



National Stroke Audit

Rehabilitation Services Report 2024

strokefoundation.org.au

About the Stroke Foundation

Stroke Foundation is a national charity that partners with the community to prevent stroke, save lives and enhance recovery. We stand alongside survivors of stroke and their families, health professionals and researchers. We build community awareness and foster new thinking and innovative treatments. We support survivors on their journey to live the best possible life after stroke. We are the voice of stroke in Australia, and we work to:

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

About the National Stroke Audit

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

Acknowledgements

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Table of contents

Contents

FORWARD.....	5
AT A GLANCE.....	6
EXECUTIVE SUMMARY	7
CHAPTER 1: INTRODUCTION	10
1.1 CLINICAL GUIDELINES AND THE NATIONAL STROKE AUDIT	11
1.2 THE NATIONAL STROKE AUDIT PROGRAM	11
1.3 STRUCTURE OF THE REPORT	12
CHAPTER 2: PARTICIPATING INPATIENT REHABILITATION SERVICES	13
2.1 DEFINING REMOTENESS AREAS	13
2.2 PARTICIPATING REHABILITATION SERVICE CHARACTERISTICS.....	13
NOTES: Q1:1 ST QUARTILE; Q3: 3 RD QUARTILE. DATA FROM STATES WITH A SMALL NUMBER OF SERVICES (ACT, NT) EXCLUDED IN LOCATION BREAKDOWN.....	15
2.3. DEDICATED STROKE REHABILITATION UNITS BEDS.....	15
CHAPTER 3: ORGANISATIONAL SURVEY RESULTS.....	16
3.1 OVERALL ADHERENCE TO THE FRAMEWORK	16
3.3 STROKE REHABILITATION MANAGEMENT	19
3.4 INTENSITY OF THERAPY	23
3.5 AMBULATORY (COMMUNITY-BASED) REHABILITATION SERVICES.....	24
CHAPTER 4: CLINICAL AUDIT RESULTS	25
4.1 CHARACTERISTICS OF PATIENTS FROM THE CLINICAL AUDIT	26
4.2 SPECIALISED INPATIENT REHABILITATION	27
4.3 PATIENT ASSESSMENT	28
4.4 MANAGEMENT OF IMPAIRMENTS	29
4.4.1. INCONTINENCE	30
4.5 COMPLICATIONS DURING INPATIENT ADMISSION.....	30
4.6 COMMUNICATION WITH PATIENTS	30
4.7 SECONDARY PREVENTION	32
4.8 PREPARATION FOR DISCHARGE	33
4.9 LIFE AFTER STROKE FOR PATIENT AND FAMILY	34
4.10 PATIENT OUTCOMES	34
4.10.1 Mortality, length of stay and functional outcomes	35
4.10.2 Discharge destination.....	35
4.11 ACCESS TO COMMUNITY REHABILITATION	36
4.12 KEY PERFORMANCE INDICATORS BASED ON LOCATION.....	37
4.13 KEY PERFORMANCE INDICATORS BASED ON SPECIALISATION OF REHABILITATION SERVICE	38
CHAPTER 5: CLINICAL AUDIT CHANGES OVER TIME	40
CHAPTER 6: IMPACT OF COVID-19	42
CHAPTER 7: DISCUSSION AND RECOMMENDATIONS	44
6.1 STRENGTHS AND LIMITATION OF THE DATA	48
6.2 RECOMMENDATIONS	48

Foreword



On behalf of Stroke Foundation and our Clinical Council, I am pleased to present the National Stroke Audit Rehabilitation Service Report 2024. The Audit offers vital insights into the care provided by inpatient stroke rehabilitation services across Australia.

Stroke impacts the brain, changing the lives of both survivors and their loved ones in an instant. With one in four people experiencing a stroke in their lifetime, the focus on rehabilitation has never been more important. Thanks to advancements in hyperacute and acute stroke treatment, more Australians are surviving strokes, but there is more to recovery than surviving. Early treatment is the tip of the iceberg and just the beginning of the rest of the survivor's life. This phase must be followed by access to rehabilitation services offering the right type and amount of treatment for recovery, in the right place, at the right time, in both hospital and/or community settings.

Recovery can be challenging and isolating, and the role of multidisciplinary rehabilitation services is paramount. Comprehensive and holistic inpatient rehabilitation provides an essential pathway for survivors of stroke to regain independence and self-determination and maximise long-term recovery and well-being. The value and impact of rehabilitation must therefore be recognised and resourced accordingly to allow for quality, coordinated services that optimise care and outcomes.

Physical recovery is vital, but recovery extends beyond walking and talking. Stroke attacks the brain, the 'human control centre', and survivors of stroke frequently face a range of cognitive and psychological challenges that, if unaddressed, can hinder the rehabilitation and recovery process. A holistic approach delivered by a specialist team, that addresses the full impact of stroke as well as personal goals and preferences is essential.

The 2024 Audit Report describes only incremental progress in a small number of areas since the 2020 Audit. The commitment of rehabilitation professionals to delivering quality care despite challenges is commendable. Key areas still need attention, however, including access to rehabilitation, therapy frequency and dose, mood assessment, education on modifiable risk factors, information about sex and relationships, and carer support needs assessments.

Results in this year's Audit provide insight into the ongoing impact of COVID-19 on rehabilitation services. One in five services report rehabilitation service's structures and resourcing have not returned to pre-pandemic levels. This must be corrected.

This report outlines priorities for government, health care administrators and health care professionals as we move forward in the post pandemic era and strive for equitable access to appropriate, specialised and adequately resourced rehabilitation services for stroke. It is time to view rehabilitation as an important next step in the patient journey after the initial treatment and shift the focus from surviving to thriving!

A handwritten signature in black ink, reading 'Lisa Murphy'.

Dr Lisa Murphy
Chief Executive Officer
Stroke Foundation



At a glance

Inpatient stroke rehabilitation services

- > Only **3 services** met all **10 elements** of the National Rehabilitation Services Framework
- > **1 in 3 services** met less than half the elements of the Framework
- > **1 in 5 services** have not returned to pre-covid structure and resourcing

Supporting professional practice



30% of services have no continuing education for staff to support evidence-based practice



49% of services do not provide communication partner training to staff working with patients with aphasia

Supporting recovery and wellbeing in the community



67% were referred for ongoing rehabilitation



83% of patients have a care plan developed with the team for discharge into the community



BUT only **61%** received information on stroke and recovery



Even fewer (**25%**) received information about sex and relationships after stroke

103 Stroke Rehabilitation Services

8,925 Patient admissions

3,454 Case notes

Treating the whole person – Mood



Only **66%** of patients received an assessment for **anxiety and depression** and **44%** of these patients were experiencing **mood problems**.



