



strokefoundation

National Stroke Audit

Rehabilitation Services Report 2014





About the National Stroke Foundation

The National Stroke Foundation is a national not-for-profit organisation working with stroke survivors, carers, health professionals, government and the public to reduce the impact of stroke on the Australian community.

We are the voice of stroke in Australia. Our mission is to stop stroke, save lives and end suffering.

We will achieve this by:

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

Visit www.strokefoundation.com.au for more information.

National Stroke Foundation
Level 7, 461 Bourke Street
Melbourne VIC 3000
Phone +61 3 9670 1000
Fax +61 3 9670 9300
www.strokefoundation.com.au

ISBN 978-09872830-9-2

Suggested citation: National Stroke Foundation.
National Stroke Audit – Rehabilitation Services
Report 2014. Melbourne, Australia.

Note: The full document is available at
www.strokefoundation.com.au

Table of Contents

Report preparation	2		
Acknowledgements	2		
Glossary	2		
Executive summary	4		
Recommendations	6		
Chapter 1: Introduction	8		
1.1 Stroke in Australia	8		
1.2 Stroke rehabilitation services in Australia	8		
1.3 The National Stroke Audit Program	9		
1.4 Structure of the report	9		
Chapter 2: Methods	10		
2.1 Development of the questions	10		
2.2 Recruitment	10		
2.3 Training and support	10		
2.4 Organisational Survey methods	10		
2.5 Clinical Audit methods	10		
2.6 Data collection	10		
2.7 Data verification	11		
2.8 Data analysis	11		
Chapter 3: Participating hospitals	12		
3.1 Response rates and location of participating hospitals	12		
3.2 Characteristics of participating hospitals	13		
Chapter 4: Stroke Rehabilitation Framework elements	14		
4.1 Rehabilitation Stroke Services Framework	14		
4.2 Best practice and quality improvement	15		
4.3 Staff development	15		
4.4 Research	15		
Chapter 5: Assessment and management of patients	16		
5.1 Patient demographics	16		
5.2 Patient assessment	17		
5.3 Management of impairments	18		
5.4 Intensity of practice	20		
5.5 Goal setting and communication with patients	21		
Chapter 6: Secondary prevention and discharge planning	22		
6.1 Secondary prevention	22		
6.2 Preparation for discharge	22		
6.3 Life after stroke for patients and families	23		
Chapter 7: Assessing the outcomes of stroke	25		
7.1 Use of outcome measures	25		
7.2 Complications during hospital admission	25		
7.3 Mortality, length of stay and functional outcomes	25		
7.4 Discharge destination	26		
7.5 Access to community rehabilitation	26		
Chapter 8: Changes over time	28		
Chapter 9: Discussion and recommendations	29		
Chapter 10: Appendices	33		
Appendix 10.1 Participating hospitals	33		
Appendix 10.2 Audit questions related to the Rehabilitation Stroke Services Framework	37		
References	38		

Report preparation

Ms Elizabeth Ritchie

National Coordinator, Stroke Audit Program,
National Stroke Foundation

Ms Tara Purvis

Research Officer, Translational Public Health and
Evaluation Division, Stroke and Ageing Research,
Department of Medicine, School of Clinical Sciences
at Monash Health Monash University

Mr Kelvin Hill

National Manager, Clinical Programs,
National Stroke Foundation

Associate Professor Dominique Cadilhac

Head, Translational Public Health and Evaluation Division
Stroke and Ageing Research, Department of Medicine,
School of Clinical Sciences at Monash Health, Monash
University, NHMRC/NHF Research Fellow

Ms Monique Kilkenny

Senior Research Officer, Translational Public Health
and Evaluation Division, Stroke and Ageing Research,
Department of Medicine, School of Clinical Sciences
at Monash Health, Monash University

Dr Erin Lalor

Chief Executive Officer,
National Stroke Foundation

Ms Bonny Westmore

Project Officer,
National Stroke Foundation

Acknowledgements

The National Stroke Foundation would like to thank all who participated in the audit. We recognise the commitment to this process was significant and in many cases done with no financial recompense. We hope the information collected through this process provides valuable information that can be used at a local and national level.

The web-based data collection tool was developed by Netsolving Ltd.

Data analysis was undertaken by the Translational Public Health and Evaluation Division, Stroke and Ageing Research, School of Clinical Sciences at Monash Health, Monash University.

Rehabilitation data was provided with permission from individual hospitals by the Australasian Rehabilitation Outcomes Centre (AROC). Thanks to Tara Stevermuer and Francis Simmonds for their assistance in this process.

We acknowledge Ms Leah Wright for her input into the development of this report.

Glossary

ADL

Activities of daily living. The basic elements of personal care.

AIHW

Australian Institute of Health and Welfare. Australia's national agency for health and welfare statistics and information.

AFRM

Australasian Faculty of Rehabilitation Medicine. The Faculty's role as a higher education institution is central to its mission, "to train, accredit and support medical practitioners in the management of disability and handicap arising out of illness and injury."

AROC

Australasian Rehabilitation Outcomes Centre. AROC collects and reports on data from the Australian specialist medical rehabilitation sector.

DVT

Deep vein thrombosis. A clot of blood in the deep veins of the leg, arm or abdomen.

FIM

Functional Independence Measure. A score for measuring outcomes of rehabilitative care by recording a person's actual performance of basic activities of daily living. The scale consists of 18 activities of daily living with a score for each item ranging between 1 and 7 (1 = completely dependent to 7 = independent without device).

ICD-10

The International Statistical Classification of Diseases and Related Health Problems 10th Revision (ICD-10) is a coding of diseases and signs, symptoms, abnormal findings, complaints, social circumstances and external causes of injury or diseases as classified by the World Health Organization (WHO).

Q1, Q3

A measure of variability based on dividing a data set into quartiles. In this report we have used the first (Q1) and third (Q3) quartiles to provide a measure of variability. Q1 denotes the 25th percentile and Q3 the 75th percentile.

Known N

Known N is the number of eligible cases for any question being measured. It excludes from the denominator cases that do not qualify to be analysed, e.g. the Known N for analysis of treatment with antithrombotic medication would include ischaemic patients with stroke only.

MDT

Multidisciplinary team. Consists of medical, nursing and allied health practitioners.

MRS

Modified Rankin Score. A global disability scale that records a patient's functional ability with a score between 0 and 6 (0 = no symptoms, 6 = death).

NHMRC

National Health and Medical Research Council. NHMRC is Australia's peak body for health and medical research, health advice and ethics in health care and in health and medical research.

NSF

National Stroke Foundation. The NSF is a not-for-profit organisation that works with the public, government, health professionals, patients, carers and stroke survivors to reduce the impact of stroke on the Australian community.

SUTC

Stroke Unit Trialist's Collaboration is a group of authors who have written several landmark systematic reviews showing patients with stroke treated on stroke units have better health outcomes than those receiving conventional care.

Stroke unit

Various definitions exist. In principle the following attributes are common:

1. co-located beds within a geographically defined unit
2. a dedicated multidisciplinary team with a special interest in stroke or rehabilitation
3. regular team meetings and regular informal, clear interdisciplinary communication
4. access to ongoing professional education and training
5. a focus on patient-centred management with early involvement of carers.

Urban

Term used to describe metropolitan areas as well as large rural centres or regional areas with a population greater than 25,000.¹

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 25,000.¹

<30 stroke rehabilitation admissions per year

An arbitrary range used for analysing the audit data based on the likelihood staff will be less experienced in stroke management given the low exposure to patients with stroke per year.²

31–79 stroke rehabilitation admissions per year

An arbitrary range used for analysing the audit data based on the likelihood staff will be moderately experienced in stroke management given the moderate exposure to stroke patients per year.²

>80 stroke rehabilitation admissions per year

An arbitrary range used for analysing the audit data based on the likelihood staff will be more experienced in stroke management given the high exposure to stroke patients per year.²

Executive summary

The National Stroke Audit Rehabilitation Services Report 2014 provides valuable data on the nature of current rehabilitation stroke services in Australia. This report, for the first time, captures data in relation to the new National Rehabilitation Stroke Services Framework 2013. Importantly, it reflects a comprehensive description of clinical care aligned with the recommendations in the *Clinical Guidelines for Stroke Management 2010*.

It aims to highlight areas where the system for stroke rehabilitation is working well and to report on improvements or changes that may be needed as we move towards a consistent model of care across Australia. Hospitals may use the information in this report to compare themselves to the national averages presented to assess their stroke service performance and this may help to guide areas for quality improvement activity.

The National Rehabilitation Services Framework was developed in response to a need identified in the 2012 National Stroke Audit Rehabilitation Services report. The Framework provides recommendation for high quality stroke rehabilitation services. It also details the essential elements, principles and models of care for stroke rehabilitation services and provides administrators, funders, policy makers and health professionals with guidance about systems for effective transition of stroke survivors into the community when they leave hospital.

A total of 111 hospitals contributed data to the organisational survey. Among these hospitals 103 (93%) audited a total of 3,081 clinical case notes of patient admissions. From the Organisational Survey results it was estimated 8,425 patients with stroke were provided with inpatient rehabilitation during the previous year. Hospitals participating in the Clinical Audit accounted for the care of 7,750 (92%) of these patients. Interestingly these numbers are similar to figures provided by the Australasian Rehabilitation Outcomes Centre in *The AROC Annual Report: the state of rehabilitation in Australia in 2013* in which a total of 7,617 stroke rehabilitation episodes were counted.

The patient profiles mostly were comparable for this audit compared to the previous 2012 audit, with the same median age of audited cases in 2012 compared to 2014 (76 years).

For the first time, care provided in rehabilitation hospitals has been mapped to these essential elements of care in this report. There were ten elements of care recommended in the National Framework and there were two hospitals reporting adherence to all ten elements of the Framework. Seven hospitals were adhering to 9 of the elements, and there were 50 hospitals reporting they adhered to 5–7 of the elements. As the Framework becomes more integrated into rehabilitation services, these results should improve in future audits.

Encouragingly, the Clinical Audit data provided evidence that, overall, patients were often receiving expected care in accordance with the clinical guidelines. However, the Organisational Survey highlighted there remains a lack of processes to ensure this care is given consistently.

The National Framework highlights the need for specialised interdisciplinary stroke teams to best support patients, with the needs of patients audited falling across the spectrum of hospital care. It also highlights the importance of providing support not only to the patient but their carer. Only 43% of hospitals reported the routine provision of this support such as carer training, provision of information/education and provision of a care plan.

While these individual aspects of care appear to be done quite well based on the clinical data, the gaps reinforce the need to have formalised systems, policies and procedures so all patients and their family/carer are adequately supported to optimise their return to life activities. Just over 10% of patients had no documented evidence of discussing their management with the team. Only one-third of patients were given information about peer support groups or self-management programs and only 18% of patients were offered any information on sexuality post stroke.

As in previous audits the need for improved psychological and mood assessment and supports was highlighted. This audit found 39% of patients with identified mood impairment on admission were assessed by psychology and less than one-third of patients with stroke were provided formal counselling before their return home.

Management of incontinence was also an area where improvement was needed for patients to return to valued life activities. More than one-third of patients assessed were documented as having urinary incontinence and 62% of patients with urinary incontinence had a continence management plan documented. This remains a consistent pattern with previous audit reviews and continues to be an area for service development.

Perhaps most concerning was the large number of patients who were sent home without vital information on their recurrent stroke risk and the role rehabilitation can play in reducing risk. In this national audit it was found only 42% of patients received lifestyle advice as part of risk factor modification. Of the participating hospitals, 75 (68%) reported access to home-based rehabilitation services. However, 19 hospitals (26%) had on average more than two weeks delay in access to this service. Outpatient rehabilitation remains the most widely available rehabilitation service at 98 (88%) of sites. However, similar to home-based therapy one-third of hospitals had an average wait of over two weeks and 16% the delay to access the service was three or more weeks (similar to 15% reported in 2012).

