures on discharge

	Australia n (%)
On antithrombotics on discharge*† (N=2,551)	2,407 (94%)
On antihypertensives on discharge† (N=3,494)	2,775 (79%)
Received advice about risk factor modification on discharge† (N=3,613)	2,178 (60%)
On lipid-lowering treatment at discharge*† (N=2,461)	2,100 (85%)

*Ischaemic strokes only.
†Patients discharged alive, and with no contraindication.

5.8 Preparation for discharge

A range of physical, psychosocial, social and financial consequences can create challenges for the stroke survivor's adjustment to life in the community following discharge.17 Effective discharge planning facilitates the transfer of the stroke survivor to the community by maximising independence, minimising social isolation and ensuring that the needs of the patient and carer are addressed. Carers often report lack of preparation for living with stroke in the community.

Results

Of the 120 rehabilitation services that completed the Organisational Survey, 98% stated that patient education was routinely provided at their hospital and 68% of the services surveyed reported that they routinely provided a discharge care plan. The Clinical Audit confirmed that 80% of patients receive a discharge care plan and this has increased steadily over each audit period (78% in 2016), but does leave 20% of patients missing out.

Tailored information regarding stroke rehabilitation and recovery was provided to only 2,254 stroke survivors (62%). This is much lower than that reported in the Organisational Survey, with 97% of services providing the patient with information regarding stroke care, implications and recovery prior to discharge.

Adherence to the other discharge planning processes are outlined in Table 14.

Table 14. Use of discharge-planning processes

	Australia n%
Discharge care plan provided (N=3,334)*	2,666 (80%)
GP sent discharge summary (N=3,333)*	3,178 (95%)
Contact provided for post-discharge programs (N=3,613)*†	2,410 (67%)

*Known N is limited to eligible patients alive at discharge
†Contact provided to patient or family

5.9 Life after stroke for patient and family

The *Clinical Guidelines for Stroke Management 2010* covers a range of topics including return to driving, return to work, leisure activities, sexuality and accessing support.

The information provided to stroke survivors and carers regarding preparation for life in the community varied. Two in five patients (43%) were provided with information about self-management programs but only 20% received information on sexuality (15% in 2016). In all, 74% of carers were provided training but only 43% were offered information about peer support.

Table 15. Preparation of stroke survivor for life in the community

	Australia n(%)
Offered written information on sexuality* (N=3,613)	715 (20%)
Provided information about self-management programs* (N=3,613)	1,558 (43%)
Offered information about peer support* (N=3,613)	1,520 (42%)
Offered assistance to return to work if wanted to return to work† (N=333)	197 (59%)
Offered some assistance to return to driving if wanted to return to driving† (N=792)	723 (91%)

*Known N is limited to patients alive at discharge

†For those patients discharged to private residence.

Table 16. Preparation carer for life in the community

	Australia n(%)
Number of reported carers*	1,425
Carers provided training† (N=988)	731 (74%)
Carers identified and discussed post-discharge needs† (N=988)	619 (63%)
Carers offered information about peer support† (N=988)	427 (43%)

*Total cohort; †Known N is limited to carers of stroke survivors that were discharged to private residence

5.10 Patient outcomes

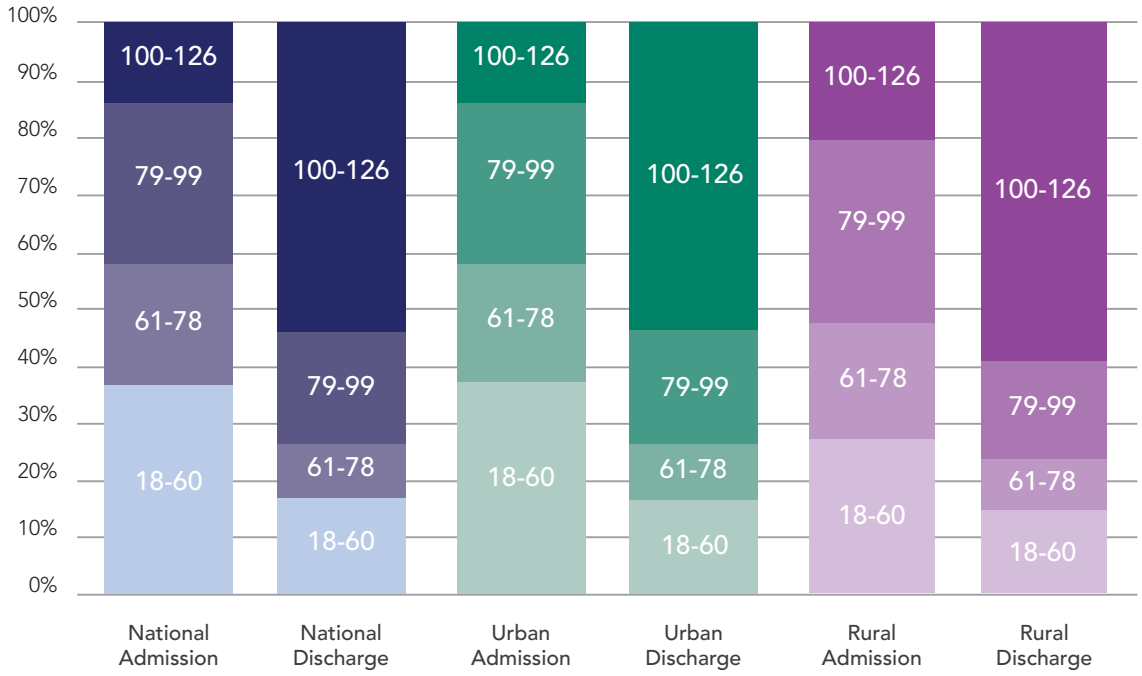
Outcome measures allow health professionals to evaluate the effectiveness and efficacy of rehabilitation interventions and therapies. Respondents were asked to describe the outcome measures used at their hospital and the patient outcomes of the audited cases are described using discharge destination, length of stay and function on discharge.

The FIM™ instrument as reported in Figure 5 below indicates severity of disability. The functional ability of a patient changes during rehabilitation and the FIM™ instrument is used to track those changes. Functional change is a key outcome measure of rehabilitation episodes.

The FIM™ instrument comprises 18 items, each of which is assessed against a seven point ordinal scale, where the higher the score for an item, the more independently the patient is able to perform the tasks assessed by that item. Total scores range from 18 to 126. The items are divided into two major groups, the Motor items, of which there are 13, and the Cognitive Items, of which there are 5. The rating scale designates major graduations in behaviour from dependence to independence. The scale provides for the classification of individuals by their ability to carry out an activity independently, versus their need for assistance from another person or a device, with the higher the score the more independent.[18]

The median FIM change across Australia was 20 (Q1:10, Q3:33). The median FIM change was slightly less in rural services compared to urban services (urban 21, Q1:10, Q3:33; rural 19, Q1:8, Q3:29).