One third of all services had no access to clinical or neuropsychologists.

Treating the whole person – Incontinence



82% had an early assessment for urinary incontinence

BUT only **51%** with urinary incontinence were given a management plan

Secondary prevention

90%



of patients discharged on **antithrombotic medication** (ischaemic)

91%



of patients discharged on **lipid lowering medication** (ischaemic)

84%



of patients discharged on **blood pressure lowering medication**

68%



had education about **behaviour change and modifiable risk factors** to prevent another stroke

Executive Summary

Rehabilitation for people with stroke, allows survivors to achieve the best recovery after stroke by supporting improvements in physical, intellectual, mental and social activities and promotes well-being.

Stroke Foundation's National Stroke Audit Rehabilitation Services Report 2024 is the 9th national report Stroke Foundation has produced on the status of inpatient stroke rehabilitation services.

The National Stroke Audit commenced in 2007 to promote evidence-based stroke care and alternates between acute stroke services and inpatient rehabilitation services. It provides a robust and representative assessment of inpatient rehabilitation services in Australia. This report aims to highlight areas where the system is working well, and where improvements or changes are needed.

Results of the 2024 Stroke Audit provide an important snapshot in time. It monitors the performance of stroke care against evidence-based Clinical Guidelines for Stroke Management and the National Rehabilitation Stroke Services Framework 2022⁷.

This year's survey of resources in inpatient rehabilitation stroke services provides an overview of the chronic gaps in infrastructure and staffing as well as the ongoing impact of COVID-19 on resourcing in the post pandemic era. It will help guide government, healthcare administrators and clinicians into the future.

The National Stroke Rehabilitation Audit collected data in two components:

1. *Organisational Survey* – Survey of resources, processes and infrastructure assessed against the **National Stroke Rehabilitation Services Framework** and completed by 103 stroke rehabilitation services.
2. *Clinical Audit* – A retrospective audit of 3454 case notes from 93 rehabilitation services and assessed against the **Living Clinical Guidelines for Stroke Management**.

The results are highly representative of rehabilitation across Australia with 92 public services and 11 private services completing the Organisational Survey. Among these, 85 public services and 8 private services participated in the Clinical Audit.

Rehabilitation services that participated in the Audit reported 8925 episodes of inpatient stroke rehabilitation in the previous 12 months with 3035 (34%) episodes captured in the Clinical Audit. Findings of the Audit indicate there have been incremental improvements in a small number of processes of care since the last Rehabilitation Audit in 2020, but also areas of decline and significant gaps remain.

A stroke attacks the brain, and its impact extends well beyond the physical. Emotional, personality and behavioural changes are common. Mood changes, such as anxiety and depression which frequently occur following a stroke, are common during rehabilitation and have been found to negatively affect patient outcomes. The importance of mental health to overall wellbeing and recovery from stroke has been recognised as crucial for more than a decade, and in response it has been included as a recommendation in the Audit Report for many years.

Once again, the Audit Report highlights inconsistencies in stroke care. All Australians need and deserve access to best-practice care. Recovery from stroke and access to specialist

services should not be determined by where you live. Recent expansion of telehealth into allied and mental health services demonstrates that geography no longer needs to be, nor is an acceptable barrier to rehabilitation care.

Inpatient rehabilitation services structure and resources

The National Rehabilitation Services Framework helps guide service planning, monitoring, and improvement in stroke rehabilitation services. This includes ensuring all staff within rehabilitation services receive ongoing, stroke specific education and training in use of evidence-based guidelines to ensure that care, support and follow up for patients and carers, is informed by the best-practice research.

Areas highlighted in the Organisational Survey representing resources within rehabilitation hospitals include:

- Only 55% of services routinely conducted [standardised early assessment for rehabilitation](#) and under half of the services (43%) reported effective links with acute providers. This gap underscores the importance of improved communication to ensure timely rehabilitation access. Furthermore, less than half of these services (44%) had a comprehensive system for transfers of care.
- 13% of services reported having [co-located beds in a geographically defined stroke unit](#), with only 8% of patients overall receiving treatment in these specialised settings. On the day of completion of the Organisational Survey, 785 patients with stroke were admitted to an inpatient rehabilitation service. Among these, 130 patients (17%) were being cared for on a dedicated stroke rehabilitation unit, (21% in 2020). The presence of these units is linked to better adherence to care indicators, underscoring the need for their expansion.
- 30% of rehabilitation services reported no [access to a program of continuing education for staff](#) to develop their knowledge in the latest evidence-based stroke care recommendations. Only 49% of services provided communication partner training, indicating a significant gap in staff education that is crucial for supporting patients with aphasia.
- Despite the known benefits of increased therapy time, only 62% of services ensured patients received [evidence-based intensity of therapy](#), with just 23% providing three or more hours of active therapy daily. The average therapy time remained at only 10 hours per week, significantly lower than the recommended levels, highlighting resource limitations in inpatient services.
- Almost one third of participating services (30%) did not have active involvement from [psychological services](#) (clinical psychology or neuropsychology) in stroke rehabilitation. With 44% of patients reported to have a mood disorder, this is a major gap.
- 41% of services confirmed they did not routinely [use evidence-based guidelines](#) to inform patient care (34% in 2020) and [participation in quality improvement activities](#) fell from 85% in 2020 to 76%.
- The COVID-19 pandemic resulted in significant changes within our hospital system that were reported in the 2020 Rehabilitation Services Audit Report. Challenges in maintaining evidence-based care have continued in the post pandemic era with 20% of services reporting that they have not returned to pre-pandemic functionality or resourcing.

Best-practice care empowering Australians to live well after stroke

The Clinical Audit is a mechanism to contrast documented care provided in hospitals to evidence based recommendations detailed in the national Living Clinical Guidelines for Stroke Management. Data for the Clinical Audit represent the care provided to patients admitted to the participating inpatient rehabilitation services between 1 January – 31 December 2023.