Unlike specialised acute stroke units with defined characteristics, no such definition exists for specialised stroke rehabilitation units. The need to identify the core elements of successful inpatient rehabilitation programs in Australia is required to improve patient outcomes. Once these core elements have been identified, a benchmark can be set for the minimum standard and characteristics of a specialised stroke rehabilitation unit.

In summary, the audit captures for the first time the quality of stroke rehabilitation services measured against the National Rehabilitation Stroke Services Framework. It is encouraging to see the majority of patients were receiving care in accordance with the Framework, particularly as it is relatively new. In order to ensure all patients are receiving high quality, consistent care in line with the Framework there is a need for further education and processes to be put in place. Further improvements are expected as the Framework matures and elements become more engrained.

Recommendations

- Health services and governments should focus on efforts to ensure rehabilitation services meet more of the essential elements outlined in the Rehabilitation Stroke Framework.
- Improve systems of care (clear policy, procedures and practices) to reduce variation in care and ensure all patients requiring stroke rehabilitation optimise their return to valued life activities after stroke (including intimate relationships).
- Systems are established to ensure greater involvement of stroke survivors and the family/carer. This should include the provision of education, information and advice on stroke and stroke recovery, including risk factor modification.
- Systems are established or enhanced to ensure the psychological and emotional support needs of all stroke survivors are considered during rehabilitation (including further assessment and treatment by psychologists) and is offered to those who require it.
- Strategies to improve continence management after stroke are implemented.
- Further work be undertaken to better understand the most appropriate community rehabilitation services which should be offered to patients after their inpatient rehabilitation to enable timely follow up and continuation of rehabilitation in the community.
- Work be undertaken to establish a minimum data set for inpatient post-acute care.

Table 1 Summary of adherence to recommended processes of care

Process of care	Eligible to receive process of care	Number receiving process of care n	Adherence to process of care %
Total number of audits=3081			
Patient assessment and management			
Physiotherapy assessment	3,038	3,032	99
Occupational therapy assessment	3,033	3,018	99
Speech pathology assessment	2,702	2,540	94
Social work assessment	2,777	2,313	83
Psychology assessment;‡	485	191	39
Tailored, repetitive practice of walking if impairment present	2,574	2,409	94
Task specific practice if difficulties with ADL	2,656	2,426	91
Continence management plan if incontinent	941	583	62
Patient-centred care			
Meeting between patients and team to discuss management plan	2,946	2,560	87
Goal setting with the patient*	2,940	2,545	87
Education provided to stroke survivor/family	3,056	2,206	72
Secondary prevention			
Received advice for lifestyle risk factors	2,892	1,226	42
Discharged on lipid-lowering medication if ischaemic stroke+	2,340	1,971	84
Discharged on blood pressure-lowering medication+	2,930	2,413	82
Discharged on antithrombotics if ischaemic stroke+	2,325	2,249	97
Discharge planning and support for life after stroke			
Discharge care plan developed with input from team and patient	2,762	2,307	84
Received information on sexuality post stroke	3,055	559	18
Post-discharge contact provided to stroke survivor or family	3,056	1,887	62
Stroke survivor offered assistance to return to driving^	642	622	97
Stroke survivor offered assistance to return to work^	207	142	69
Formal counselling offered to stroke survivor*	2,898	939	32
Formal counselling offered to family/carer#	1,123	364	32
Post-discharge needs discussed with carer#	1,132	932	82
Carer received training#	1,083	912	84

* Patients without severe cognitive and/or communication difficulties

+ For eligible patients only, without contraindications for drug

Included carers of stroke survivors discharged to a private residence

^ For those discharged home, ADL (Activities of daily living)

‡ Known N included patients with mood impairment identified on admission and deemed to have required psychology input

Introduction

1.1 Stroke in Australia

Stroke is a major cause of mortality and disability in Australia.^{3,4} Most (89%) patients with stroke will be admitted to hospital following onset and over one-third of those admitted will transition between acute and rehabilitation services.^{5,6} The cost of stroke is immense when measured in financial terms.⁷ It is also a great social burden since it carries significant personal consequences for those affected by stroke as well as their families and carers.⁷

Most patients with stroke benefit from rehabilitation,⁸ although the setting where this should occur will depend on the individual.⁹ Rehabilitation is an holistic process facilitated by a multidisciplinary team (MDT) and defined as a health strategy with a primary goal of optimising function and enabling social reintegration for the stroke survivor.^{9,10} Rehabilitation following stroke should begin as early as possible – in the acute setting because early intervention is linked to improved health outcomes.⁹⁻¹² Prompt intervention from a rehabilitation team may facilitate earlier recovery and consequently improved health outcomes.^{9,11-15}

1.2 Stroke rehabilitation services in Australia

The Australasian Rehabilitation Outcomes Centre's *The AROC Annual Report: the state of rehabilitation in Australia in 2013*¹⁶ reports there were 7,617 stroke rehabilitation episodes during 2013 which is a small increase from 2012. Stroke represents the third largest impairment category of all the rehabilitation episodes in the public sector.¹⁶

Infrastructure (e.g. access to community rehabilitation) and resources (e.g. staffing) for stroke rehabilitation around Australia varies, as does adherence to recommended care.¹⁷ In general the systems of stroke care currently existing in Australia comprise free-standing and co-located acute and rehabilitation services. The *Clinical Guidelines for Stroke Management 2010*⁹ recommends acute and rehabilitation services should provide for the person with stroke a seamless transition in the health system.^{9,18} Workforce capacity and comprehensive team functioning are critical and previous audits have noted a need for better access to continuing staff education and the full range of disciplines.^{17,10,19}

The *National Rehabilitation Stroke Services Framework* has been developed in response to a need identified in the 2012 National Stroke Audit Rehabilitation Services report. The Framework provides recommendations for high quality stroke rehabilitation services. It also details the essential elements, principles and models of care for stroke rehabilitation services and provides administrators, funders, policy makers and health professionals with guidance about systems for effective transition of stroke survivors into the community when they leave hospital.²⁰

1.3 The National Stroke Audit Program

The National Stroke Foundation has been developing clinical guidelines for stroke management since 2003 and has been measuring adherence to recommendations in national guidelines since 2007 through the National Stroke Audit Program. Each alternate year the focus of the audit program changes between acute series and rehabilitation. The current *Clinical Guidelines for Stroke Management 2010*⁹ provides an overview of the current research evidence and presents recommendations for stroke care on which the measures in the audit program are based.

The National Stroke Audit Program comprises two components:

1. An Organisational Survey of stroke rehabilitation services across Australia. The survey assesses the resources required to deliver evidence-based stroke care such as the availability of stroke units, comprehensive assessment by the MDT and team meetings. The self-reported data are provided by a nominated clinician on behalf of the team. The questions are available from www.strokefoundation.com.au/audit
2. A Clinical Audit involving a retrospective review of up to 40 consecutive patients admitted to participating rehabilitation services. The Clinical Audit is used to measure the delivery of evidence-based processes of care for patients receiving inpatient rehabilitation such as timely assessment by allied health, goal setting, care planning and discharge planning. The questions are available from www.strokefoundation.com.au/audit

The Organisational Survey and Clinical Audit are 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.

The *National Stroke Audit – Rehabilitation Services 2014* took place in Australian free-standing rehabilitation hospitals and the rehabilitation services of acute hospitals.

This report is designed to provide an overview of inpatient rehabilitation services for stroke in Australia.

Feedback to participants is an essential component of the National Stroke Audit Program considering the evidence audit and feedback can influence and change clinical practice.^{12, 21, 22} Each participating rehabilitation service receives a site-specific report highlighting the performance so informed decisions can be made to improve patient care and outcomes. The process of audit and feedback is, therefore, a crucial part of the National Stroke Foundation's guidelines implementation process and core to a cycle of continuous quality improvement.

1.4 Structure of the report

This report outlines the adherence to the *Clinical Guidelines for Stroke Management 2010*⁹ in hospitals providing rehabilitation for stroke survivors. For the first time this report also outlines resources and structures available at these centres mapped to the National Stroke Framework Rehabilitation Services.

Methods

2.1 Development of the questions

The questions for the *National Stroke Audit – Rehabilitation Services 2014* were reviewed in line with the *Clinical Guidelines for Stroke Management 2010*⁹ with comments received from participants of the previous audit and staff from the National Stroke Foundation.

Changes in 2014 occurred in a small number of questions in the organisational survey in order to reflect the recommended elements outlined in the National Stroke Framework Rehabilitation Services. No changes to the clinical audit were made to the clinical audit used in 2012.

2.2 Recruitment

To be eligible for the *National Stroke Audit – Rehabilitation Services 2014*, hospitals required a rehabilitation service. Eligible hospitals were identified by previous participation in the National Stroke Audit, stroke clinical networks and Australasian Rehabilitation Outcomes Centre (AROC) stroke numbers. Chief executive officers from public and private hospitals were sent a letter of invitation to participate. These letters were then followed up by a series of phone calls and emails to senior staff members. Recruitment for the audit occurred between 1 December 2013 and 31 May 2014. An individual was nominated as the main contact at each site. This person received all correspondence during the audit period and was responsible for data collection and quality at their site.

2.3 Training and support

Hospitals received an online training package containing a PowerPoint presentation, as well as access to the audit web tool practice page. This allowed auditors to become familiar with using the audit web tool prior to entering any real data. Once training was completed auditors were asked to email the audit team for their site's individual site code and passwords. These unique and confidential codes gave them access to the online audit web tool and allowed secure data entry. In addition to the site code and passwords, auditors were supplied with a data dictionary that provided a rationale for each question as well as definitions and help notes for each of the audit questions. The project team was available for questions at all times leading up to, and during the data entry period.

2.4 Organisational Survey methods

Respondents from participating hospitals completed an organisational survey between 5 March and 4 June 2014. The questions are available from www.strokefoundation.com.au/audit.

2.5 Clinical Audit methods

Between 1 March and 31 May 2014 clinicians at participating rehabilitation services completed a clinical audit for up to 40 consecutive stroke admissions to the rehabilitation service for the 12 months commencing 1 January 2013. Discharge from the rehabilitation service had to be prior to 31 December 2013. This was to enable reliable comparisons to be made across participating rehabilitation services. 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. Patients presenting with transient ischaemic attack (TIA) or subarachnoid haemorrhage were excluded from the audit.

2.6 Data collection

Rehabilitation hospitals agreeing to participate only in the Organisational Survey were provided with an electronic copy of the paper-based questionnaire that could be printed and taken to the MDT meeting. On completion, the questionnaire was returned to NSF by email, post or fax. The audit project team entered the results into a secure web-based data entry tool (DET). Where possible, any missing data was obtained by phone or email and the audit team entered them directly into the DET. No patient identifying data is collected by the National Stroke Foundation. However, hospitals were asked to keep records that matched the patient audit number with their hospital's unique patient record identifier to allow data to be verified if required.

This year the DET gave auditors the opportunity to link data from AROC. Hospitals that had already submitted data to AROC were given the option to import their relevant data from AROC into the DET to reduce the burden of data entry.

Hospitals could access the DET using a standard internet connection. The DET offers a variety of administrative functions including allowing the monitoring of data collection at a local and central level as well as minimising missing and inconsistent data through inbuilt logic checks.

Respondents were able to change their responses prior to 6 June 2014 at which point all data was locked. However, data queries following programmed data logic checks up to 20 June 2014 permitted further changes where data was inconsistent or appeared incorrect.