Figure 5. Functional Independence Measure scores



5.10.1 Mortality, length of stay and functional outcomes

Of the 3,651 patients audited, 38 people (1%) died while in hospital and the median time from admission to death was 25 days. The median length of inpatient rehabilitation stay was 22 days (Q1: 13, Q3: 38), a slight increase from 21 days in 2016.

The median total Functional Independence Measure (FIM) score on discharge was 102 and a greater percentage of patients have moved to the more independent FIM range of 100–126 at discharge.

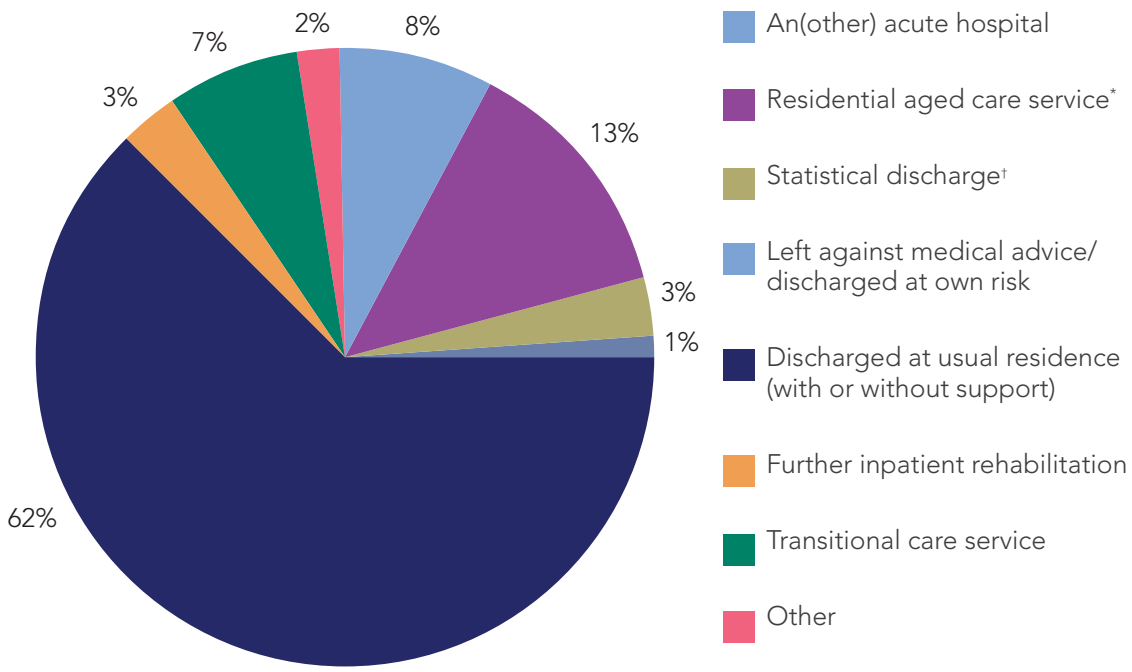
FIM efficiency is defined as the mean change in FIM score from the beginning to the end of rehabilitation divided by the mean length of stay. The higher the value, the greater the level of functional improvement per day. The FIM efficiency for all stroke patients discharged in this audit was 0.77 per day (FIM change/LOS).

The case-mix adjusted FIM efficiency reported by AROC was 0.9 per day for all AROC stroke patients in 2017.[16] Any comparison between AROC FIM efficiency and the audit results must be made with caution as the audit data is not case-mix adjusted.

5.10.2 Discharge destination

The discharge destinations of the audited patient cases are outlined in Table 18. Of the 2,329 stroke survivors discharged home, 1,287 (55%) had formal supports on discharge. For 1,270 patients (55%) the level of support on discharge home was changed from what it was prior to the stroke, indicating ongoing rehabilitation and/or disability.

Figure 6. Discharge destination



* Includes high and low level supported accommodation

† Statistical discharge means the patient was re-coded and was no longer participating in rehabilitation at the participating inpatient service.

5.11 Access to community rehabilitation

Rehabilitation often needs to continue after discharge from an inpatient setting and can be undertaken in various settings depending on availability. Community-based allied health practitioners monitor the need for, and encourage actual participation in, community and exercise activities.

Based on 120 responses to the Organisational Survey, all participating services (except four in NSW) had access to at least one form of rehabilitation service in the community.

Table 17 represents the stroke survivors referred for community rehabilitation regardless of discharge destination. Of the 3,651 patients audited, 2,412 (66%) were referred for further rehabilitation in the community.

Table 17. Patients referred for community rehabilitation

	Australia (N=3,651) n (%)
Referred for further rehabilitation	2,412 (66%)
Not known if referral made for further rehabilitation	38 (1%)
Inpatient rehabilitation*	411 (17%)
Outpatient rehabilitation*	802 (33%)
Home-based community rehabilitation*	641 (27%)
Day hospital-based community rehabilitation*	202 (8%)
Early supported discharged (ESD) service*	127 (5%)
Other*	229 (9%)

*If referred for further rehabilitation

5.12 Indicator performance based on location and stroke volume

The following table and graphs present the adherence to select clinical indicators with results split by hospital location (i.e. state) and hospital volume (i.e. annual stroke rehabilitation admissions).