- Ninety percent of patients were involved in [setting goals with the rehabilitation team](#) and 83% were involved in developing their care plan with the stroke team. Such collaboration should be the cornerstone of all rehabilitation care and all patients (or family if the patient has severe cognitive impairments) should be enabled to be actively involved in their recovery.
- Mood disturbance post-stroke is common, however, in the 2024 Audit, only 66% of eligible patients received a [mood assessment](#) and of those with mood impairment, only 51% had input from a psychologist, indicating significant gaps in providing the specialist management required.
- Post-stroke urinary incontinence is also common after stroke (42% in this Audit), yet only 51% of those with an identified impairment, had a [structured urinary incontinence management plan](#) to promote recovery. This demonstrates a critical gap in an area that can impact on discharge destination and quality of life.
- A concerning 39% of survivors of stroke did not receive vital [information about stroke and recovery](#) (such as the information contained in My Stroke Journey). This gap may be due in some instances to a lack of documentation, and services are encouraged to explore their data and processes, and implement changes where required.
- [Information and support regarding sex, intimacy and relationships](#) after stroke continues to be poor with only 25% of people offered written information about the impact of stroke on intimate relationships and only 18% being provided with the opportunity to speak to someone about their needs.
- 23% of patients were employed prior to their stroke and only 61% of these were provided with information and [advice on return to work](#) if they wanted to resume employment.
- [Preventing further strokes](#) is essential. In this Audit, provision of medication on discharge remained high overall. Prescription of [blood thinners](#) was 90%, and [cholesterol lowering medication](#) 91% and [blood pressure lowering medication](#) and [oral anticoagulants](#) (for patients with atrial fibrillation and ischemic stroke) were both 84%.
- While prescription rates for preventive medications are high, [education on lifestyle](#) changes remains suboptimal, with only 68% of patients receiving the information needed to understand and work towards lowering their stroke risk. For those who smoked or recently quit, just 47% received advice about [smoking cessation](#), leaving more than half without the information needed to empower them to quit and seek support to stay smoke free.

To address these gaps and enhance stroke rehabilitation services, the following are actions are recommended:

- Development of a national Rehabilitation Stroke Care Standard.
- Improved integration between acute and rehabilitation services to ensure a streamlined flow of care.
- Ensure staffing, equipment and processes are available to support delivery of evidence-based stroke rehabilitation, with an immediate return to pre-COVID resourcing as a minimum.
- Provision of ongoing, stroke-specific education and training to all staff. A specialised interdisciplinary stroke (or neurorehabilitation) team should be encouraged to routinely use Clinical Guidelines for Stroke Management to guide practice and to conduct targeted quality improvement activities to continually improve care.
- Improved provision of stroke information and education about stroke and recovery for patients and their family/carers. This includes tailored advice on stroke risk factors, intimacy and relationships after stroke, returning to work, and smoking cessation.
- Ensure carers of people affected by stroke have the training and ongoing support required.
- Ensure all patients with suspected altered mood are assessed and those identified with mood impairment receive adequate management and referral for ongoing care in the community.
- Ensure patients with urinary incontinence receive a structured urinary incontinence management plan.
- Ensure patients receive the recommended amount of practice to maximise recovery for all inpatient rehabilitation (including early supported discharge services) and referral to appropriate outpatient services as required.

Chapter 1: Introduction

Stroke is one of Australia's biggest killers and a leading cause of disability.¹ Stroke kills more women than breast cancer and more men than prostate cancer.¹ In 2023 it was estimated that 45,785 people in Australia experienced a stroke (34,793 for the first time). That is one stroke every 11 minutes.² This is predicted to increase to 55,000 first strokes and almost 17,000 recurrent strokes by 2050 if current trends continue. More than 440,481 people are living with the effects of stroke.²

Stroke is a leading cause of disability in Australia and around 25% of survivors of stroke are working age (under the age of 65).² In a survey of Australian survivors and carers, of those working prior to their stroke, almost three quarters (71%) reported a change in their work activities after their stroke.³ Approximately two in three stroke survivors suffer a disability that impedes their ability to carry out daily living activities unassisted.³ Secondary prevention is also important since almost half of all survivors of stroke experience another stroke within 10 years.⁴

1.1 Clinical Guidelines and the National Stroke Audit

Stroke Foundation has coordinated the development of national clinical guidelines for stroke care since 2003. Clinical guidelines are an important tool that empowers clinicians in understanding the best evidence-based interventions to help people recover from stroke. The *Living Clinical Guidelines for Stroke Management*⁵ (hereinafter referred to as the Clinical Guidelines) present evidence-based recommendations for clinical stroke care and are approved by the National Health and Medical Research Council (NHMRC) and help to form the basis of the National Stroke Audit, determining what clinical care data should be collected. The National Stroke Audit commenced in 2007 and provides longitudinal data to track changes over time; allowing hospitals to understand where they have, and have not, improved between each National Stroke Audit.

The Clinical Guidelines are only useful when they are used effectively in clinical practice. The audit and feedback process is an important strategy to encourage change in line with what is known to be best practice.⁶ The National Stroke Audit was designed by Stroke Foundation to measure adherence to the best practice recommended in the Clinical Guidelines. As well as monitoring stroke care at national and state levels, the National Stroke Audit promotes quality improvement by providing a report back to individual services. These individualised reports enable teams to compare their performance against national averages and achievable benchmarks obtained from the top-performing services and peers, based on other similar-sized (admissions per year) stroke services.

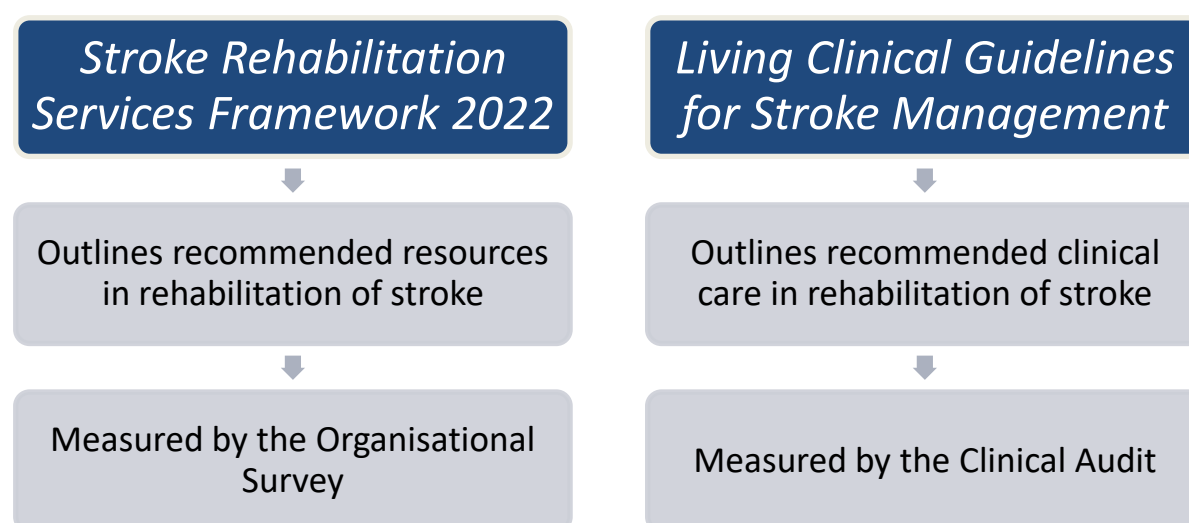
1.2 The National Stroke Audit program

The National Stroke Audit - Rehabilitation Services is comprised of:

- an Organisational Survey of stroke rehabilitation services across Australia. The Organisational Survey provides information about the resources available to deliver rehabilitation care such as the availability of activity levels, treatment, goal setting and interdisciplinary staff. The Organisational Survey questions assess the adherence to the National Rehabilitation Stroke Services Framework 2022⁷ (hereinafter referred to as the Framework) which provides national recommendations for infrastructure, principles and models of stroke rehabilitation.
- a Clinical Audit involving the retrospective review of up to 40 consecutive episodes of care for patients with stroke. Eligible patients must be admitted to, and discharged from, the participating service between 1 January – 31 December 2023. The Clinical Audit is used to measure the adherence to evidence-based processes of care such as timely assessments by clinicians, interdisciplinary care, secondary prevention, and discharge planning as recommended in the Clinical Guidelines.

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

Figure 1: Components of rehabilitation care reflected in this report



The National Stroke Audit - Rehabilitation Services is conducted biennially to provide standardised, cross-sectional data on clinical performance. The methodology for the Audit is outlined in the Supplementary Report.

1.3 Structure of the report

For this report 'rehabilitation care' refers to services providing inpatient rehabilitation care for patients with stroke from arrival to discharge from the rehabilitation service, statistical discharge to a different ward/unit in the same hospital, or transfer to another inpatient facility.

Outlined in this report are the resources and structures available at the participating rehabilitation services mapped to the Framework, as well as adherence to the Clinical Guidelines. The structure of the report is as follows:

- Chapter 2 includes details of the participating inpatient rehabilitation services.
- Chapter 3 includes the responses to the Organisational Survey, analysed at a hospital level.
- Chapter 4 provides results of the Clinical Audit, which reflects individual patient care.
- Chapter 5 includes changes over time in stroke care delivered over the previous rehabilitation Audit cycles
- Chapter 6 provides insight into the ongoing impact of COVID-19 on stroke rehabilitation services
- Chapter 7 includes discussion and recommendations regarding the data from the National Stroke Audit – Rehabilitation Services 2024.

Chapter 2: Participating Inpatient Rehabilitation Services

Rehabilitation services were identified nationwide based on the following criteria:

- admitting at least 20 patients for stroke rehabilitation in 2023,
- previous participation in the Audit program, or
- consultation with state-based clinical networks.

2.1 Defining remoteness areas

Classification of participating services as metropolitan or regional/rural was based on the Accessibility and Remoteness Index of Australia (ARIA+).⁸ The Australian Statistical Geography Standard (ASGS) defines Remoteness Areas into 5 classes of relative remoteness across Australia⁹:

- Major Cities of Australia
- Inner Regional Australia
- Outer Regional Australia
- Remote Australia
- Very Remote Australia

The participating services fall into the first four classes of remoteness, as none of the participating services are classified as Very Remote Australia (refer to Supplementary Report for more information). There was only one participating remote service, and this has been included with outer regional services for these data analyses.

2.2 Participating rehabilitation service characteristics

There were 103 services, including 11 private services, that completed the Organisational Survey, reporting a total of 8,925 admissions during the 2023 calendar year. The Clinical Audit was completed by 93 services.

The number of patients with stroke admitted per year to the 103 rehabilitation services ranged from 7 to 471, with just under half the services (48%) reporting between 30 and 79 stroke rehabilitation admissions.

Services that reported 29 or fewer annual inpatient stroke rehabilitation admissions (N=14) accounted for 257 (3%) of all reported admissions. Rehabilitation services admitting 80 or more patients with stroke per year (N=39) admitted 6,025 (67% of all admissions).

Tables 1 to 4 provide the characteristics of services participating in the 2024 Audit.

Table 1: Participating rehabilitation services by state and type

	Organisational Survey			Clinical Audit		
	Total	Public	Private	Total	Public	Private
Australia	103	92	11	93	85	8
ACT	1	1	0	0	0	0
NSW	37	31	6	34	30	4
NT	2	2	0	2	2	0
QLD	17	16	1	15	15	0
SA	7	6	1	7	6	1
TAS	4	3	1	4	3	1
VIC	26	24	2	23	21	2
WA	9	9	0	8	8	0

Table 2: Number of stroke admissions per annum by rurality

	Australia (N=103)	Rurality		
		Major Cities (N=61)	Inner Regional (N=30)	Outer Regional & Remote (N=12)
Total number of stroke admissions per annum reported in survey	8,925	6,488	1,941	496

Table 3: Number of stroke admissions per annum by volume

	Australia (N=103)	Reported annual stroke admissions		
		≥80 (N=39)	30 - 79 (N=50)	≤29 (N=14)
Total number of stroke admissions per annum reported in survey	8,925	6,025	2,643	257

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

	Number of beds			Number of annual stroke admissions			Reported annual stroke admissions		
	Median	Q1	Q3	Median	Q1	Q3	≤29	30-79	≥80
Location									
Australia (N=103)	23	16	40	63	44	98	14	50	39
NSW (N=37)	20	17	35	54	35	80	6	21	10
QLD (N=17)	21	16	42	74	55	91	0	10	7
SA (N=7)	6	6	52	26	17	280	4	1	2
TAS (N=4)	22	15	35	45	40	48	0	4	0
VIC (N=26)	30	18	45	78	46	114	2	11	13
WA (N=9)	26	16	78	117	60	149	1	2	6
Rurality									
Major cities (N=61)	30	20	52	78	51	117	4	28	29
Inner Regional (N=30)	18	16	24	51	44	80	3	19	8
Outer Regional & Remote (N=12)	11	6	19	27	21	61	7	3	2
Setting									
Public (N=92)	21	16	34	64	45	103	12	43	37
Private (N=11)	44	33	90	45	39	78	2	7	2

Notes: Q1: 1st quartile; Q3: 3rd quartile. Data from states with a small number of services (ACT, NT) excluded in location breakdown.