Each participating rehabilitation service was asked to enter the first five patients' clinical notes twice using two different auditors who were requested to do this independently. This was to identify whether a case note audited by two people provided the same responses without any discussion about the case. This data is not reported here. This information will be used to refine the 2016 audit.

2.7 Data verification

Staff from the Translational Public Health and Evaluation Division, Stroke and Ageing Research, Monash University, implemented programmed data logic checks to validate data from the Organisational Survey and the Clinical Audit to ensure data was consistent. Following data cleaning, the final data was verified with each of the participating hospitals. Each participating rehabilitation service was sent a copy of their raw organisational and clinical data in an Excel spreadsheet to verify before the final analyses were undertaken.

2.8 Data analysis

Staff from the Translational Public Health and Evaluation Division, Stroke and Ageing Research, Monash University, analysed all data. For confidentiality, identifying information such as hospital name, not necessary for analysis, was excluded from the data submitted to Monash University. Only the hospital site identification number was provided.

The data was analysed using computer programs including Intercooled STATA 12.0 for Windows (Stata Corp, College Station, TX) and Excel (Microsoft Excel 2007). The data was exported from the web-based DET as an Excel spreadsheet and transferred into STATA.

All organisational and clinical data was aggregated to provide national estimates.

Subcategories for analysis included urban/rural status and public/private status. One hospital from the Australian Capital Territory (ACT) participated. The data from this hospital was combined with the New South Wales (NSW) hospitals and presented as 'NSW' throughout the report. We attempted to compare the data within a subcategory of specialised versus non-specialised units. However, given there is no agreed definition of a specialised rehabilitation unit, the comparison proved difficult and unreliable. This highlights the need for determining how stroke specialist rehabilitation units can be defined.

For medical history and impairment data, only valid responses (i.e. Yes, No) were included in the analysis. All other responses (such as 'not documented' or 'not assessed') have been reported in a separate column in the tables. 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 and 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. For processes of care where eligibility criteria were specified, a note has been made in the rationale or in a table footnote. Derived variables relating to processes of care, such as length of stay, were calculated based on admission and discharge dates.

The median (50th percentile) and first and third quartiles (25th and 75th) were reported for skewed continuous data from questions such as the number of strokes admitted each year.

Statistically significant differences in adherence between 2012 and 2014 process of care variables were compared using a chi square test with significance level set at $p < 0.05$.

Participating hospitals

3.1 Response rates and location of participating hospitals

This year there were 133 hospitals found to be eligible, 109 of these were public hospitals.

The 109 eligible public hospitals were targeted with active recruitment techniques involving follow-up phone calls and email communication. In total, 96 public hospitals and 15

private hospitals completed the Organisational Survey, and of these, 91 public and 12 private hospitals also participated in the Clinical Audit. This represents an 88% participation rate by eligible public hospitals in the Organisational Survey and 83% participation in the Clinical Audit.

Of the 13 public hospitals who didn't participate at all, nine declined to participate and the other four did not respond.

Table 2: Participating hospitals by location and rurality

	Organisational Survey			Clinical Audit		
	Total	Public	Private	Total	Public	Private
Australia	111	96	15	103	91	12
NSW/ACT	44	39	5	39	35	4
NT	1	1	0	1	1	0
QLD	17	15	2	16	14	2
SA	7	4	3	7	4	3
TAS	4	3	1	3	3	0
VIC	28	25	3	27	25	2
WA	10	9	1	10	9	1
Rurality						
Urban	100	86	14	92	81	11
Rural	11	10	1	11	10	1

3.2 Characteristics of participating hospitals

Hospital beds are an important resource. Respondents were asked to report the number of beds on their rehabilitation ward (if applicable) and on the dedicated stroke rehabilitation unit (if present). A stroke rehabilitation unit differs from the other two types of stroke unit, acute and integrated in that it does not admit patients acutely (within two days of stroke onset). Usually admission occurs within a week or so after stroke onset.

Annual stroke admissions are a major factor influencing the rehabilitation teams ability to offer specialist care. Respondents were asked to provide the number of stroke admissions to their rehabilitation unit in the previous year.

Results

Among the 111 participating hospitals in the Organisational Survey, inpatient rehabilitation was provided to 8,425 patients with stroke in 2013.

Hospitals also participating in the Clinical Audit accounted for the care of 7,750 (92%) of these patients.

On the day of the survey 662 patients with stroke were admitted to all rehabilitation services. Of these, 70 (11%) patients were cared for on a dedicated stroke rehabilitation unit.

Staff reported a total of 3,636 dedicated in-patient rehabilitation beds in the 111 participating hospitals (per hospital median: 26; Q1, Q3: 18, 40). South Australia reported the largest rehabilitation services, while Northern Territory reported the smallest (Table 3). Over half the hospitals reported between 36 and 97 stroke admissions in 2013.

The number of stroke rehabilitation patients admitted to each hospital in 2013 ranged from 8 to 400 (median: 56; Q1, Q3: 36, 97).

Table 3: Characteristics of participating hospitals by location, rurality and setting, and number of rehabilitation beds and stroke admissions

	Number of beds 2013 Median (Q1 Q3)*	Number of admissions 2013 Median (Q1 Q3)*	Number of stroke admissions per site in 2013			
			≤30	31–79	80–99	≥100
Australia (N=111)	26 (18, 40)	56 (36, 97)	19	55	14	23
NSW (N=44)	23 (18, 35)	55 (33, 73)	10	24	6	4
NT (N=1)+	18	16	1	0	0	0
QLD (N=17)	22 (15, 29)	52 (45, 87)	1	11	1	4
SA (N=7)	55 (30, 65)	99 (40, 135)	0	3	1	3
TAS (N=4)	22 (13, 35)	37 (31, 45)	1	3	0	0
VIC (N=28)	30 (21, 50)	75 (37, 102)	5	10	6	7
WA (N=10)	32 (12, 62)	80 (37, 138)	1	4	0	5
Rurality						
Urban (N=100)	29 (20, 41)	60 (40, 98)	12	51	14	23
Rural (N=11)	8 (8, 16)	23 (15, 36)	7	4	0	0

* (Q1 Q3) quartile one, quartile three

+ Actual value reported as only one site

Availability of independent living units varied the most between settings. Thirty-eight percent of urban hospitals reported having access to an independent living unit while only two (18%) rural hospitals reported access. Whilst 39% of public hospitals reported access to an independent living unit this was less in private hospitals (20%).

Stroke Rehabilitation Framework elements

4.1 Rehabilitation Stroke Services Framework

The Framework details the essential elements, principles and models of care determined as best-practice evidence-based stroke rehabilitation. Questions in the Organisational Survey are linked to the ten essential elements in the Framework with one to three positive responses to survey questions needed to achieve compliance with each element. For example, for element two (specialised

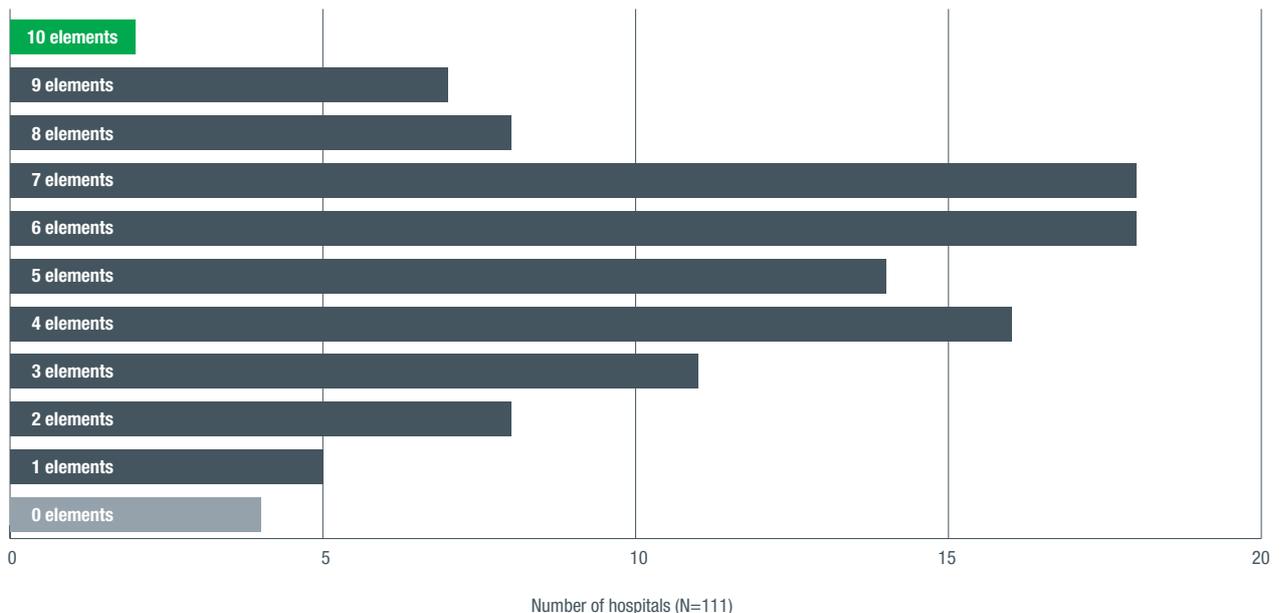
interdisciplinary team) hospitals had to have all team members present on staff AND have access to professional development specific to stroke (Questions 3.1 and 3.4 from the Organisational Survey) – the full list of elements and related questions can be found in appendix 10.2.

Results

Table 4 reports adherence to essential elements of stroke services as prescribed in the Rehabilitation Stroke Services Framework 2013.

Table 4: Framework comparison

Framework elements	Australia (N=111) n (%)	NSW/ACT (N=44) n (%)	QLD (N=17) n (%)	SA (N=7) n (%)	TAS (N=4) n (%)	VIC (N=28) n (%)	WA (N=10) n (%)
1. Effective links with acute stroke service providers	68 (61)	32 (73)	13 (77)	5 (71)	2 (50)	12 (43)	4 (40)
2. Specialised interdisciplinary stroke (or neuro-rehabilitation) team with access to staff education and professional development specific to stroke	66 (60)	28 (64)	12 (71)	3 (43)	1 (25)	15 (54)	7 (70)
3. Co-located stroke beds within a geographically defined unit	30 (27)	8 (18)	7 (41)	3 (43)	0 (0)	7 (25)	5 (50)
4. Standardised and early assessment for neuro-rehabilitation	48 (43)	21 (48)	7 (41)	4 (57)	1 (25)	13 (46)	2 (20)
5. Written rehabilitation goal setting processes with patients	81 (73)	30 (68)	12 (71)	4 (57)	3 (75)	25 (89)	7 (70)
6. Routine use of evidence-based guidelines to inform evidence-based therapy for clinicians	76 (69)	35 (80)	12 (71)	6 (86)	1 (25)	16 (57)	6 (60)
7. Best practice and evidence-based intensity of therapy for goal related activity with patients	63 (57)	30 (68)	10 (59)	4 (57)	0 (0)	14 (50)	5 (50)
8. Systems for transfer of care, follow-up and re-entry for patients	29 (26)	10 (23)	2 (12)	4 (57)	0 (0)	9 (32)	4 (40)
9. Support for the person with stroke and carer (e.g. carer training, provision of information/education, provision of care plan) to maximise community participation and long-term recovery	48 (43)	14 (32)	8 (47)	4 (57)	1 (25)	17 (61)	4 (40)
10. Systems that support quality improvement, i.e. regular (at least every two years) review of local audit data by the stroke team to prioritise and drive stroke care improvement	60 (54)	23 (52)	11 (65)	6 (86)	1 (25)	14 (50)	5 (50)

Figure 1: Framework elements met

4.2 Best practice and quality improvement

All rehabilitation providers need to ensure they have a culture of quality improvement via audit, benchmarking and review. This is to ensure they are providing the best practice care based on the available evidence, expert consensus and client experience. These quality improvement activities should be regular (at least every two years) and use patient record to identify practice gaps, review local factors involved and lead to a clear action plan for improvement.²⁰

Results

Eighty-four (76%) hospitals reported that over the past two years the stroke team have been involved in quality improvement activities which included reviewing local audit data and agreeing on strategies to improve care.