Table 18. National adherence to key indicators

	AUS n (%)	AUS 95% CI
Patient-centred care		
Goals set with input from the team and patient* (N=3,426)	3,208 (94%)	93-94%
Patient's mood assessed during admission (N=3,651)	2,057 (56%)	55-58%
Discharge planning		
Evidence that care plan was developed with the team and patient (or family alone if patient has severe or cognitive impairments) † (N=3,334)	2,666 (80%)	79-81%
Patient and/or family received information covering stroke, hospital management, secondary prevention and recovery (e.g. My Stroke Journey booklet) (N=3,651)	2,254 (62%)	60-63%
Carers provided training+ (N=988)	731 (74%)	71-77%
Secondary prevention		
Received advice about risk factor modification on discharge† (N=3,613)	2,178 (60%)	59-62%
On antihypertensives on discharge^ (N=3,494)	2,775 (79%)	78-81%

* Set with patient, therefore those without severe cognitive and/or communication difficulties

† Patients discharged alive

+ Included carers of stroke survivors discharged to a private residence

^ Eligible patients only, without contraindications for drug

Figure 7. Adherence to key indicators by hospital location

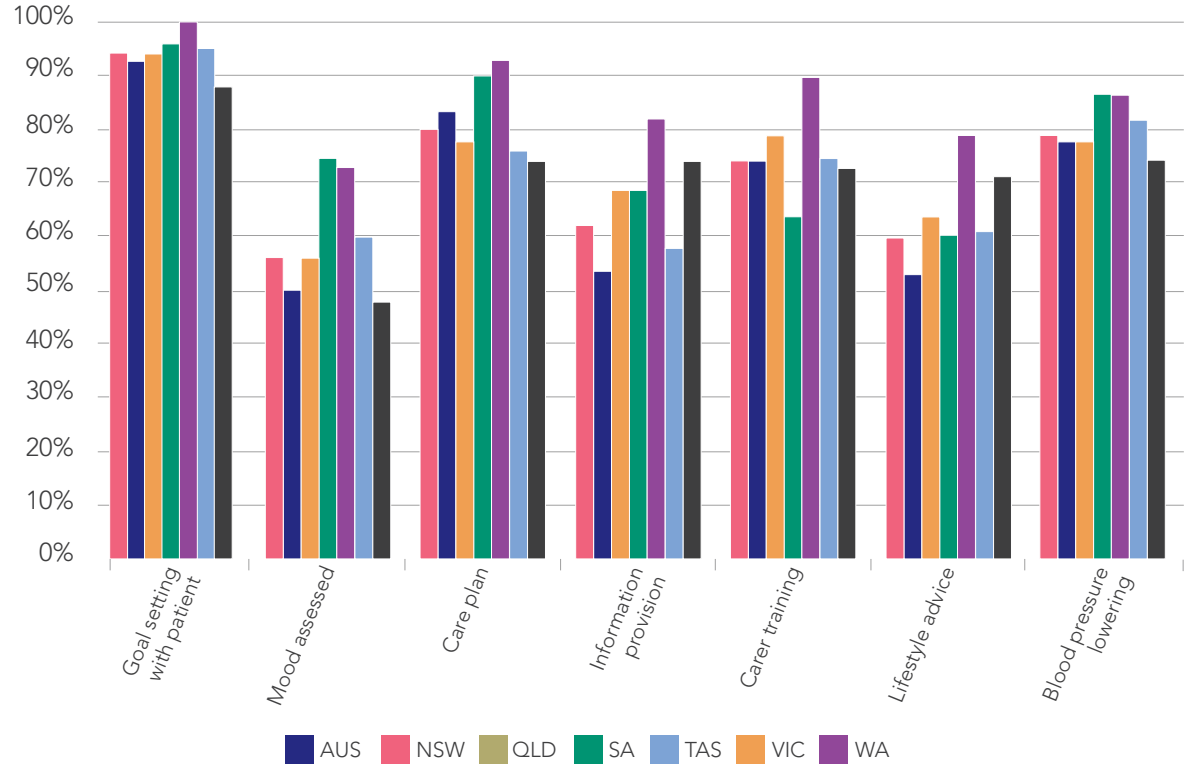
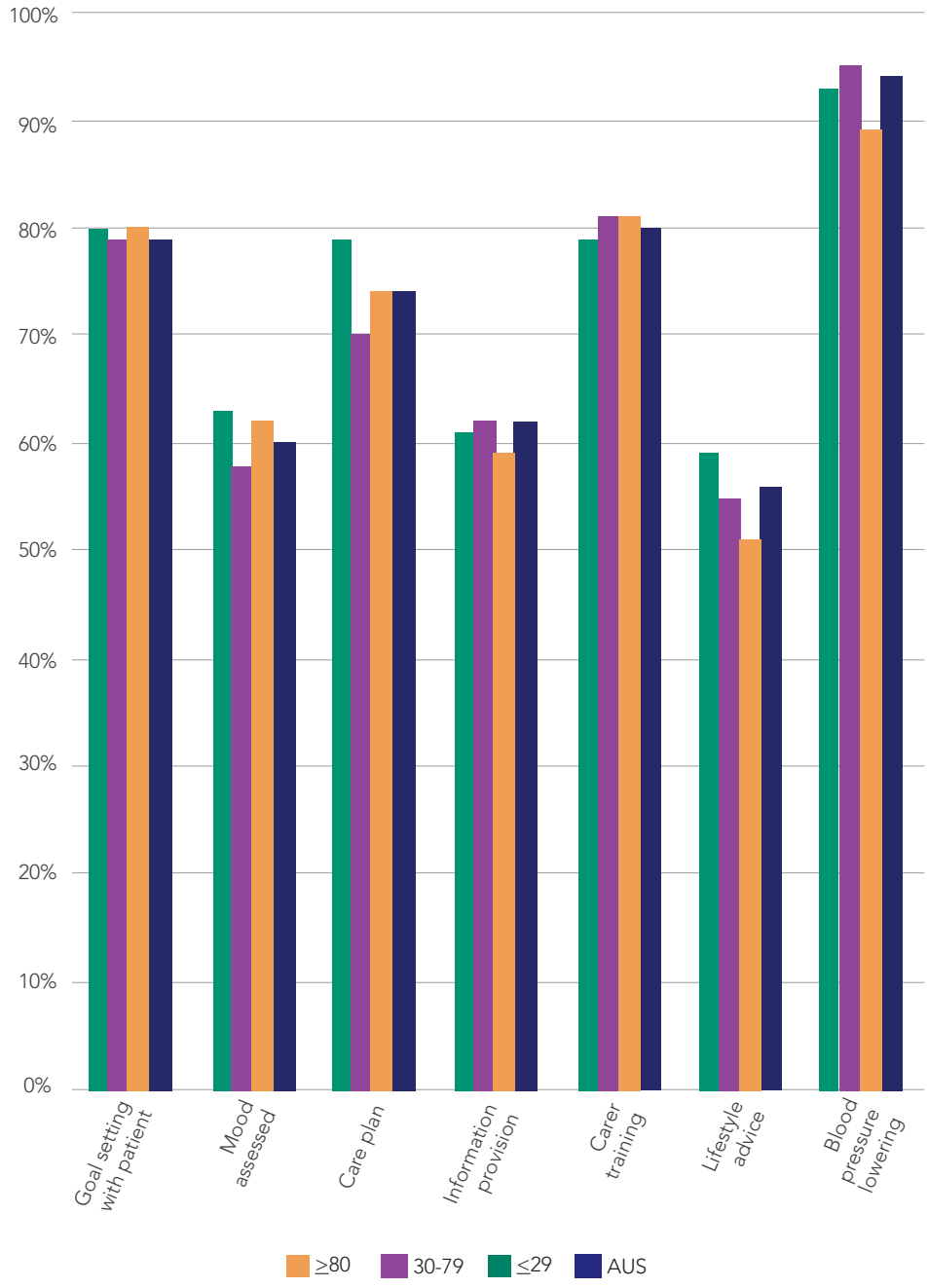