2.3. Dedicated Stroke Rehabilitation Units beds

There were 13 rehabilitation services (13%) that reported having co-located stroke beds within a geographically defined unit. Stroke units that have been shown to deliver highly effective stroke care share several characteristics, including:

- Location in a geographically discrete unit
- Co-located beds within a geographically defined ward. Beds must be those set aside for the rehabilitation of patients with stroke only. Beds don't necessarily need to be located within the same bay/room but do need to be located within one ward
- A dedicated multidisciplinary team (MDT) with an interest in stroke or rehabilitation
- Staff with a special interest and expertise in the management of stroke, and access to ongoing professional education and training
- Clear communication, with regular team meetings to discuss management (including discharge planning) and other meetings as needed (e.g. family conferences); and
- Active encouragement of stroke survivors and their carers/families to be involved in the rehabilitation process.⁵

A total of 169 dedicated stroke rehabilitation unit beds were reported at the 13 services with dedicated stroke rehabilitation units (median = 12 beds). On the day of completion of the Organisational Survey, 785 patients with stroke were admitted to an inpatient rehabilitation service. Among these, 130 patients (17%) were being cared for on a dedicated stroke rehabilitation unit (21% in 2020).

Chapter 3: Organisational Survey Results

The capacity to plan, deliver and evaluate high quality stroke rehabilitation services is essential for improvement of healthcare delivery and patient outcomes. The aim of the Framework is to improve the quality of Australian stroke rehabilitation services by outlining the recommended structures, networks, settings, and criteria for monitoring. The Framework comprises 10 recommended elements that all rehabilitation services should be actively ensuring they meet.

This section of the report describes the current resources available in Australia to support best practice stroke care and each service's adherence to the Framework. Performance by location is shown in Table 5.

Key findings:

- National adherence to the Framework showed some variation in individual elements between 2020 and 2024 but the national median number of elements met remains the same at six (Q1: 4, Q3: 8).
- Three services met all 10 elements and 33% of services met less than half of the Framework elements.
- Median number of elements met appears higher in services with larger stroke rehabilitation admissions and in specialised rather than general rehabilitation services.
- A large disparity between states continues in relation to structures and processes required for stroke management in rehabilitation.
- Early assessment for rehabilitation was reported as standard practice by 55% of services.
- Routine use of evidence-based guidelines to inform practice was only reported by 59% of participating services.
- Only 62% of services reported having documented processes and systems in place to ensure patients receive evidence-based intensity of therapy.
- Staff time or skill was reported as a limiting factor in being able to provide the right amount of physical therapy for 86% of services.
- Data-driven quality improvement activities to improve care, were reported in 76% of services.
- Communication partner training for health professionals who interact with people with aphasia (new question for 2024) was reported as being routinely provided by 49% of services, although there is a considerable variation between states (14% of services to 89% of services).
- The COVID-19 pandemic had a significant impact on services around the country and 20% of services have not returned to pre-pandemic structure and function.

3.1 Overall adherence to the Framework

Among the 103 rehabilitation services completing the Organisational Survey, the median number of Framework elements met nationally was six. The elements most commonly met were goal setting with the patient and team, information and education provision for the patient and carers, and having systems in place for quality improvement. Three services (3%) were found to meet all 10 elements. The largest proportion of services (17 services, 17%) met seven elements. It is important to note that 30 services (29%), met less than half of the Framework elements (≤ 4 elements) in 2024. The median number of elements met increased slightly for services with a larger volume of admissions for patients with stroke (six for 30-70 admissions, seven for 80+ admissions) and also in services where there was a dedicated stroke unit (eight elements met).

A breakdown by rurality, volume and presence of a dedicated stroke unit is shown in Tables 5 to 7.

Table 5: Median number of Framework elements by rurality

		Rurality		
	Australia (N=103)	Major Cities (N=61)	Inner Regional (N=30)	Outer Regional & Remote (N=12)
Median number of <i>Framework</i> elements met (Q1, Q3)	6 (4, 8)	6 (5, 8)	5 (3, 7)	6 (5, 7)

Q1: 1st quartile; Q3: 3rd quartile

Table 6: Median number of Framework elements by volume

		Reported annual stroke admissions		
	Australia (N=103)	≥80 (N=39)	30 - 79 (N=50)	≤29 (N=14)
Median number of <i>Framework</i> elements met (Q1, Q3)	6 (4, 8)	7 (5, 9)	6 (4, 7)	5 (4, 7)

Q1: 1st quartile; Q3: 3rd quartile

Table 7: Median number of Framework elements by specialised unit

	Australia (N=103)	Dedicated stroke unit (N=13)	No dedicated stroke unit (N=90)
Median number of <i>Framework</i> elements met (Q1, Q3)	6 (4, 8)	8 (6, 9)	6 (4, 7)