4.3 Staff development

It is important staff in dedicated stroke services have received the appropriate training in stroke care and they have ongoing access to regular professional development to maintain and update their skills and knowledge in stroke care.²⁰

It was reported 68 (61%) hospitals provided access to staff for continuing education related to stroke management, processes supporting routine use of guidelines and their participation in research.

4.4 Research

Forty-one of the 54 hospitals reportedly conducting stroke research had a focus on rehabilitation-specific studies. A total of 132 research studies were being undertaken, of which 74 were rehabilitation specific. This was slightly lower than reported in 2012 (n=82 rehabilitation specific studies).

Assessment and management of patients

5.1 Patient demographics

Participants in the Clinical Audit entered data for a total of 3,081 (excluding 207 reliability cases) patient case notes. The majority (93%) of these patients were managed in urban hospitals.

Table 5: Patient demographics

Demographic	Australia (N=3,081) n (%)
Male	1,655 (54)
<65	683 (22)
65–74	724 (23)
75–84	1,037 (34)
≥85	637 (21)
Median Age (Q1 Q3)*	76 (66, 84)
Aboriginal and/or Torres Strait Islander background^	54 (2)
Non-English speaking background with requirement for interpreter	243 (8)
Ischaemic stroke	2,391 (78)
Intracerebral haemorrhage	532 (17)
Unknown stroke type	158 (5)
Independence on admission (mRS 0-2)#	261 (9)
	FIM score (Q1 Q3)+
Median FIM on admission	76 (53, 95)
Median motor FIM on admission	51 (30, 66)
Median cognitive FIM on admission	26 (19, 31)

*Q1 Q3- first quartile, third quartile

^1-13% not stated/inadequately described – removed from denominator

+<5% missing data

#<2% missing data

The majority (79%) of the audited cases were managed in mixed rehabilitation wards. Just over one-fifth of the cases (658) audited were treated in either a specialist stroke or neuro-rehabilitation unit.

5.2 Patient assessment

5.2.1 Multidisciplinary team (MDT) assessment

Respondents were asked to provide the dates and times of assessment by members of the MDT on each audited case so median times to assessment could be calculated. Eligibility for an assessment by allied health was determined from the medical record. For example, assessment rates and times to assessment for dietitians and psychologists only related to those with documented nutrition complications and mood impairment respectively.

Results

The majority of patients were assessed by most members of the MDT at some point during their admission (Table 6).

Some patients were not seen by some allied health disciplines because the particular therapist was not employed by the hospital. This was most common for patients with mood impairment where clinical psychology was often unavailable.

Table 6: Multidisciplinary team assessment

Discipline	Eligible for assessment N	Received assessment n (%)	Median time to assessment M (Q1 Q3)* days^
Physiotherapy	3,038	3,032 (99)	0 (0, 1)
Occupational therapy	3,033	3,018 (99)	1 (0, 2)
Speech pathology	2,702	2,540 (94)	1 (0, 3)
Social work	2,777	2,313 (83)	5 (2, 9)
Dietetics	1,012+	986 (98)	3 (1, 7)
Psychology	485#	191 (39)	10 (5, 19)

*Q1 Q3; first quartile, third quartile

+Known N includes patients with nutrition complications identified on admission

#Known N includes patients with mood impairment identified on admission and deemed to have required psychology input

^Known dates

5.2.2 Use of standardised assessment tools

Clinicians should use validated and reliable assessment tools or measures which meet the needs of the patient to guide clinical decision-making.⁹ Respondents were asked to indicate if standardised assessments were used for evaluating impairments following stroke and to select the ones most frequently used. More than one assessment tool for each impairment could be selected.

Results

Respondents from all surveyed hospitals reported the use of standardised assessment tools for evaluation of common impairments after stroke. The assessment tools used for common impairments are outlined in Table 7. Only 55% of patients received an assessment for mood, however, documentation was poor and a large number (n=898) of patients were excluded from this analysis. There were a range of various 'other' tools reported. Further work is required to report these in detail.

Table 7: Summary of tools used for assessing impairments

Assessment	Received assessment n (%)	'Not documented' response n (%)	Tool used to assess impairment	Rate of selection of tool n (%) ⁺
Upper limb function (N=3,081)	2,686 (87)	155 (5)	Upper limb component of the Motor Assessment Scale: UL-MAS	1,505 (56)
			9 hole peg test: 9HPT	581 (22)
			Other	1,374 (51)
Urinary incontinence (N=3,081)	2,543 (83)	192 (6)	Non-standardised bladder function chart	980 (39)
			Post-void residual scan	1,021 (40)
			FIM subset	2,064 (81)
			Other	450 (18)
Mood (N=3,081)	1,194 (39)	898 (29)	Geriatric Depression Scale: GDS	290 (24)
			Hospital and Depression Scale: HADS	200 (17)
			Other	661 (55)

⁺Of all patients who received assessment

5.3 Management of impairments

Respondents reported impairments on admission. The management of the consequences of stroke were also audited. Management options were based on common therapies recommended in the *Clinical Guidelines for Stroke Management 2010*.⁹

Results

Most patients (87%) on admission had difficulties with ADLs and 84% had difficulty walking independently. As with the previous section the use of 'other' therapies or management strategies varied and are not detailed in this present report.

Table 8: Management of impairments

Impairment assessed	Impairment present n (%)*	'Not documented/ not assessed' response n (%)	Type of therapy/management	Therapy provided n (%)+
Difficulty walking independently (N=3,055)	2,574 (84)	18 (1)	Tailored, repetitive practice of walking	2,409 (94)
			Cueing of cadence	1,150 (45)
			Mechanically assisted gait	405 (16)
			Joint position biofeedback	442 (17)
			Other therapy	1,362 (53)
Difficulties with ADLs (N=3,054)	2,656 (87)	27 (1)	Task specific practice	2,426 (91)
			Trained use of appropriate aids	1,618 (61)
			Other	975 (37)
Aphasia (N=2,958)	845 (29)	123 (4)	Alternative means of communication	518 (61)
			Phonological and semantic interventions	630 (75)
			Constraint-induced language therapy	122 (14)
			Supported conversation techniques	638 (76)
			Delivery of therapy programs via computer	117 (14)
			Group therapy	165 (20)
			Other therapy	312 (37)
Neglect/inattention (N=2,800)	778 (28)	281 (9)	Visual scanning with sensory stimulation	569 (73)
			Prism adaption	28 (4)
			Eye patching	27 (4)
			Simple cues	649 (83)
			Mental imagery training	160 (21)
			Other therapy	262 (34)
Nutrition complication (N=2,917)	1,038 (36)	164 (5)	Ongoing monitoring by dietitian	990 (95)
			Nutritional supplementation	818 (79)
			Alternative feeding	170 (16)
Upper limb impairment (N=2,686)	1,821 (69)	58 (2)	Constraint-induced movement therapy (in selected patients)	154 (9)
			Repetitive task-specific training	1,577 (87)
			Mechanically assisted training (need help notes to specify)	169 (9)
Urinary incontinence (N=2,543)	941 (37)	0 (0)	Continence management plan	583 (62)
Mood impairment (N=1,194)	546 (47)	33 (3)	Antidepressants	373 (68)
			Psychological (e.g. cognitive-behavioural) interventions	214 (39)
			Other therapy	137(25)

*Known N all patients with assessment recorded ie yes/no (excludes not documented/not assessed data)

^Known N patients who 'received assessment' (Table 7)

+N is all patients with impairment present

5.4 Intensity of practice

The amount and intensity of rehabilitation provided to stroke survivors greatly affects their outcomes. The *Clinical Guidelines for Stroke Management 2010*⁹ recommend patients be provided with as much therapy as possible with a minimum of an hour active practice for physical therapy and as much therapy for dysphagia or communication difficulties as can be tolerated.⁹ Group therapy is suggested as one strategy to increase the amount of practice.⁹

Results

The reported intensity of available therapy at the participating rehabilitation services is outlined in Table 9. The frequency of each activity varied. Therapy in a group setting was used at 95 (86%) hospitals.

Table 9: Intensity of available therapy (Organisational Survey)

	Australia (N=111) n (%)	If yes, frequency			
		Always n (%)	Usually n (%)	Sometimes n (%)	Rarely n (%)
Do patients with motor impairments usually undertake at least one hour of active physical therapy (physiotherapy and/or OT) per day (at least five times per week)?	108 (97)	55 (51)	49 (45)	3 (3)	1 (1)
Is group circuit class training used as a method to increase amount of practice?	66 (60)	21 (32)	20 (30)	24 (36)	1 (2)
Is speech therapy for dysphagia or communication difficulties provided as much as can be tolerated (aiming for at least two hours per week)?	107 (96)	58 (54)	45 (42)	4 (4)	0 (0)
Is provision made during the day for patients to practice skills learnt in therapy sessions?	107 (96)	36 (34)	52 (48)	19 (18)	0 (0)

5.5 Goal setting and communication with patients

Stroke survivors and their families/carers should be given the opportunity to participate in the process of setting goals unless they choose not to or are unable to participate.⁹

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

In total 2,560 (87%) patients without severe cognitive and/or communication difficulties had the opportunity to meet and discuss their management with the MDT. For 135 (4%) patients with severe cognitive and/or communication difficulties family members met with the team in lieu of the patient to discuss their management. Just over 10% of patients had no documented evidence of discussing their management with the team.

Most hospitals (81%) had a formal process for goal setting. The processes used for establishing goals are outlined in Table 10. The most common practice for goal setting was an interview with the patient by individual disciplines followed by a review at the MDT meeting (70%). In total, 2,545 (83%) patients without cognitive or severe communication difficulties were central to the process of setting their goals with input from the MDT. For 141 (5%) patients with severe cognitive or communication difficulties, the patient's goals were set by their family/carer with input from the MDT. One in five patients did not have the opportunity to discuss goal setting with the MDT.

Table 10: Processes for goal setting (Organisational Survey)

Process	Australia (N=111) n (%)
Usual practice is that person interviewed by separate disciplines only	6 (5)
Usual practice is that person interviewed by disciplines separately and goals reviewed at MDT meeting	78 (70)
Usual practice is that person and MDT develop goals together	14 (13)
No consistent process	8 (7)
Goals not patient-directed	1 (1)
Other	4 (4)

Table 11: Involvement of patient/family in goal setting processes (Clinical Audit)*

	Australia (N=2,946) n (%)
Patients met with team to discuss management*	2,560 (87)
	(N=2,940)
Goals set with input from patients*	2,545 (87)
	(N=3,081)
Patients/family received information regarding stroke	2,219 (72)

*Patients without cognitive/communication difficulties

Secondary prevention and discharge planning

6.1 Secondary prevention

There are clear recommendations in the *Clinical Guidelines for Stroke Management 2010*⁹ for the use of blood pressure-lowering, cholesterol-lowering and antiplatelet or anticoagulation pharmacotherapy to prevent further vascular events.⁹ Commencement of therapy should occur prior to discharge to improve compliance.²³ All stroke survivors should be assessed and educated on lifestyle risk factor modification.⁹

Results

Table 12 summarises the secondary prevention measures provided on discharge. Ninety-seven percent of patients with an ischaemic stroke were prescribed antithrombotics, while under half received advice about risk factor modification.