Figure 8. Adherence to key indicators by hospital stroke admission volume



5.13 Indicator performance based on specialisation of rehabilitation service

The following table presents adherence to select clinical indicators with results split by care provided on a dedicated stroke rehabilitation unit or neurological rehabilitation unit. While information and education provision appear higher in specialised services there was lower mood assessment in these services. As discussed in section 5.2 the evidence is not clear if specialised stroke rehabilitation units improve patient outcomes.

Table 19. Adherence to key indicators for specialist and general rehabilitation services

	Dedicated stroke/ neuro rehab unit (N=12) n (%)	General/mixed rehabilitation unit (N=97) n (%)	p-value
Patient-centered care			
Goals set with input from the team and patient*	950 (94%)	2,258 (93%)	0.42
Patient's mood assessed during admission	563 (52%)	1,494 (58%)	**0.001**
Discharge planning			
Evidence that care plan was developed with the team and patient (or family alone if patient has severe or cognitive impairments)†	782 (80%)	1,884 (80%)	0.82
Patient and/or family received information covering stroke, hospital management, secondary prevention and recovery (e.g. *My Stroke Journey* booklet)	704 (65%)	1,550 (60%)	**0.004**
Carers provided with training+	207 (78%)	524 (73%)	0.10
Secondary prevention			
Patient received education about behaviour change for modifiable risk factors prior to discharge†	739 (69%)	1,439 (57%)	**<0.001**
Discharged on blood pressure-lowering medication (antihypertensives)^	814 (79%)	1,961 (80%)	0.82

* Set with patient, therefore those without severe cognitive and/or communication difficulties

† Patients discharged alive

+ Included carers of stroke survivors discharged to a private residence

^ Eligible patients only, without contraindications for drug

1 in 2 patients

With urinary incontinence had no management plan

CHAPTER 6

Changes over time

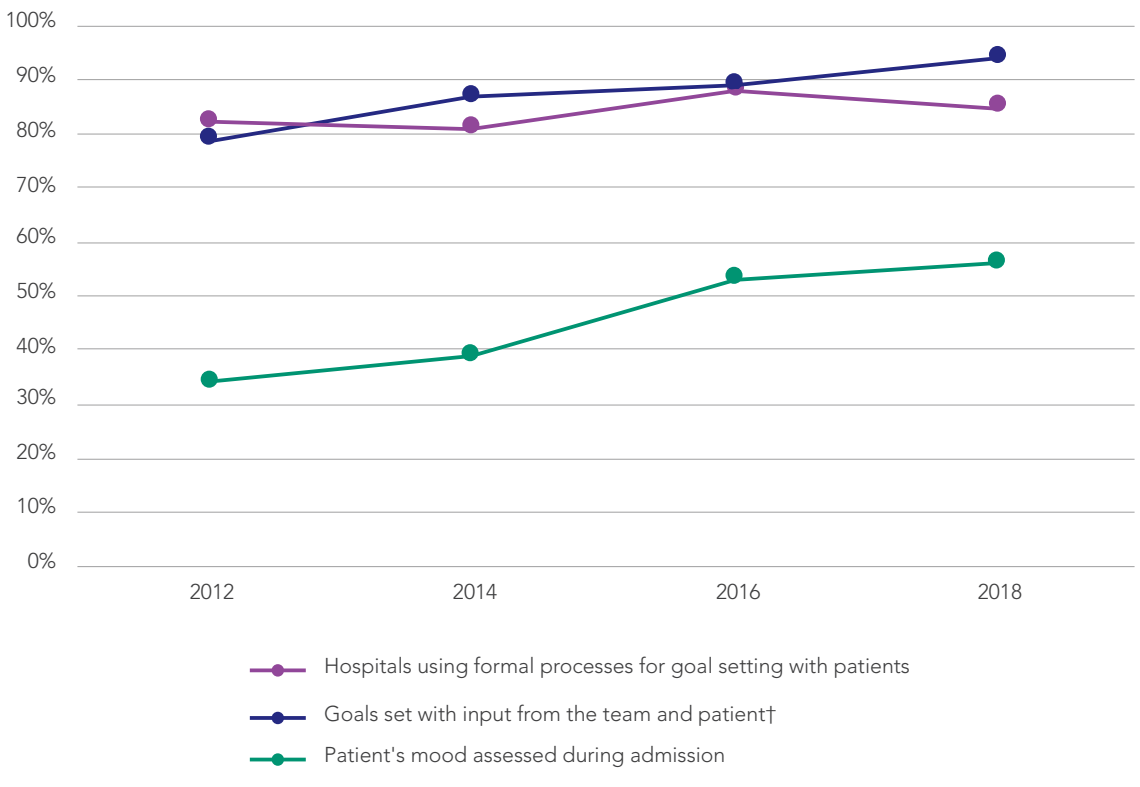
Changes in indicator performance over time provide a useful comparator to assess improvements or otherwise in clinical practice.

The following table details selected recommended care indicators for 2012, 2014, 2016 and 2018. Care must be taken in directly comparing the results for certain indicators as question wording and response options have changed, particularly between the 2016 and 2018 audit cycles.

Some key indicators have improved a little, such as mood assessment, and other indicators have improved more encouragingly, such as behaviour change education for modifiable risk factors, goals set with input from the team and patient, and receiving information covering stroke, hospital management, secondary prevention and recovery.