Q1: 1st quartile; Q3: 3rd quartile

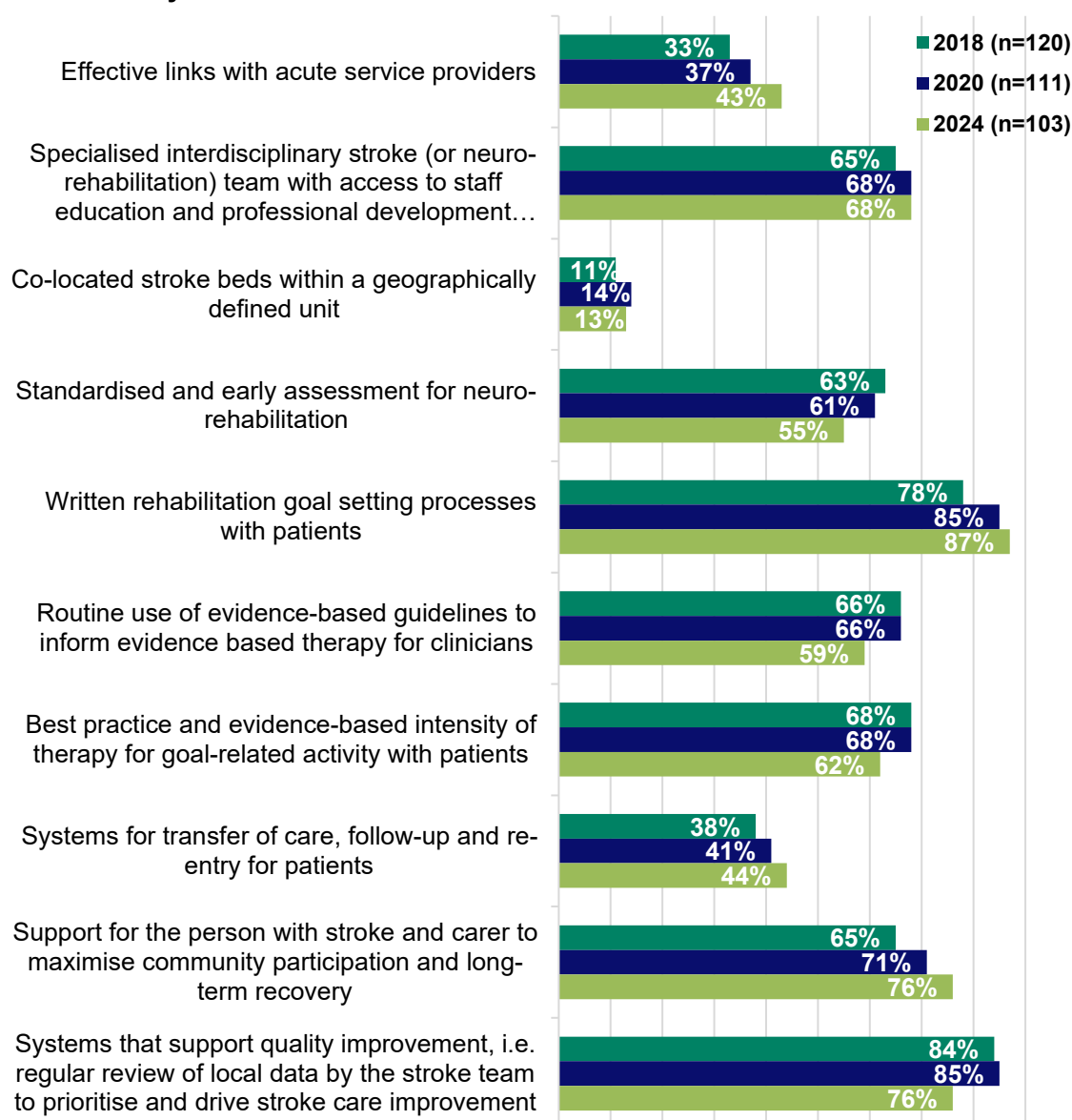
3.2 Individual elements of the Framework

Table 8. Adherence to the individual elements of the Framework by location

Elements of the Framework	AUS (N=103) %	NSW (N=37) %	NT (N=2) %	QLD (N=17) %	SA (N=7) %	TAS (N=4) %	VIC (N=26) %	WA (N=9) %
Effective links with acute service providers	43	35	50	65	71	25	35	44
Specialised stroke (or neuro-rehab) team	68	65	50	88	57	25	65	78
Co-located stroke beds	13	5	0	12	14	0	8	56
Standardised and early assessment	55	49	100	71	71	25	54	56
Written rehabilitation goal setting processes	87	86	100	82	86	100	88	89
Routine use of evidence-based guidelines	59	51	50	71	71	50	54	78
Best practice and evidence-based intensity of therapy	62	51	50	71	100	75	58	67
Systems for transfer of care, follow-up and re-entry for patients	44	46	50	35	57	0	42	67
Support for community participation and long-term recovery	76	73	0	71	100	100	77	78
Systems that support quality improvement, i.e. review of local data by the stroke team to drive stroke care improvement.	76	70	100	88	86	50	69	100

Figure 2 below shows Australia's aggregated adherence to the 10 individual elements of the Framework over the three last Audits.

Figure 2. Australia's aggregated adherence to the 10 elements of the Framework over three Audit cycles.



3.3 Stroke rehabilitation management

An important component of rehabilitation is having a specialised interdisciplinary team of health professionals that provides a coordinated program. For patients with stroke, the program should include individual assessment, treatment ensuring recommended levels of active therapy to optimise outcomes, regular review, discharge planning and follow-up. The rehabilitation team may include various disciplines working together and coordinating the input of medical, nursing, and allied health skills, along with social, educational, and vocational services.

The use of telehealth in stroke rehabilitation has continued to have a vital role in ensuring the delivery of a sustainable health system, with 52% of services reporting the onsite use of telehealth to inform clinical decision making within the last six months (38% in 2018, 56% in 2020).

3.3.1 Composition of rehabilitation team

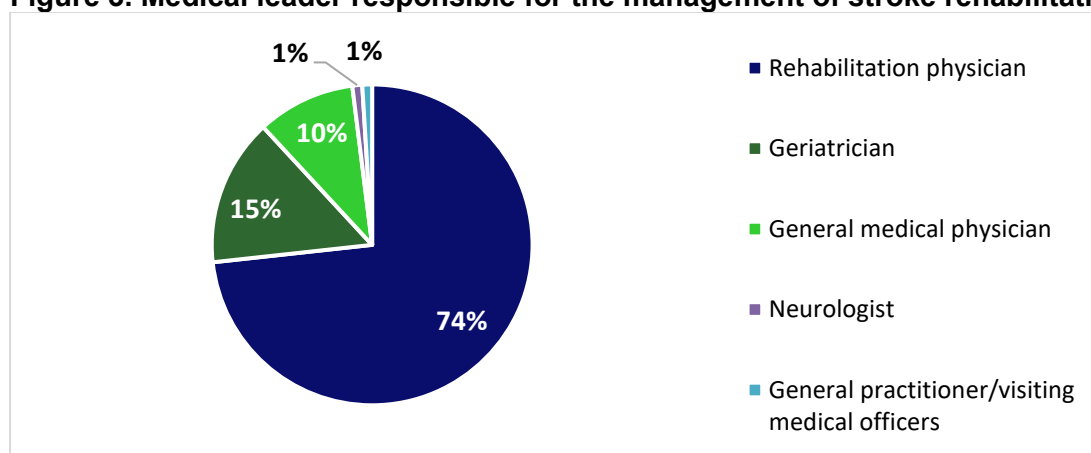
An important component of rehabilitation is a specialised interdisciplinary team of health professionals that provides a coordinated program and includes individual assessment, treatment, regular review, discharge planning and follow-up. The rehabilitation team may include many disciplines, combining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

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

Results

The medical leader responsible for the management of rehabilitation patients with stroke was the Rehabilitation Physician in 74% of services (Figure 3).

Figure 3. Medical leader responsible for the management of stroke rehabilitation



Access to allied health staff was almost universally reported in this Audit (Table 9). Recreational therapists and diversional therapists were the least common in stroke rehabilitation (9% and 8% respectively, down from 13% and 15% in 2020). Clinical psychologists were involved at 61 services (59%) and 51 services had input from a neuropsychologist (50%) with 31 services having neither a clinical nor a neuropsychologist actively involved in the management of patients with stroke. Almost one third of participating services (30%) did not have active involvement from psychological services in stroke rehabilitation.