Table 12: Secondary prevention measures on discharge

	Australia (%)
On antithrombotics on discharge*+ (N=2,325)	2,249 (97)
On antihypertensives on discharge+ (N=2,930)	2,413 (82)
On lipid lowering therapy on discharge*+ (N=2,340)	1,971 (84)
Received advice about risk factor modification on discharge+ (N=2,892)	1,226 (42)

*Ischaemic strokes only

+Patients discharged alive, and with no contraindication for drug

6.2 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. Rehabilitation is concerned with addressing these factors and facilitating the stroke survivor's reintegration to the community as well as their physical recovery.

Effective discharge planning facilitates the transfer of the stroke survivor to the community by maximising independence, minimising social isolation and ensuring the needs of the patient and carer are addressed. Carers often report difficulties coping in the community due to inadequate training and lack of support following the discharge of the stroke survivor.^{9, 24}

Aspects of care recommended in the *Clinical Guidelines for Stroke Management 2010*⁹ include a potential home visit, assessment and discussion of the post-discharge needs of the patient and family/carer, and timely communication with relevant health professionals in the community.⁹ All stroke survivors and their families/carers should be provided with tailored information and opportunities for clarification or reinforcement of the information provided.⁹

Respondents were asked to describe how discharge-planning processes and patient education is usually delivered at their hospital. Respondents were then asked to describe the discharge-planning processes that had been documented for their audited patients and their carers.

Results

Of the 111 hospitals surveyed, 90% stated patient education was provided at their hospital. Education delivery methods include written/audio visual and verbal sessions, either individual or group. Most hospitals provided written and verbal information/education. Fewer patients were found to have documented evidence of written information in the clinical audit (Table 13). Half the hospitals surveyed reported providing a discharge care plan while the Clinical Audit revealed four in five patients received a care plan prior to discharge. Just over half of the hospitals surveyed reported having protocols for guiding discharge planning (51%) and provided a key contact person for post-discharge questions (58%), which is similar in the findings from the Clinical Audit (Table 14). Among those discharged home (N=1,716), 1,216 (71%) had a home assessment completed.

Table 13: Patient education provided

	Australia	
	(Organisational Survey) (N=111) n (%)	(Clinical Audit) (N=3,056) n (%)
Patient education provided	99 (89)	2,206 (72)
If yes, provided by	n^ (%)	n^ (%)
Written or audio	81 (82)	1,318 (60)
Individual verbal	87 (88)	1,893 (86)
Group session	28 (28)	444 (20)

*Known N limited to stroke survivors

^Denominator limited to those who had patient education

Table 14: Use of discharge-planning processes

	Australia n (%)	NSW n (%)	NT n (%)	QLD n (%)	SA n (%)	TAS n (%)	VIC n (%)	WA n (%)
Discharge care plan provided (N=2,762)*	2,307 (84)	756 (79)	6 (46)	408 (89)	176 (85)	76 (95)	678 (89)	207 (73)
Contact provided for post-discharge questions (N=3,056)**	1,887 (62)	686 (64)	1(8)	234 (48)	175 (78)	42 (50)	534 (64)	215 (63)

*Known N is limited to eligible patients alive at discharge.

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

6.3 Life after stroke for patients and families

The transition from therapy to life after stroke can be challenging.²⁵ The *Clinical Guidelines for Stroke Management 2010*⁹ covers a range of topics including return to driving, return to work, leisure activities, sexuality and accessing support.⁹

Respondents were asked to describe the activities documented related to preparing the patient and carer for life in the community.

Results

The information provided to stroke survivors and carers regarding preparation for life in the community varied (summarised in Tables 15 and 16). One-third of patients were provided with information about self-management programs and 18% received information on sexuality. While 84% of carers were provided training, only 32% were offered formal counselling.

Of the 111 hospitals that completed the Organisational Survey, 60 (54%) reported routinely following up patients with stroke to assess their post stroke needs.

Fifty-six (51%) hospitals reported having local protocols for routinely reviewing patients with stroke discharged from inpatient rehabilitation.

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

	Australia	
	N	n (%)
Offered formal counselling if no cognitive issues*	2,898	939 (32)
Received information on sexuality*	3,055	559 (18)
Provided information about self-management programs if no cognitive issues*	2,599	883 (34)
Offered information about peer support*	2,865	908 (32)
Offered assistance to return to work if wanted to return to work+*	207	142 (69)
Offered some assistance to return to driving if wanted to return to driving+*	642	622 (97)

*Known N is limited to patients alive at discharge

+For those patients discharged to private residence.

Table 16: Preparation of carer for life in the community

	Australia	
	N	n (%)
Number of reported carers^	2,107	1,161 (55)
Carers provided training*	1,083	912 (84)
Carers identified and discussed post-discharge needs*	1,132	932 (82)
Carers offered information about peer support*	1,161	522 (45)
Carers offered formal targeted counselling*	1,123	364 (32)

^Of those survivors discharged to a private residence.

*Known N is limited to carers of stroke survivors that were discharged to private residence (excluding no, but).

Chapter 7

Assessing the outcomes of stroke

7.1 Use of outcome measures

All of the participating hospitals reported using at least one outcome measure. The Functional Independence Measure (FIM)²⁶ was the most frequently used measure (108 hospitals [97%]) followed by the Motor assessment scale²⁷ 52 (47%) and Barthel Index²⁸ 22 (20%).

7.2 Complications during hospital admission

Table 17 depicts the complications present on admission to rehabilitation and those developed during the rehabilitation stay. Fourteen percent of the patients audited had a 'fall' and 13% (389) developed a urinary tract infection during the rehabilitation admission.

Table 17 Complications on admission and during rehabilitation

	On admission to rehabilitation (N=3,081) n (%)	During rehabilitation (N=3,081) n (%)
Aspiration pneumonia	124 (4)	85 (3)
Deep vein thrombosis (DVT)	39 (1)	29 (1)
Falls	299 (10)	441 (14)
Fever	102 (3)	179 (6)
Pressure sores	66 (2)	62 (2)
Shoulder subluxation	116 (4)	84 (3)
Shoulder pain	227 (7)	231 (8)
Urinary tract infection	234 (8)	389 (13)
Contracture	17 (1)	28 (1)
Malnutrition	269 (9)	116 (4)

7.3 Mortality, length of stay and functional outcomes

Among the 3,081 patients audited, 25 (1%) died while in hospital. The median length of stay for those patients who died was 14 days (Q1 Q3; 8, 28).

The median length of stay for the 3,056 patients discharged from hospital was 22 days (Q1 Q3; 13, 39). The median FIM score on discharge was 105 (Q1 Q3; 80, 116). A FIM score greater than 80 reflects a functional level requiring assistance from only a single caregiver.²⁹

A total of 1,310 (45%) patients achieved a 22-point net positive change in FIM. Of these, 79% were discharged to a private residence. It has been shown a 22-point change in FIM represents a reliable threshold for consideration of a positive response to rehabilitation.¹⁹ This also correlates with average FIM improvement of 22.7 from admission to discharge reported in AROC data.¹⁶

Table 18: Distribution of FIM scores and mRS on admission and discharge

FIM Range	Australia	
	Admission %	Discharge %
18–60	33	16
61–78	20	8
79–99	28	18
100–126	19	58
Median (Q1 Q3)* change FIM	19 (9, 33)	
mRS		
0	1	3
1	1	4
2	7	26
3	18	36
4	43	19
5	30	12
Change in mRS	N (%)	
Improvement	1,799 (60)	
No change	1,113 (37)	
Deterioration	77 (3)	

*Q1 Q3; first quartile, third quartile
mRS – modified Rankin Scale
FIM – Functional Independence Measure

7.4 Discharge destination

Of the 2,107 patients discharged home, 1,073 (51%) had formal supports provided on discharge. These supports were new for 793 patients (74%).

7.5 Access to community rehabilitation

Of the 21 hospitals reporting access to early supported discharge, 13 responded their model was considered a true substitute for in-patient rehabilitation.

Table 22 represents the stroke survivors referred for community rehabilitation regardless of discharge destination. Of the 2,064 patients discharged home (with valid responses to this question) 1,668 (81%) were referred for further rehabilitation in the community. Referrals to ongoing rehabilitation included 280 (17%) cases to a transitional care service, 682 (41%) to outpatient rehabilitation and 709 (43%) to community rehabilitation.

The availability of allied health staff in community rehabilitation services varied. Physiotherapists, occupational therapists and speech pathologists were more readily available (approximately 87–100%) in all settings (outpatient, rehabilitation provided in the home, early supported discharge services and day hospitals). Generally the availability of psychologists was limited (17–48%).

Table 19: Discharge destination

	Australia (N=3,081) n (%)
Private residence	2,107 (68)
High level supported	343 (11)
Low level supported	113 (4)
Died in hospital	25 (1)
Statistical discharge*	150 (5)
Other	343 (11)

*Statistical discharge means the patient was re-classified and was no longer participating in formal rehabilitation at the site. It may include patients transferred to another hospital for further rehabilitation or patients transferred to another service within the same hospital for any of acute care/maintenance/palliative care.

Table 20: Access to community rehabilitation

	Australia (N=111) n (%)
Early supported discharge teams	29 (26)
Outpatient rehabilitation	98 (88)
Community-based rehabilitation provided in the home	75 (68)
Day hospital	31 (28)
Access to any of the four types of rehabilitation	109 (98)
No access to any types of rehabilitation	2 (2)

Table 21: Usual time to access community rehabilitation after discharge

	Hospitals with access to service N	Time to access community rehabilitation service				
		<1 week n (%)	1–2 weeks n (%)	2–3 weeks n (%)	3–4 weeks n (%)	>4 weeks n (%)
Early supported discharge teams	29	20 (69)	8 (28)	1 (3)	-	-
Outpatient rehabilitation	98	28 (29)	36 (37)	18 (18)	6 (6)	10 (10)
Community-based rehabilitation provided in the home	75	34 (45)	22 (29)	15 (20)	2 (3)	2 (3)
Day hospital	31	15 (48)	7 (23)	4 (13)	3 (10)	2 (6)

Table 22: Patients referred for community rehabilitation

	Australia (N=2,953) n (%)*
Referred for further rehabilitation#	2,006 (68)
If yes, type of rehab+	(N=2,006) n (%)
Community rehabilitation	739 (37)
Outpatient rehabilitation	715 (36)
Other inpatient rehabilitation	252 (13)
Transitional Service	403 (20)

*Known N (excluding missing data and not documented) used for denominator

+Patients can be referred to more than one type of rehabilitation

#Regardless of discharge destination

Changes over time

Examining changes in adherence to select recommendations over time provides a way to assess whether quality of care priorities identified in previous audits are being translated into practice. Only questions that were directly comparable between the audit periods are provided below. Note, only the results from the previous (2012 audit) and the current audit (2014) have been compared statistically.