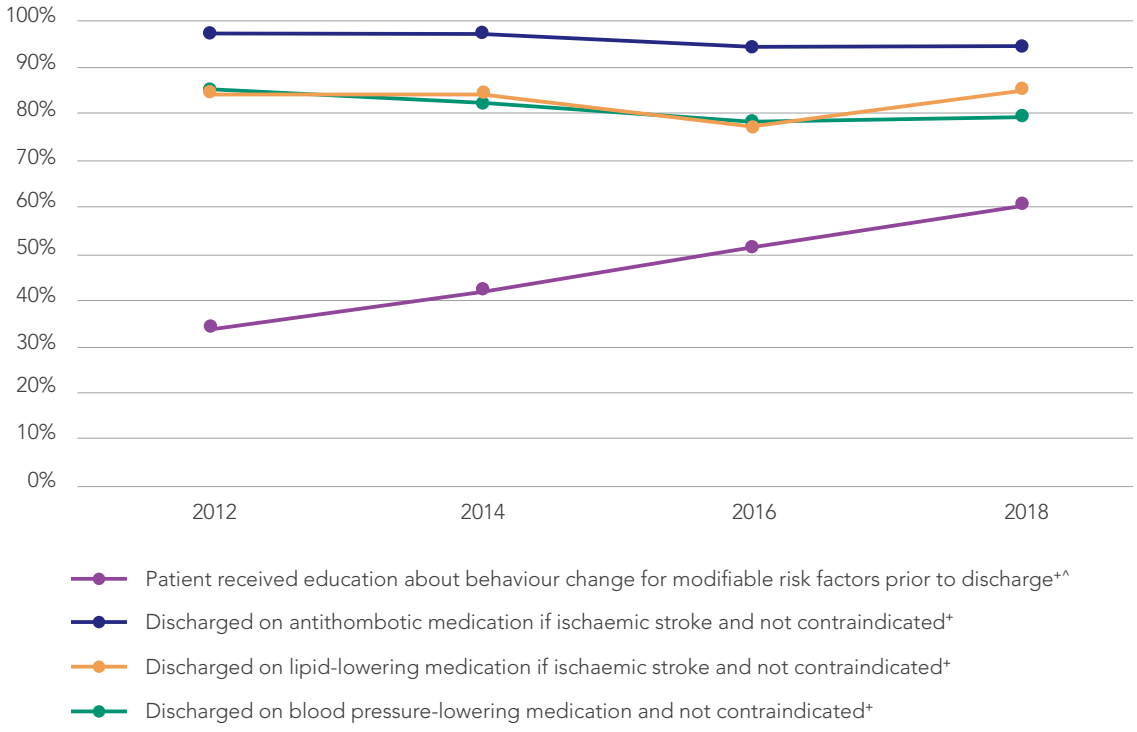
However there are still a number of indicators that remain relatively unchanged, such as carer received training, evidence of care plan development and discharge on appropriate medications.

Figure 9. Progress against key indicators over time for patient-centred care



† For patients without severe cognitive/communication difficulties

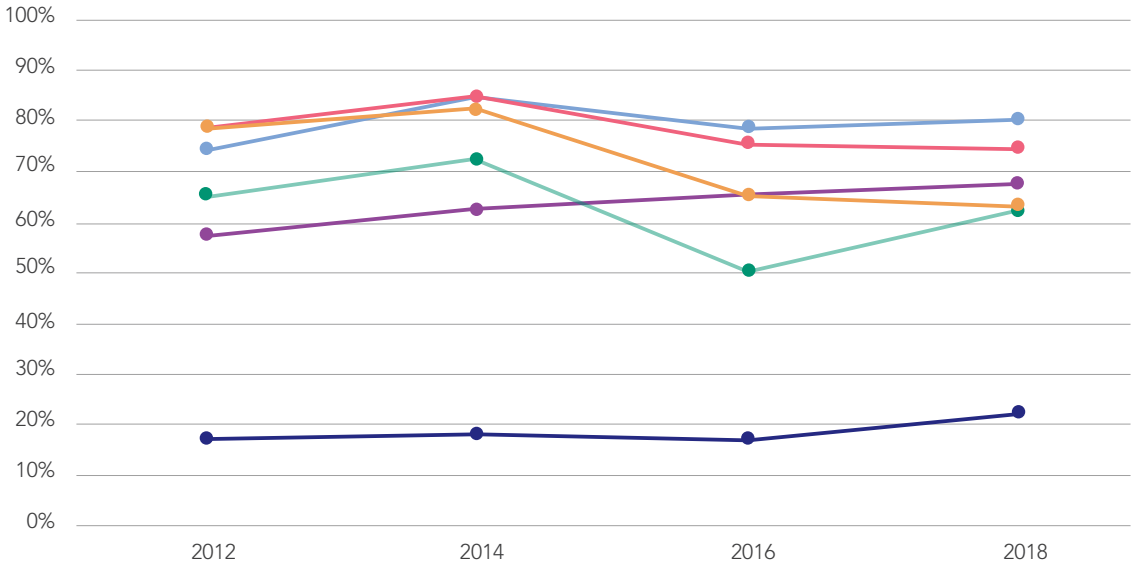
Figure 10. Progress against key indicators for secondary prevention



+ For those alive at discharge

^ Questions have been reworded and response options have changed over time (i.e. inclusion not documented or unknown). Therefore, care must be taken when comparing % across time periods as data is not directly comparable

Figure 11. Progress against key indicators over time for discharge planning



- Evidence that care plan was developed with the team and patient (or family alone if patient has severe or cognitive impairments)+^
- Patient and/or family received information covering stroke, hospital management, secondary prevention and recovery (e.g. *My Stroke Journey* booklet)^
- Post-discharge contact provided to stroke survivor/family
- Stroke survivor received information on sexuality post stroke
- Carer received relevant training#^
- Post discharge needs discussed with carer

\+ For those alive at discharge

\# Eligible patients included those who were discharged to a private residence

^ Questions have been reworded and response options have changed over time (i.e. inclusion not documented or unknown). Therefore, care must be taken when comparing % across time periods as data is not directly comparable

Insufficient therapy

Only **51%** of services

reported delivering 2 or more hours of **active therapy daily** as per guidelines

CHAPTER 7

Discussions and recommendations

The National Stroke Audit – Rehabilitation Services Report 2018 provides the largest snapshot to date of current inpatient rehabilitation services for stroke in Australia. Importantly, the results are presented according to the *Stroke Rehabilitation Services Framework 2013* and *Clinical Guidelines for Stroke Management*, and progress since the last National Stroke Audit is able to be described.

The number of participating hospitals and audited cases in this year's National Stroke Audit – Rehabilitation Services Report ensures results are robust and meaningful. More stroke rehabilitation services participated in both components (Organisational Survey and Clinical Audit) of the National Stroke Audit than in any previous rehabilitation cycle; 109 services in 2018 compared with 108 services completed both components in 2016. While AROC reported 258 facilities managed at least one stroke rehabilitation episode, only 141 of these admitted over 20 patients. 114 services participated in the National Stroke Audit that admitted 20 or more people for stroke rehabilitation. There were 3,651 episodes of care audited for this year's Clinical Audit, an increase from 3,514 episodes in 2016, which represents approximately one third of all annual rehabilitation admissions.