Table 9. Multidisciplinary team composition

	Australia (N=103)
The following health professionals are actively involved in the rehabilitation management of patients with stroke:	n (%) or median (Q1, Q3)
Rehabilitation physician	85 (83)
Geriatrician	51 (50)
General medical physician	38 (37)
Neurologist	33 (32)
General practitioner/visiting medical officers	23 (22)
Rehabilitation nurse	92 (89)
Clinical nurse consultant	48 (47)
Clinical nurse specialist	53 (51)
Physiotherapist	103 (100)
Speech pathologist	102 (99)
Dietitian	101 (98)
Social worker	103 (100)
Occupational therapist	103 (100)
Clinical psychologist	61 (59)
Neuropsychologist	51 (50)
Recreational therapist	9 (9)
Diversional therapist	8 (8)
Allied health assistant/therapy assistant	101 (98)
Medical resident	91 (88)
Stroke liaison officer/stroke care coordinator	35 (34)
Other	32 (31)

3.3.1 Team communication

Respondents were asked to report the frequency of interdisciplinary team meetings. Regular communication amongst the team is vital to address the various issues that may arise in a timely manner. The team meetings (case conferences) are one way to facilitate coordinated and efficient communication about patient management.

Results

Regular interdisciplinary team meetings occurred at 99 rehabilitation services (96%), with services meeting on average four times each month.

Overall, 78 services (76%) reported having a dedicated person liaising between acute and rehabilitation services (up from 57% in 2020), with 64 services (62%) holding regular

meetings. Of the 64 services, 55 services (86%) reported meeting four or more times per month (79% in 2020), 6 services (9%) reported meeting once monthly and 3 services (5%) reported meeting less than once per month.

3.3.2 Professional development

Provision of targeted education and collaborative involvement in data collection for quality-of-care monitoring, can facilitate and embed a culture of performance review of evidence-based practice and importantly, quality improvement initiatives to address gaps. Access to regular stroke-specific education for staff working in rehabilitation services, is a core component of organised and evidence-based stroke care.

Results

A total of 72 rehabilitation services (70%) reported access to a program of continuing education for staff relating to stroke management. There was variability across states, ranging from 25% to 100%, with staff in larger services more likely to have opportunities for professional development (82%) as shown in Table 10.

Communication partner training (CPT) was also more frequently available in services with higher volume admissions but there was large variability across states. Nationally, CPT was available in just under half of the participating rehabilitation services.

Table 10. Staff professional development and education

	Australia (N=103)	Reported annual stroke admissions		
		≥80 (N=39)	30 - 79 (N=50)	≤29 (N=14)
	%	%	%	%
Rehabilitation services with access to a program of continuing education for staff relating to stroke management	70	82	62	64
Communication partner training is routinely offered to health professionals and/or volunteers who interact with people with aphasia	49	54	50	29

3.3.3 Assessment for rehabilitation

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

Results

There was a high level of collaboration reported between acute and rehabilitation services when assessing suitability for rehabilitation, with 73 services (71%) reporting the assessment to be a joint process. Involvement of acute care doctors in the rehabilitation assessment was reported by 89 services (86%; 77% in 2020). A total of 95 services (92%) reported using a standardised process for assessing suitability for rehabilitation admission. The assessment was typically reported to take place within the first three to four days of admission (40 services, 39%; 50% in 2020), but a number of services stated that the timeframe for this assessment varied (34 services, 33%).

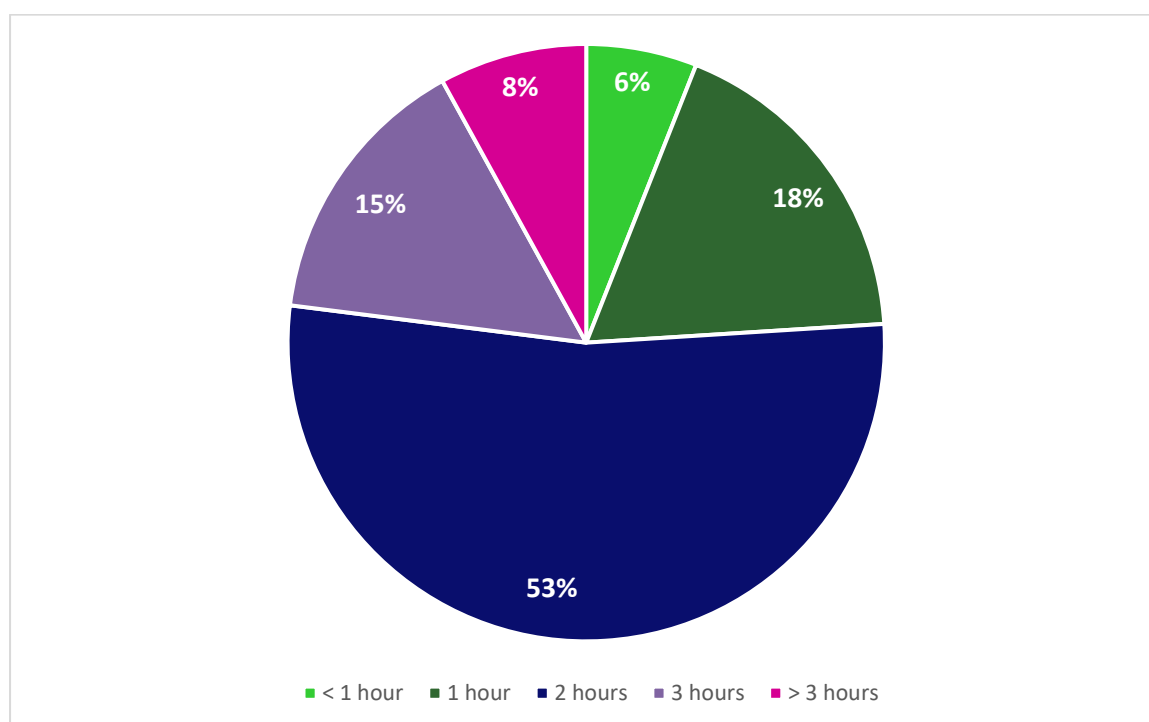
3.4 Intensity of therapy

The amount and intensity of rehabilitation provided to survivors of stroke greatly affects their outcomes. The recommendation in the Guidelines is that patients be provided as much therapy as possible with a minimum of three hours of scheduled practice, involving at least two hours of actual active practice each weekday for physical therapy, and as much therapy for dysphagia or communication difficulties as can be tolerated. Group therapy is suggested as one strategy to increase amount of therapy time; however, it should be acknowledged that access to therapy in this format may be limited for patients who are cared for by an early supported discharge (ESD) service. These patients may have access to alternative therapies which have not been captured within the categories of this Audit.