Table 23: Progress on recommendations over time (all hospitals)

Recommendation	Adherence by year			
	2008	2010	2012	2014
Professional development and research				
% Access to continuing education relating to stroke management to facilitate improved adherence to evidence-based care	54	55	68	61
Total number of stroke rehabilitation research programs	56	79	82	74
Patient assessment and management				
% Hospitals using formal process for goal setting with patients	93	76	82	81
% Goals set with input from the team and patient+	–	79	79	87*
% Mood assessed	56	–	34	39*
Discharge-planning and follow up				
% Discharge care plan outlining post-discharge care in the community developed with the input from the team and the patient	–	75	74	84*
% Stroke survivor received information on sexuality post stroke	13	12	17	18
% Post-discharge contact provided to stroke survivor/family	63	52	57	62*
% Carer received training#	67	71	78	84*
% Post-discharge needs discussed with carer#	88	86	78	82*
% Carer offered information about peer support#^	45	40	40	45*
% Access to any community rehabilitation services++	92	97	96	98
Secondary prevention				
% Life style advice given to stroke survivor^	46	42	34	42*
% Discharged on antithrombotic if ischaemic stroke and not contraindicated	–	89	97	97
% Discharged on lipid-lowering medication if ischaemic stroke and not contraindicated	77	79	84	84
% Discharged on blood pressure-lowering medication and not contraindicated	78	82	85	82*

*Chi square test comparing 2012 and 2014 audit results. Significance $p < 0.05$

+For patients without severe cognitive/communication difficulties

#Eligible patients included those who were discharged home

^Answers changed from 2012 to include 'not documented'. This has been included in denominator for 2012/2014 so care must be taken when comparing to earlier time periods as not directly comparable

++This included access to community rehabilitation in the home, early supported discharge, day hospital or outpatients

Chapter 9

Discussion and recommendations

The *National Stroke Audit Rehabilitation Services Report 2014* provides valuable data on the nature of current rehabilitation stroke services for stroke in Australia. Importantly, a comprehensive description of clinical care that is aligned with the recommendations in the *Clinical Guidelines for Stroke Management 2010*⁹ is provided.

Hospitals may use the information in this report to compare themselves to the national averages presented to assess their stroke service performance and this may help to guide areas for quality improvement activity.

Characteristics of participating hospitals and audited cases

A total of 111 hospitals contributed data to the Organisational Survey. Among these hospitals 103 (93%) audited a total of 3,081 clinical case notes of patient admissions. From the Organisational Survey results it was estimated 8,425 patients with stroke were provided with inpatient rehabilitation during the previous year. Hospitals participating in the Clinical Audit accounted for the care of 7,750 (92%) of these patients. Interestingly, these numbers are similar to figures provided by the Australasian Rehabilitation Outcomes Centre in *The AROC Annual Report: the state of rehabilitation in Australia in 2013* in which a total of 7,617 stroke rehabilitation episodes were counted.

The majority of participating hospitals were located in urban areas with 11 rural hospitals providing data for the Organisational Survey and the Clinical Audit.

The patient profiles mostly were comparable for this audit compared to the previous 2012 audit. In the current audit most patients were dependent on admission (median FIM™ 76 IQR 53-95) and had difficulty walking independently (84%).

Essential elements of rehabilitation services

The National Rehabilitation Stroke Services Framework has been developed in response to a need identified in the 2012 National Stroke Audit Rehabilitation Services report which recommended “further work should be undertaken to identify core elements of effective stroke rehabilitation units to facilitate greater access to this model of evidence-based stroke care in Australia.”

The Framework provides recommendations for establishing high quality stroke rehabilitation services in Australia. The essential elements, principles and models of care for stroke rehabilitation services are outlined. This document also provides guidance for administrators, funders, policy makers and health professionals about systems for effective transition of stroke survivors into the community when they leave hospital.

For the first time care provided in rehabilitation hospitals has been mapped to these essential elements of care in this report. To ensure this would be possible, up to three questions from the Organisational Survey had to be answered for each element. There were ten elements of care recommended in the National Framework and there were two hospitals reporting adherence to all ten elements of the Framework. Seven hospitals were adhering to nine of the elements and there were 50 hospitals reporting they adhered to 5–7 of the elements. As the Framework becomes more integrated into rehabilitation services, these results should improve in future audits.

The Clinical Audit data provided evidence that overall patients were often receiving expected care in accordance with the clinical guidelines. However, the Organisational Survey highlighted there remains a lack of processes to ensure this care is given consistently. For example, effective links with acute stroke service providers should be established as recommended in the National Framework. This should include a standardised referral form and/or process for rehabilitation consultation and services and for referral back to acute service providers if required.²⁰ Sixty-one percent of hospitals reported having these links. This figure varied greatly between states with NSW and QLD hospitals reporting three-quarters of their hospitals adhering to this element while in VIC and WA it was less than half.

The National Framework highlights the need for specialised interdisciplinary stroke teams with access to staff education and stroke specific professional development. It is important staff providing stroke care have received appropriate training and have ongoing access to regular professional development to maintain and update their skills and knowledge in stroke care. Multidisciplinary group education sessions may be an effective way to maintain professional development specific to stroke.²⁰ These education sessions also assist the team to remain focussed on overall patient goals and not just discipline specific goals.²⁰ Unfortunately 40% of audited hospitals reported the absence of a specialised interdisciplinary team and limited access to ongoing education and professional development.

An essential element of the rehabilitation Framework is providing support of the person with stroke and their carer. Only 43% percent of hospitals reported the routine provision of this support such as carer training, provision of information/education and provision of a care plan. While these individual aspects of care appear to be done quite well based on the clinical data, the gaps reinforce the need to have formalised systems, policies and procedures so all patients and their family/carer are adequately supported. It was unfortunate that just over 10% of patients had no documented evidence of discussing their management with the team.

Future analyses of the data is to explore if hospitals, which are reporting greater adherence to the elements, are needed to understand if they also have better adherence to the recommended processes of care from the clinical audit. This would provide direct evidence of the Framework elements supporting the better provision of high quality care.

Multidisciplinary assessment and management

For the majority of allied health assessments these were shown to be undertaken comprehensively and within a day of admission for physiotherapy (99%) and occupational therapy (99%, one day) while for speech pathology this was most often within 3 days (94%). It was encouraging to see improvements in goal setting with input from the team and patient (79% in 2012 to 87% in 2014).

Mood is frequently affected following a stroke. Depression after stroke is the most common mood disturbance with a meta-analysis of 51 observational studies finding just under one-third of patients experience depression.³⁰ Only 39% of patients with identified mood impairment on admission were assessed by psychology with a median time to assessment for psychology of 10 days. This remains a consistent pattern with previous audit reviews and continues to be an area for service development.

Counselling services should be available to all stroke survivors and their families/carers.⁹ Formal counselling was provided to less than one-third of patients with stroke. This result is similar to the number of carers offered formal counselling (32%). However, it is unclear if this is an appropriate level since it is unknown whether formal counselling was deemed as 'not required' following assessment of the patient and carer needs.

Over one-third of patients assessed were documented as having urinary incontinence. Stroke survivors with confirmed continence difficulties should have a continence management plan formulated, documented implemented and reviewed.⁹ Only 62% of patients with urinary incontinence had a continence management plan documented. This remains a consistent pattern with previous audit reviews and continues to be an area for service development.

Secondary prevention, information, education and discharge planning

Every patient with stroke should be assessed and informed about their risk factors for further stroke and strategies that are available to modify these risk factors.⁹ In this national audit it was found only 42% of patients received lifestyle advice as part of risk factor modification. Medications for secondary prevention (antithrombotics, blood pressure and cholesterol-lowering) were slightly higher on discharge than those reported following acute care (2014 Rehabilitation audit 97%, 82%,84% versus Acute Care audit 2013, 95%,77%,79%).⁶ However, 18% of patients are not on blood pressure-lowering medication and 16% are not on cholesterol-lowering medication as recommended in the guidelines. This data aligns with the known challenges of providing non pharmacological interventions compared to drug prescription⁹ and the ongoing gaps in prescription of prevention medication. These findings remain a consistent pattern with previous audit reviews and continue to be an area for service development

In the national guidelines it is recommended patients with stroke and their family/carers be given a care plan, be provided carer training and are given information about peer support and sexuality prior to leaving the hospital setting.⁹ Eighty-four percent of patients received a discharge care plan to help facilitate their return to the community and correspondence with health professionals. This has been an important improvement from 74% from the last audit cycle in 2012.

Relevant members of the multidisciplinary team should provide specific and tailored training for family/carers before the stroke survivor is discharged home. For those patients discharged home with a carer, 84% of the carers were offered training and this was a significant improvement compared to previous audits. The provision of a post discharge contact also increased to 67% from 57% in 2012 but highlights further improvements could still be made in this area.

Only one-third of patients were given information about peer support groups or self-management programs. This is despite national guideline recommendations stating all stroke survivors and family/cares should be given information about the availability and benefits of local support groups. This remains a consistent pattern with previous audit reviews and continues to be an area for service development.

In the national guidelines it is stated survivors of stroke and their partners should be offered the opportunity to discuss issues relating to sexuality with an appropriate health professional. Further, they should be provided with written information addressing issues relating to sexuality after stroke. In this audit only 18% of patients were offered any information on sexuality post stroke and this is virtually unchanged since the last audit in 2012 (17%).

Access to community rehabilitation and follow-up

Rehabilitation often needs to continue after discharge from hospital. In one Cochrane review it was found rehabilitation therapy services in the community (home or centre-based) within the first year after stroke reduced the odds of a poor outcome.⁹ Outcomes and satisfaction of those with stroke and their carers may be greater in home-based rehabilitation settings). In this audit 75 hospitals (68%) reported access to home-based rehabilitation services. However, 19 hospitals (26%) had on average more than two weeks delay in access to this service. Outpatient rehabilitation remains the most widely available rehabilitation service at 98 (88%) of sites.

However, similar to home-based therapy one-third of hospitals had an average wait of over two weeks and 16% the delay to access the service was three or more weeks (similar to 15% reported in 2012). Further effort is needed to provide timely access to appropriate community rehabilitation services.

Using audit data to improve care

All rehabilitation providers need to ensure they have a culture of quality improvement via audit, benchmarking and review to ensure they are providing care based on evidence-based clinical guidelines. These quality improvement activities should be regular (at least every two years), use data to identify practice gaps, gain consensus from the multidisciplinary team on the highest priorities, review local factors involved and lead to a clear action plan for improvement.⁹

This audit program provides an important standardised dataset aligned to clinical practice guidelines. Routine collection may be difficult unless a smaller subset is selected. The development of a minimum data set for rehabilitation may be very useful to more frequently monitor important processes of care in order to improve quality of care. Much work has been done to systematically develop a minimum set of indicators for acute care and similar work is needed to further enhance the new Framework.³¹

Limitations of the data

Interpreting the data in this report must be done with caution for several reasons. Firstly, audit data may be subject to various forms of reporting bias. Secondly, documentation issues should be considered. Recording of data for the Clinical Audit assumes if a process was not documented then 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 (e.g. such as the provision of education prior to discharge). 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 quality improvement activities. Because there are no consistent guidelines defining the appropriate minimum facilities for rehabilitation stroke units, unlike acute care definitions, comparing unit to unit can be difficult.

Strengths of the data

Biases were minimised by standardised training and ongoing support throughout the audit process. A comprehensive data dictionary was provided to increase inter-rater reliability and each site conducted a reliability check in which data from five cases was entered by two auditors. Logic checks were inbuilt to the web tool to verify data entered and all hospitals received their data for verification once the Clinical Audit was closed. In addition, the 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 was analysed by an independent organisation.

Conclusion and recommendations

The *National Stroke Audit – Rehabilitation Services Report 2014* provides important information for showing the current strengths of our hospital system for stroke rehabilitation as well as important areas requiring further development and focus.

Based on this summary, the National Stroke Foundation makes the following recommendations to improve stroke rehabilitation processes and outcomes:

- Health services and governments should focus on efforts to ensure rehabilitation services meet more of the essential elements outlined in the Rehabilitation Stroke Framework.
- Improve systems of care (clear policy, procedures and practices) to reduce variation in care and ensure all patients requiring stroke rehabilitation optimise their return to valued life activities after stroke (including intimate relationships).
- Systems are established to ensure greater involvement of stroke survivors and the family/carer. This should include the provision of education, information and advice on stroke and stroke recovery, including risk factor modification.
- Systems are established or enhanced to ensure the psychological and emotional support needs of all stroke survivors are considered during rehabilitation (including further assessment and treatment by psychologists) and is offered to those who require it.
- Strategies to improve continence management after stroke are implemented.
- Further work be undertaken to better understand the most appropriate community rehabilitation services which should be offered to patients after their inpatient rehabilitation to enable timely follow up and continuation of rehabilitation in the community.
- Work be undertaken to establish a minimum data set for inpatient post-acute care.