The information provided in this report will help to guide areas for quality improvement activity and improve patient outcomes. Rehabilitation services are encouraged to assess their stroke service's performance by comparing themselves to the national, state and annual admission-specific averages presented.

Improved adherence to the Framework

Responses reported this year by participating rehabilitation services showed that the largest proportion of services (23%) met eight of the 10 Framework elements, and there has been an overall improvement, with services achieving an average of seven elements compared to six in 2016. Encouragingly, there has been an increase in services achieving six or more elements of the Framework, rising from 47% in 2014 to 63% in 2018. While this is encouraging, 25 services (21%) met less than four of the ten Framework elements and so further work is required. Larger volume services and those who reported dedicated stroke units met more Framework elements. Four inpatient rehabilitation services among the 120 surveyed were found to have met all 10 elements of the Framework; all were large services admitting 80 or more patients with stroke over the past 12 months.

The Framework aims to improve the quality of Australian stroke rehabilitation services by providing a basis for measuring adequacy of current structures and resources, guiding decisions about resource requirements and providing an outline for monitoring quality of stroke rehabilitation care. Delivering optimal stroke services equitably across Australia remains a challenge, with variable access to best practice stroke services.

All efforts should be made to improve patient access to evidence-based stroke rehabilitation care in Australia. Capacity to deliver quality stroke rehabilitation services is essential for improvement of healthcare delivery and patient outcomes. Rehabilitation services need to use the Framework to identify gaps in their service provision for stroke and take the opportunity to examine ways of implementing change to achieve both Framework adherence and recommended evidence-based service provision.

Stroke rehabilitation team composition and coordination

For the majority of inpatient rehabilitation services the medical leadership for stroke was formally recognised. Not surprisingly rehabilitation physicians were the most common medical lead, followed by geriatricians. Allied health staff were well represented in the make-up of specialised interdisciplinary teams across Australia, with physiotherapists, occupational therapists and speech pathologists at all services and the majority having access to dietitians, social workers and allied health assistants. Access to the services of recreational therapists and diversional therapists was not commonly reported.

Clinical psychologists and neuropsychologists were actively involved in the management of stroke patients, with 77 services (64%) having either a clinical or neuropsychologist on staff. Potential ways to improve access to psychology services, possibly via innovative models such as telehealth, is needed for the one third of participating services that do not currently have access.

Regular team meetings occurred at all 120 rehabilitation services, and 95 services (79%) reported having a dedicated person liaising between acute and rehabilitation services. Meetings between services can take time and may be more appropriate for large volume services that can justify the time. In this audit 44% of services reported regularly meeting with acute providers with the majority of these (81%) meeting at least weekly. Where meetings are not feasible, good handover processes should be used to ensure seamless transfer of care between acute and rehabilitation services; these appear to be in place (refer to assessment for rehabilitation in the following column).

Professional development

A total of 83 rehabilitation services (69%) reported access to a program of continuing education for staff relating to stroke management. There was variability across services and it appears that staff in larger services are more likely to have opportunities for professional development. Given the benefits of specialised stroke care specifically relate to the expertise of the staff who deliver care, more should be done to ensure all rehabilitation services have routine, stroke-specific education, ideally linked to the *Clinical Guidelines for Stroke Management*, which will now be 'living' and rapidly incorporate relevant new research.

Assessment for rehabilitation

The decision on suitability and acceptance for rehabilitation was most often made by the post-acute physicians (80%) but this is often done in collaboration with the acute physician (71%) or multidisciplinary team (70%). A high proportion of services (91%) reported using a standardised process for assessing suitability for rehabilitation admission. Of those services that had a standardised process this usually occurred within the first week of acute admission (71%).

Intensity of therapy

Only 68% of services reported having documented processes and systems to ensure patients receive evidence-based intensity of therapy. Group circuit classes were provided by 92 services (77%). There was variation across the states and larger volume services reported use of classes in practice. The number of services that reported providing at least one hour of active therapy per day decreased from 93% in 2016 to 69% in this year's Organisational Survey and only half (52%) of services reported an average time of 2 or more hours per day undertaking active therapy (within 3 hours of scheduled therapy given there are considerable rest periods/ change to set up) which is now recommended in the 2017 *Clinical Guidelines for Stroke Management*. While increasing the amount and intensity of practice can be challenging, more focus is needed to ensure patients receive sufficient rehabilitation to maximise recovery during inpatient rehabilitation.

Specialised rehabilitation units and stroke care

In the Organisational Survey 13 services (11%) reported having a dedicated stroke rehabilitation unit (co-located stroke beds within a geographically defined unit). On the day of completion of the Organisational Survey, 712 patients with stroke were admitted to an inpatient rehabilitation service. Among these, 87 patients (12%) were being cared for on a dedicated stroke rehabilitation unit.

In the Clinical Audit 30% of cases reported care on a specialist rehabilitation ward (10% dedicated stroke rehabilitation unit; 8% neuro-rehabilitation unit; 12% combined acute/rehabilitation stroke unit). While specialised rehabilitation units may improve outcomes the evidence is based on a small number of trials that are over 20 years old and hence impact may be more to do with volume and related experience. This area may warrant further consideration.

Management of impairments

Patients in this audit had many common impairments, including difficulty with ADLs (87%), difficulty walking (76%) and difficulty with upper limb (73%). Half of the patients had mood impairment and about one third have communication and/or cognitive impairments. 42% of those assessed were found to have urinary incontinence.

All rehabilitation services reported involvement of physiotherapists, occupational therapists and speech pathologists, with high access (>98%) for social workers and dietitians. However, less than 50% of patients were assessed by psychology if a mood impairment was reported and in 8% of those cases there was no psychologist or neuropsychologist on staff. Further focus on mood assessments is required.

Reported therapy provision for impairments was consistent with previous audits with slight increases for most of the recommended therapies listed in the *Clinical Guidelines for Stroke Management*. Recommended care for urinary incontinence remains suboptimal with half (52%) of those with incontinence recorded to have a documented management plan. Further focus on incontinence is also required.

Goal setting with patients

Almost all services (85%) reported in the Organisational Survey that they had a formal process in place for developing and documenting goals with patients. The most common practice for goal setting was an interview with the patient by individual disciplines followed by a review at the multi-disciplinary team (MDT) meeting. Encouragingly, goals set with input from the patient was 94% in the Clinical Audit – a further improvement since 2016 (89%).