Chapter 10

Appendices

Appendix 10.1 Participating hospitals

The National Stroke Audit is the combination of a huge amount of work from many people and we greatly appreciate those who participated from the following hospitals:

ACT**Canberra Hospital**

Dr Chris Katsogiannis

NSW**Albury Wodonga Health Service – Albury Campus**

Jessica Amy
Lindsay Campbell
Vanessa Crosby
Abby Heafield
Sarah Potter
Cindy Ridgway
Liesa Tighe
Heather Thurnam
Kate Wiesner

Armidale Hospital

Melissa Gill
Amanda Styles

Ballina District Hospital

Kim Hoffman
Denise McCall
Louise Meers

Balmain Hospital

Dr Indu Nair
Kylie Draper
Enrico Belmonte

Bankstown Lidcombe Hospital

Denise Houston
Mallika de Melo
Etesa Polman
Lauren Christie
Elena Trees
Bathurst Hospital
Fiona Ryan
Belmont Hospital
Christie Allen
Karen Ruddell
Colette Sanctuary
Rushika Siriwardena
Dianne Wood

Belmont Hospital

Christie Allen
Karen Ruddell
Colette Sanctuary

Rushika Siriwardena
Dianne Wood

Berkeley Vale Private Hospital

Michelle Turner

Camden Hospital

Brian Lane
Kendall Neilson

Coffs Harbour Base Hospital

Melissa Christos
Karen Longworth

Coledale District Hospital

Melissa Harrison
Suzanne Lide

Concord Hospital

Dr Veena Raykar

David Berry Hospital

Kerry O'Leary

Greenwich Hospital

Brad Carpenter

Griffith Base Hospital

Susan Matich

Hornsby and Ku-ring-gai Hospital

Malcolm Kanard
Dr Cesar Uy

Rankin Park Centre

Helen Baines
Nevenka Bareham
Grahame Brock
Teresa Christian
Elise Clarke
Renae de Vries
Judith Dunne
Megan Lancaster
Sherree Robinson
Eve Smith
Carlie Swinton

Kempsey District Hospital

Marianne Miller
Jan Wilkins

Lady Davidson Private

Suellen Fulton

Lawrence Hardgrave Hospital

Ian Galvin

Lourdes Hospital

Dipalee Amin
Erin Collins
Kaylene Green
Tamara Hollman
Kelly Mackintosh
Amelia Scifleet
Caroline Squires
Rowena Sweeney

Maitland Hospital

Jessica Allen-Atkins
Renae Galvin
Kate Fahey

Mercy Care Centre Young

Lucie Flynn

Metro Rehabilitation Hospital

Dr Anuka Parapuram
Nicole Rakic
Fiona Scott

Mona Vale Hospital

Margaret Beazley
Dr Tejas Kanhere
Dr Dulip Wettasinghe

Mount Druitt Hospital

Lorraine Stephenson

Nepean Hospital

Roslynn Marshall
Lyn Stanton

Orange Base Hospital

Fiona Ryan

Port Kembla Hospital

Kristen Farrell
Jenny Favi
Maren Jones
Michele Mathieson
Concetta Mercuri
Louise Morrison
Linda Morrissey
Kathryn Perry
David Rolleston
Kate Rowntree
Nicole Seymour
Katie Tsaccounis
Neil Young

Prince of Wales Hospital

Andrew Murray
Peter Thompson

Royal Rehabilitation Private Hospital

Sandra Lever

Ryde Hospital

Howard Davis

Shoalhaven District Memorial Hospital

Kerry O'Leary

St George Hospital

Daniela Quijano
Julie Morrison

St Joseph's Hospital

Ji Yong Ahn
Jaclyn Chan
Javnika Chauhan
Pam Chen
Elaine Chui
Stella Kok
Erica Morgan
Maeve-Ann O'Reilly
J Quines
Ellie Temple
Kenny Vuong
Charles Ye

St Vincent's Hospital

Olivia Misa

Sutherland Hospital

Barbara Passaris
Andrea Thatcher

Tamworth Base Hospital

Leica Le Brocq
Sue Simpson

Wagga Wagga Base Hospital

Pamela Dendy

War Memorial Hospital

Madeleine Berry
Jane Corlett
Kate Guthrie
Jill Hall
Laura Lim
Fiona Russell
Louise Short

Westmead Hospital

Pip Triggs

Wingham Community Hospital

Jenny Fishpool
Leanne Lawson
Tracey McKinnon
Jennifer Rudd

Wyong Public Hospital

Justine Watkins

NT**Royal Darwin Hospital**

Erika Schlemmer
Dr Howard Flavell

QLD**Brighton Health Campus and Services**

Paul Bew
Dr Tik Chan
Dr Amrita Prasad
Dr Kathryn Pugh

Bundaberg Base Hospital

Joanne Branch
Muriel Chapman
Frances Cochrane
Jessica Donegan

Zoe Dierselhuis
Lyndell Scott

Cairns Base Hospital

Damiane Clifford

Caloundra Hospital

Dr John Blenkin
Joanne Clark
Maria Pardoen
Dr Phoebe Slape

Greenslopes Private Hospital

Claire Carsley
Lada Habul

Gympie Hospital

Kimberley Klenner
Rebecca Sjodin

Ipswich Hospital

Amanda Baker
Lenka Biroš
Linda Edwards
Judith Hilton
Jessica Moore
Dr Juan Rois
Shannon Walsh

Mackay Base Hospital

Kathryn J Dougan
Debbie Duncan
Marie Parsons

Maryborough Hospital

Tracey Cropp
Jodie Rae

Peninsula Private Health

Robyn Causer
Fiona Fyffe
Anneka Taborsky

Prince Charles Hospital

Kaylee Brownhill
Sarah Kekki
Dr Ling Lan
Leah Thompson

Princess Alexandra Hospital

Dr Philip Aitken
Kylie Short

Carly Grace
Elizabeth Satake
Maria Draper
Adriana Hada
Dr Lisa Kelly

Queen Elizabeth II Jubilee Hospital

Michelle Romano
Dr Jerry Wong

Redcliffe Hospital

Kerrie Garrad
Jennifer Reuterink

Royal Brisbane and Women's Hospital

Dr. Kana Appadurai
Nadia Borgna
Penni Burfein
Dr Kong Goh
Louisa Hoffensetz
Dr Lisa Kelly
Ian Parker
Scott Parkinson
Natalie Moore
Giovanna Tornatore

Toowoomba General Hospital

Michelle Crawford
Joanne Huggins
Timothy Richardson

Townsville Hospital

Tracey Evanson
Sarah Wilkinson

SA**Calvary Rehabilitation Hospital**

Kate Beltran
Julia Eastway
Brooke Hanlon
Susan Mitchell
Kathy Penniment
Danielle Ruiz

Griffith Rehabilitation Hospital

Denise Collopy
Julie Vincent
Lauri Wild

Hampstead Rehabilitation Centre

Lachlan Angus
Rachel Dempsey

Rachel Harling
Catherine Lieu
J'aime Newland
Kendal Stone
Laleh Vounasis

Modbury Hospital

Chris Borgelt
Jane Gray
Ailyn Hanin
Debra Ormerod
Nikki Pelliccia

Repatriation General Hospital

Julie Harding
Siobhan Jackson

St Margaret's Rehabilitation Hospital

Tyson Baird
Maree Braithwaite
Melissa Kirchner
Emma Leeson
Margaret Manning
Tracey Oakley
Stephanie Searle
Georgie Tucker
Lauren Webber
Amanda Wurfel

The Memorial Hospital

Ru Kidson

TAS**Calvary Healthcare**

Sandy Hniatek

Launceston General Hospital

Polly Showell

North West Regional Hospital

Owen Benjamin
Rosemary Britt

Royal Hobart Hospital

Brendan Bakes
Maija Kumpulainen
Bronwen Taylor
Frances Palaya
Melissa Waugh

VIC**Angliss Hospital**

Dr Alex Champness
Lisa Fedrick
Abigail Heuver
Kevin Mulrain
Daphne Van Patee
Kylie Rice
Collette Leech
Merrin Lewis
Matthew Palozzi
Grant Scroggie
Christine Schuette
Shannon Scratch
Alica Sincic
Rebecca Sullivan

Bairnsdale Hospital

James Roughley

**Ballarat Health Services
– Queen Elizabeth
Centre**

Mary Cranage
Julie Moore

Bendigo Hospital

Teagan Anketell
Irene Chettle
Min Goh
Stacey Hynes
Tegan McDonald
Leanne Muns
Meghann Parkhurst
Maree Pearson
Jemma Tulloch
Caitlin Wright

**Broadmeadows
Health Service**

Dr Vincent Lavery
Dr Lily Ng
Dr Mekala Thayalan

**Bundoora Extended
Care Centre**

Dr Sandra Brown
Dr Harold Eeman
Dr Su Yi Lee

Casey Hospital

Maria Apostolides
Kerrie Armstrong
Lauren Growse
Carmen Mohanu
Debbie Roe
Rebecca Verrell

**Caulfield General
Hospital**

Dr Brian Anthonisz
Seamus Kelleher
Sophe Kimonides
Susie Leech
Kelly McMahon
Lauren Pennisi
Emma Schneider
Dr Parinaz Sharifi
Bianca Summers
Meaghan Waddingham

Dandenong Hospital

Melissa Andreotti
Deanne Davis
Christopher Ellis
Jasmine Everist
Kantaro Ito
Holly Slater
Merryn Summers
Sue Summers
Angela Norman
Peta Prindiville
Jenny Walsh
Sarah Washbourne

**Dorset Rehabilitation
Centre**

Janine Connelly

Goulburn Valley Hospital

Sian Hudson
Johanna Madden

Kingston Centre

Katrina Angus
Jill Douthie
Marek Gorski
Sharon Horkings

Dr Amandeep Kaur
Whitney Lipman
Dr Lucy Madebwe
Adam McKinstry
Elissa O'Connell
Jessica Underwood
Ellie Walter
Monique Wylie

**Latrobe Regional
Hospital**

Carolyn Beltrame
Natasha Tatlow

**McKellar Centre,
Barwon Health**

Sara Coulter
Sara Gillett
Anita Gordon
Ciara Martyn
Wendy Mahony
Madelaine McGlashan
Natasha Selenitsch
Heather Smith
Kate Tamblyn
Johanna Williams

Mildura Base Hospital

Jo Cottrell
Deanne Matotek

**North Eastern
Rehabilitation Centre**

Brendon Haslam

**Peninsula Health –
Golf Links Road
Rehabilitation**

Caitlin Casson
Lyndall Chapman
Karen Edwards
Carol Gore
Sarah Gore
Allison Hocking
Tammy Hufer
Juleen Lim
Milly Noonan
Dr Daniella Pasagic
Alana Saunders
Alice Tovey

**Peninsula Health –
Rosebud Rehabilitation
Unit**

Sue Harvey
Allison Hocking
Mangai Murugappan
John Pierce
Fleur Scrivens
Rebecca Wood

Peter James Centre

Dr Jason Chen
Hedi Cumming
Loretta Evans
Rachel Jamieson
Sarah Johnson
Susie Joseph
Julia Kawanishi
Dr Genevieve Kennedy
Kaitlyn King
Tamara Moritz
Sarah Osieurak
Joyce Poon
Danielle Sansonetti
Grant Scroggie
Kylie Sherwell
Deena Soma

**Royal Melbourne
Hospital**

Dr Ashray Gunjur
Dr Claire Higgins
Dr Primna Kenneth
A/Prof Louisa Ng
Joshua Sansom
Dr Niloufar Torkamani
Dr Nina Zhang

Royal Talbot Hospital

Joanna Cameron
Vanessa Sloan

St George's Hospital

Dr Jill Collins
Robert Mehan
Dean Wilson

St John of God Bendigo

Louise Harrison
Dr Debbie Kesper

St Vincent's Hospital

Emma Hill
Meaghan Mackenzie

Sunshine Hospital

Sarah Byron
 Charlene Downey
 Leo Edwards
 Shakuntala Francis
 Hayley Osborne
 Matthew Thorpe
 Jane Tillyard
 Erin Mullins
 Anne Renshaw
 Catherine Sayer
 Michelle Watling

Wangaratta Hospital

Kim Brown
 Nicole Sullivan
 Kirsty James

**Warrnambool Hospital,
Southwest Healthcare**

Heather Foley
 Patrick Groot
 Rosalie Pickett

**Western District
Hospital**

Judy Esson
 Julie Stevens

WA**Albany Hospital**

Ashleigh Hair

**Armadale Kelmscott
Memorial Hospital**

Alexandra Dray
 Shannon Mann

Bentley Hospital

Kieran English
 Ellen Sawtell
 Nikki Thomas

**Bunbury Regional
Hospital**

Graham Benbow
 Renee Dehring
 Kerry Frontino
 Pat O'Leary
 Katherine Royer

Fremantle Hospital

John Harris
 Anne Judge

**Geraldton Regional
Hospital**

Jasmine Forden
 Sian Hodgkin
 Ruth Warr

**Hollywood Private
Hospital**

Kristy Darrah
 Liz Higham
 Tracey Sariago
 Catherine Verran

Osborne Park Hospital

Melissa Daines
 Patricia Morgan
 Jessica Nolan
 Anita Jennings
 Dr Kien Chan
 Catherine Viandante
 Angela Cream
 Rebecca Kingston
 Kimberly Keeley
 Deborah West

**Royal Perth Hospital –
Shenton Park Campus**

Alisha Anderson
 Ariane Bivoltsis
 Paul Cooper
 June Hambleton
 Brittany Hamilton
 David Harrison
 Rajani Mullassery
 Chandran
 Jocelyn White

**Swan Kalamunda
Districts Hospital**

Clin A/Prof Timothy Bates
 Emily Bennett
 Cathy Forrester
 Tiing Lio
 Catherine Udall
 Rachel Way
 Yee Ching Wong

Appendix 10.2 Audit questions related to the Rehabilitation Stroke Services Framework

	Audit questions
1. Effective links with acute stroke service providers	2.17 Is there a dedicated person liaising between acute and rehabilitation services? 2.2 Is there a standardised process for assessing suitability for rehabilitation? (combine both)
2. Specialised interdisciplinary stroke (or neuro-rehabilitation) team with access to staff education and professional development specific to stroke	3.1 Please identify which of the following health professionals are actively involved in the rehabilitation management of stroke patients at your hospital? 3.4 Is there a program for the continuing education of staff relating to the management of stroke? (combine both)
3. Co-located stroke beds within a geographically defined unit (either response)	1.7 Does your site have a dedicated stroke rehabilitation unit? 1.8 Does your site have co-located stroke beds within a geographically defined unit? (Either 1.7 OR 1.8)
4. Standardised and early assessment for neuro-rehabilitation (combine both)	2.2 Is there a standardised process for assessing suitability of patients to be admitted for rehabilitation at your site? 2.3 Routinely when does the assessment for inpatient rehabilitation occur? (within 7 days) (combine both)
5. Written rehabilitation goal setting processes (combine both)	2.5 Does your site have a formal process for developing and documenting goals with patients? 2.6 How does your hospital usually establish patient-directed goals? (combine both)
6. Routine use of evidence-based guidelines to inform evidence-based therapy	2.15 Are there documented processes and systems to support and monitor the routine use of evidence-based guidelines to inform clinical care?
7. Best practice and evidence-based intensity of therapy for goal related activity	2.16 Are there documented processes and systems to ensure patients receive evidence-based intensity of therapy for goal related activity?
8. Systems for transfer of care, follow-up and re-entry (combine all)	4.5 Does your site offer a key contact person (in the hospital) for patients/carers to access for post discharge queries and post discharge support? 4.6 Does your site have protocols guiding discharge planning for your stroke rehabilitation patients? 4.11 Does your site routinely follow up stroke patients to assess their post stroke needs? (combine all three)
9. Support for the person with stroke and carer (e.g. carer training, provision of information/education, provision of care plan) to maximise community participation and long-term recovery	2.14 Does your hospital routinely provide patient information/education prior to discharge? 4.7 Does your site routinely provide a care plan to patients on discharge? 4.10 Does your site routinely provide carer training to carers requiring it? (combine all three)
10. Systems that support quality improvement, i.e. regular (at least every two years) review of local audit data by the stroke team to prioritise and drive stroke care improvement	4.9 Over the last two years has the stroke team been involved in quality improvement activities that have included reviewing local audit data and agreeing on strategies to improve care? 2.15 Are there documented processes and systems to support and monitor the routine use of evidence-based guidelines to inform clinical care? (combine both)

References

- 1 Australian Institute of Health and Welfare. Rural, regional and remote health: A guide to remoteness classifications,. 2004 March 2004.
- 2 Writing Sub-Committee of the National Stroke Audit – Post Acute Services National Advisory Committee. (Personal Communication). 2008.
- 3 Australian Institute of Health and Welfare (AIHW). Australia's Health 2012. In: AIHW, ed. Canberra: AIHW 2012:579.
- 4 Australian Institute of Health and Welfare, Senes S. How we manage stroke in Australia. Australian Institute of Health and Welfare. 2006;AIHW cat. No. CVD 31.
- 5 Thrift AG, Dewey HM, Macdonell RA, McNeil JJ, Donnan GA. Stroke incidence on the east coast of Australia: the North East Melbourne Stroke Incidence Study (NEMESIS). *Stroke*. 2000 Oct;31(9):2087–92.
- 6 National Stroke Foundation. National Stroke Audit Acute Services Clinical Audit Report Melbourne, Australia; 2013.
- 7 Cadilhac DA, Carter R, Thrift AG, Dewey HM. Estimating the long-term costs of ischemic (IS) and hemorrhagic (ICH) stroke for Australia: new evidence derived from the North East Melbourne Stroke Incidence Study (NEMESIS). *Stroke* 2009(40):915–21.
- 8 Stroke Unit Trialists' Collaboration. Organised inpatient (stroke unit) care for stroke. *Cochrane Database of Systematic Reviews* 2007, Issue 4 Art No: CD000197 DOI: 101002/14651858CD000197 2007.
- 9 National Stroke Foundation. Clinical guidelines for stroke management. Melbourne, Australia: NSF; 2010.
- 10 Stucki G, Cieza A, Melvin J. The international classification of functioning, disability and health: A unifying model for the conceptual description of the rehabilitation strategy. *Journal of Rehabilitation Medicine*. 2007;39(4):279–85.
- 11 Paolucci S, Antonucci G, Grasso M, Morelli D, Troisi E, Croiso P. Early versus delayed inpatient stroke rehabilitation: a matched comparison conducted in Italy. *Archives of Physical Medicine and Rehabilitation*. 2000;81(6):695–700.
- 12 Grimshaw J, Eccles M, Lavis J, Hill S, Squires J. Knowledge translation of research findings. *Implement Sci*. 2012(7):50.
- 13 Sprigg N, Gray LJ, Bath P, Boysen G, De Deyn P, Friis P. Stroke severity, early recovery and outcome are each related with clinical classification of stroke: Data from the 'Tinzaparin in Acute Ischaemic Stroke Trial'(TAIST). *Journal of the neurological sciences* 2007;254(1-2):54–9.
- 14 Ottenbacher K, Jannell S. The results of clinical trials in stroke rehabilitation research. *Archives of neurology*. 1993;50(1):15–21.
- 15 Novack T, Satterfield W, Lyons K, Kolski G, Hackmeyer LC, M. Stroke onset and rehabilitation: time lag as a factor in treatment outcome. *Arch Phys Med Rehab* 1984;65(6):316–9.
- 16 Australian Rehabilitation Outcomes Centre (AROC). The AROC Annual Report: the state of rehabilitation in Australia in 2012; 2012 December 2012.
- 17 National Stroke Foundation. National Stroke Audit Rehabilitation Services. Melbourne Australia; 2012.
- 18 Faux S, Ahmat J, Bailey J, Kesper D, Crotty M, Pollack M. Stroke Rehab Down Under: Can Rupert Murdoch, Crocodile Dundee, and an Aboriginal Elder Expect the Same Services and Care? *Top Stroke Rehabil*. 2009;16(1):1–10.
- 19 Hubbard I, Harris D, Kilkeny M, Faux S, Pollack M, Cadilhac D. Adherence to Clinical Guidelines Improves Patient Outcomes in Australian Audit of Stroke Rehabilitation Practice. *Archives of physical medicine and rehabilitation*. 2012;93(6):965–71.
- 20 National Stroke Foundation. National Rehabilitation Stroke Services Framework. Melbourne, Australia: NSF; 2013.

- 21 Jamtvedt G, Young JM, Kristoffersen DT, O'Brien MA, Oxman AD. Audit and feedback: effects on professional practice and health care outcomes. Cochrane database of systematic reviews. 2006;Issue 2:CD000259.
- 22 Eccles M, Grimshaw J. Selecting, presenting and delivering clinical guidelines: are there any "magic bullets"? MJA. 2004;180(6):52.
- 23 Thrift A, Kim J, Douzmanian V, Gall S, Arabshahi S, Loh M, et al. Discharge is a critical time to influence 10-year use of secondary prevention therapies for stroke. Stroke. 2014;45(2):539-44.
- 24 Andrews N, Kilkenny M, Naylor R, Purvis T, Lalor E, Moloczij N, et al. Understanding long-term unmet needs in Australian survivors of stroke. International Journal of Stroke. 2014;9(7).
- 25 National Stroke Foundation. Walk in our shoes. Melbourne: NSF; 2008.
- 26 Uniform Data System for Medical Rehabilitation. The FIM System® Clinical Guide, Version 5.2. Buffalo: UDSMR 2009.
- 27 Loewen SC, Anderson BA. Predictors of stroke outcome using objective measurement scales. Stroke. 1990;21:78-81.
- 28 D'Olhaberriague L, Litvan I, Mitsias P, Mansbach HH. A reappraisal of reliability and validity studies in stroke. Stroke. 1996;27:2331-6.
- 29 Lieberman D, Lieberman D. Rehabilitation following stroke in patients aged 85 and above. JRRD. 2005;42(1):47-54.
- 30 Hackett ML, Yapa C, Parag V, Anderson CS. Frequency of depression after stroke: A systematic review of observational studies. Stroke. 2005;36(6):1330-40.
- 31 Cadilhac D, Kilkenny M, Churilov L, Harris D, Lalor E. Identification of a reliable subset of process indicators for clinical audit in stroke care: an example from Australia. Clinical Audit. 2010;2:67-77.



National Stroke Foundation

National Office
Level 7, 461 Bourke Street
Melbourne VIC 3000
Phone: +61 3 9670 1000
Fax: +61 3 9670 9300
Email: admin@strokefoundation.com.au
We have offices in Brisbane, Canberra,
Hobart, Perth and Sydney.
www.strokefoundation.com.au

 www.facebook.com/strokefoundation

 [@strokefdn](https://twitter.com/strokefdn)

 [@strokefdn](https://www.instagram.com/strokefdn)