Complications during inpatient admission

Prevention and early management of complications is critical to good stroke care. 538 (15%) of the audited patients had a fall and 511 (14%) developed a urinary tract infection (UTI) during the rehabilitation admission (both being same rate as reported in 2016). Of those who had a UTI (most with incontinence but some without) only 39% had a urinary continence management plan documented. Atrial fibrillation was newly diagnosed in 135 patients (4%) during admission. All other complications were consistent with that reported in 2016.

Secondary prevention

At the point of discharge from the inpatient rehabilitation service, 40% of patients did not receive advice about risk factor modification. Stroke or neuro rehabilitation services appear to provide better care than general/mixed services, but 30% are still not being provided this important aspect of secondary prevention. Significant improvements in this indicator have occurred over the last four audit cycles with almost 10% improvement each cycle, but more improvements are clearly needed.

Medication adherence remains consistent for antiplatelet medication and blood pressure lowering medication, however, improvements are noted in lipid-lowering medication. Commencement of secondary prevention medication prior to discharge improves long term adherence and reduces secondary stroke rates and should continue to be a focus for spot reviews and improvements.[19]

Tailored information and discharge planning

In the Clinical Audit tailored information regarding stroke rehabilitation and recovery was provided to only 62% of stroke survivors. This is much lower than that reported in the Organisational Survey, with 98% of services reported that patient information was routinely provided prior to discharge. It is unclear if this is simply an issue with documentation or poor compliance.

The opposite was found regarding a documented discharge care plan, which was provided to 80% of patients in the Clinical Audit yet only 81 services (68%) reported routinely providing a discharge care plan on discharge from hospital.

Furthermore, over one third of services reported not having protocols in place to guide discharge care planning, and while 82% of services in the Organisational Survey reported providing simple contact details to patients and/or carers should they have any questions after discharge, only 67% in the Clinical Audit had this documented as provided. Stroke survivors and their carers/families report the transition from hospital after stroke is a critical point in their recovery and comprehensive planning is important. All rehabilitation services should be providing this to all patients and further improvements is required.

Life after stroke for patient and family

Carers and family members play a critical role in life after stroke. Unfortunately, many carers are not being supported adequately with 26% not receiving training, possibly due to the fact that 37% of carers had no documented assessment of their needs prior to admission. The results of the Organisational Survey indicated that 95% of sites are routinely providing carer training if required. Greater documentation and focus on carers is recommended.

After hospital discharge, transition to life after stroke is often challenging. Linking up with others who have had stroke can help as can formal programs to build self-management skills. However, only 43% were provided with information about self-management programs and 42% were informed about peer support, e.g. availability and benefits of local stroke support groups or other sources of peer support such as StrokeConnect online support. Of the 74% of carers who were provided training, only 43% were offered information about peer support.

As noted above information about sexuality remains low, with only 20% of patients offered written information addressing issues relating to sexuality post-stroke. Health professionals need to treat patients holistically and support them in the area of intimacy that can be very challenging after stroke.

Results of this audit indicate people are mostly being supported to return to driving if they want to do so (91%), however, only 59% of people were in working age were offered assistance in return to work.

Patient outcomes

The median length of inpatient rehabilitation stay was 22 days (Q1: 13, Q3: 38), a slight increase from 21 days in 2016 but lower than that reported in the AROC registry (27.4 days).[16] Discharge destination for 62% of stroke survivors was to usual residence (similar to 65% in 2016) with 55% requiring formal supports on discharge. For 55% of patients the level of support on discharge home was changed from what it was prior to the stroke, indicating ongoing rehabilitation and/or disability. Median FIM on discharge was 102, which was similar to 2016 (105), as is the median change in FIM.

Access to community rehabilitation

Based on 120 responses to the Organisational Survey, all participating services (except four in NSW) had access to at least one form of rehabilitation service in the community. Many stroke survivors are referred for community rehabilitation regardless of discharge destination, and of the 3,651 patients audited 66% were referred for further rehabilitation in the community, with 33% referred to outpatient rehabilitation and 27% to home-based community rehabilitation.

Given the large number of patients requiring further rehabilitation it is important to ensure there are sufficient resources to offer appropriate therapy over a longer period of time. The Organisational Survey reported only 63% of services routinely following up patients to assess their post-stroke needs. It is unclear if the current organisation of follow-up services is sufficient to ensure the ongoing needs of patients are being met.

Urban vs rural services

There were important results comparing rural and urban services. However, caution should be shown in comparing the results due to the small number of services (six) and audited files (143 episodes). Rural services were found to have shorter length of stay (15 days as compared to 22 days). Perhaps surprisingly, rural services seem to have performed better than urban services for things such as written goal setting, mood screening, and patient information generally and specifically relating to sexuality, blood pressure-lowering medication and elements of discharge care planning.

However, other areas were found to perform lower, such as carer needs and training, lipid medication, and input from social workers.

Strength of the data

The *National Stroke Audit – Rehabilitation Services* provides an excellent cross-sectional overview of stroke rehabilitation services in Australia. The following strategies were used to minimise potential biases:

- Potential reporting biases were minimised by a thorough process of standardised training and ongoing support throughout the audit process.
- A comprehensive data dictionary was provided to assist interpretation of both the Organisational Survey and Clinical Audit questions, increasing inter-rater reliability.
- Each service conducted a reliability check in which data from three to five cases was entered by two auditors.
- Programmed logics were built into the AuSDaT to verify data at the point of entry and then an independent logic check conducted with data sent back to services for verification.
- In addition, the National Stroke Audit Project Team was able to monitor data entry to follow up on missing data where these were critical to analysis.
- To minimise interpretation bias, data were analysed by an independent organisation.

Limitations of the data

There are several limitations to the data that readers of this report should consider:

- Participation in the National Stroke Audit is voluntary and data self-reported therefore may be subject to reporting bias, or misinterpretation of questions (response bias);
- Documentation issues should be considered; recording of data for the Clinical Audit assumes that, if a process was not documented, it was not performed, which may not always be the case. This is highlighted when data from the Organisational Survey and Clinical Audit provide conflicting information. However, as documentation of care is a medico-legal responsibility and proof that care was delivered, care could not be assumed in the absence of documentation. Better documentation will provide the ability to gather more robust data for monitoring stroke care and should be factored into all quality improvement activities;
- No case-mix adjustment was undertaken;
- Accuracy of responses may be dependent on the respondent's knowledge of their hospital's stroke services; and
- The National Stroke Audit is undertaken once every two years and the patient cohort sample size was relatively small in several of the participating services. Application of exclusion criteria and missing data further reduced the sample size for some indicator level analyses.

7.1 Conclusion and recommendations

The National Stroke Audit promotes the delivery of evidence-based stroke care by providing longitudinal data on resources and clinical performance, with national and state comparative data, as well as urban/rural, public/private, stroke unit/no stroke unit, and admission volume breakdowns. This report provides a robust overview of the current organisation and performance of stroke rehabilitation services across Australia.

It is encouraging to report improvement in most of the areas in the Organisational Survey and Clinical Audit. However, while improvements have occurred there are many areas where substantial improvements are required. Ongoing work and effort is required to review gaps in care, assess local barriers and enablers, develop and implement improvement plans and monitor the impact on the quality of care provided during inpatient rehabilitation. The significant proportion of the Australian population impacted by stroke, the cost of poor outcomes and the benefits that can be achieved by the delivery of appropriate interventions highlight the value of regular monitoring of care and ongoing efforts to improve quality. It is clear more effort needs to be applied by all if we are going to adequately serve the needs of our communities.

Action is required at two levels: gaps in care must be identified and addressed at a local level and, where common gaps exist, work should be carried out in consultation with relevant state clinical networks and health departments to support wider improvement.

Recommendations

1. Review stroke service coordination and links to ensure a streamlined flow of care based on patient's individual needs.
2. Ensure clinicians receive ongoing, stroke-specific education and training in line with the Clinical Guidelines for Stroke Management.
3. Ensure services are organised to provide more therapy during and after inpatient rehabilitation to maximise the opportunity for recovery.
4. Ensuring the psychological wellbeing of all patients is assessed and appropriate support is provided, recognising stroke recovery extends beyond the physical.
5. Preparing survivors for the life of their choosing through education, support, service linkages and planning for recovery within and beyond inpatient rehabilitation.
6. Greater recognition of the role of carers in the recovery journey, including assessments and training.

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Unprepared for life after stroke

80% 

NOT given information about intimacy after stroke

41% 

NOT offered assistance to return to work (for those who wanted to)

40% 

NOT given basic information about stroke rehabilitation **OR** lifestyle advice to prevent another stroke

26% 

of carers **NOT** offered training to cope with physical and emotional aspects of caring

APPENDIX

Participating services in Australia

We would like to thank everyone involved at all participating hospitals for their support and hard work on the National Stroke Audit – Rehabilitation Services 2018

New South Wales

Armidale Hospital

Ballina District Hospital

Balmain Hospital

Bankstown Lidcombe Hospital

Bathurst Hospital

Belmont Hospital

Berkeley Vale Private Hospital

Braeside Hospital

Coffs Harbour Base Hospital

Coledale District Hospital

Concord Hospital

David Berry Hospital

Greenwich Hospital

Griffith Base Hospital

Hornsby & Ku-ring-gai Hospital

Hunter Valley Private

John Hunter Hospital (Rankin Park)

Kurri Kurri Hospital

Lady Davidson Private Hospital

Lourdes Hospital

Maclean District Hospital

Metro Rehab Hospital

Mona Vale Hospital

Moruya Hospital

Mount Druitt Hospital

Nepean Hospital

Port Kembla Hospital

Prince of Wales Hospital

Royal Rehab Private

Ryde Hospital

Sacred Heart Health Service

Shoalhaven District Memorial Hospital

St George Hospital

Sutherland Hospital

Tamworth Base Hospital

Wagga Wagga Rural Referral Hospital

War Memorial Hospital

Wauchope Memorial Hospital

Westmead Hospital

Wingham Community Hospital

Northern Territory

Royal Darwin Hospital

Queensland

Brighton Health Campus

Bundaberg Base Hospital

Cairns Hospital

Eden Rehabilitation Hospital

Gold Coast University Hospital

Gympie Hospital

Ipswich Hospital

John Flynn Rehabilitation Hospital

Logan Hospital

Mackay Base Hospital

Maryborough Base Hospital

Mater Health Services – Brisbane

Princess Alexandra Hospital

Queen Elizabeth II Jubilee Hospital

Redcliffe Hospital

Robina Hospital

Rockhampton Base Hospital

Royal Brisbane and Women's Hospital

Sunshine Coast University Hospital

The Prince Charles Hospital

Toowoomba Hospital

Townsville Hospital

South Australia

Calvary Rehabilitation Hospital

Flinders Medical Centre

Griffith Rehabilitation Hospital

Hampstead Rehabilitation Centre

Modbury Hospital

Mt Gambier Hospital

Riverland Regional Health Service – Berri Campus

Whyalla Hospital

Tasmania

Launceston General Hospital

North West Regional Hospital

Royal Hobart Hospital

Calvary Healthcare Tasmania – St Johns Campus

Victoria

Angliss Hospital

Bairnsdale Hospital

Bendigo Hospital

Broadmeadows Hospital

Casey Hospital

Caulfield General Hospital

Central Gippsland Hospital

Dorset Rehabilitation Hospital

Echuca Hospital

Goulburn Valley Hospital

Heidelberg Repatriation Hospital

Kingston Centre

Latrobe Rehabilitation Hospital

Mildura Hospital

North Eastern Hospital

Golf Links Rd Hospital

Rosebud Hospital

Peter James Hospital

Royal Melbourne Hospital

Royal Talbot Hospital

St John of God Bendigo

St Vincent's Hospital Victoria

North East Health Wangaratta

Warrnambool Hospital

Hamilton Base Hospital

Sunshine Hospital

Wimmera Base Hospital

Albury Wodonga Health – Wodonga Campus

Cabrini Private Hospital

Mornington Centre

McKellar Centre – Barwon Health

Epworth HealthCare Brighton

St Vincent's Hospital St George's

Western Australia

Albany Hospital

Armadale Memorial Hospital

Bentley Hospital

Bunbury Hospital

Fiona Stanley Health Group

Fremantle Hospital

Geraldton Regional Hospital

Joondalup Health Campus

Osborne Park Hospital

Rockingham General Hospital

St John of God Midland Public Hospital

View the full report and additional documents at **informme.org.au/stroke-data**

Stroke FOUNDATION

How to get more involved

- **Give time** – become a volunteer.
- **Raise funds** – donate or hold a fundraising event.
- **Speak up** – join our advocacy team.
- **Leave a lasting legacy** – include a gift in your Will.
- **Know your numbers** – check your health regularly.
- **Stay informed** – keep up-to-date and share our message.

Contact us

- **StrokeLine 1800 STROKE (1800 787 653)**
- **strokefoundation.org.au**
- **/strokefoundation**
- **@strokefdn**
- **@strokefdn**

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