Results

Most services reported having physiotherapists (PTs) and/or occupational therapists (OTs) available to provide active clinical care five days per week (71 services, 69%), with 32 services (31%) reporting PT and/or OT availability on at least one day over the weekend. Group circuit classes were provided by 74 services (72%).

Figure 4. Average time that patients with motor impairments undertake active physical therapy (Physiotherapy or Occupational Therapy) per day.



The average number of minutes of active physical therapy provided per patient per week was 600 minutes. This included total therapy delivered by any mechanism such as one-on-one therapy, group circuit classes, and allied health assistance. Putting this total into context, 600 minutes equates to 10 hours of active physical therapy per week, which could equate to, 2 hours per day if provided 5 days per week or 1 hour 26 minutes per day if provided 7 days per week.

Provision of the right amount of physical activity was reported as being limited by patient factors (86%) such as capacity, dependence, co-morbidities. Staff factors (86%) such as

time, skill, and experience, as well as time spent on non-patient contact activities (77%) were also reported as impacting the right amount of physical activity. There were only a small number of services that reported the ability to provide the recommended levels of physical activity to all patients (7 services, 7%).

3.5 Ambulatory (community-based) rehabilitation services

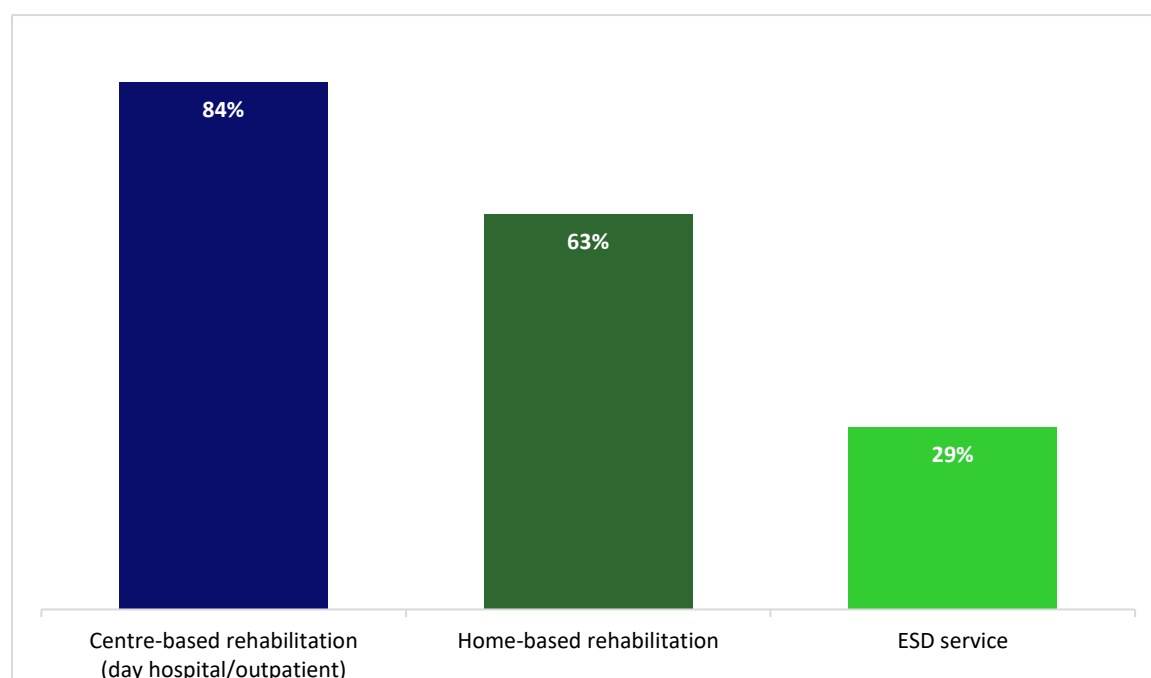
The Framework refers to four types of ambulatory rehabilitation services:

- Day hospital – an intensive, time-limited program requiring two or more disciplines.
- Outpatients – single discipline therapy in an outpatient setting, with access to a multidisciplinary team if needed.
- Home-based – individualised rehabilitation in the home, or transition care services (not stroke specific).
- Early supported discharge (ESD) – hospital substitution model with the MDT and nursing staff providing an equivalent level of intensity to inpatient rehabilitation.

Results

Referral to centre-based rehabilitation (day hospital/outpatient) was provided by 87 services (84%), with referral to home-based rehabilitation provided by 65 services (63%). ESD service referrals were provided by 30 services (29%; figure 5).

Figure 5. Community rehabilitation services available for further rehabilitation



Chapter 4: Clinical Audit Results

The results of the Clinical Audit relate to the uptake of recommendations pertaining to rehabilitation from the Clinical Guidelines, reported as adherence to processes of care (quality indicators). Further information on national adherence against the key processes of care, including changes over time, is presented in Chapter 5.

Key findings:

Low adherence to quality indicators:

- Mood assessment during admission 66%.
- Management plan for patients with urinary incontinence 51%.
- Patient and carer information and education:
 - Education on modifiable risk factors 68%
 - Patient and/or family received information about stroke and recovery 61%
 - Provision of information about sex and sexuality after stroke 26%
 - Provisions of advice about smoking cessation for current smokers or recently quit 47%
 - Information for carers 51%

Moderate to high adherence to quality indicators:

- Discharge care plans outlining ongoing care in the community, developed with the team and patient 83%
- Medications prescribed on discharge was 91% lipid-lowering, 84% antihypertensives, 90% antithrombotics for ischemic stroke, 84% anticoagulants for atrial fibrillation.

Performance on quality indicators by service characteristics:

- Specialist stroke/neurological rehabilitation services performed better on mood assessment (72% vs 63%) and provision of patient information (76% vs 66%) and care plans (90% vs 80%). Other indicators were comparable to those for mixed rehabilitation services.
- Highest performance on processes of care indicators, in particular service locations (metro/regional/rural) and admission volumes (low/medium/high), is spread across categories in both groups.

Table 11 below provides an overview of national adherence to these processes of care.

Table 11: National adherence to recommended processes of care quality indicators

Process of care	Eligible to receive process of care (N)	Number receiving process of care (n)	Adherence to process of care %
Patient assessment and management			
Goal setting with the patient or family	3,454	3,105	90
Mood assessed during admission	3,454	2,266	66
Secondary prevention			
Patient received education about behaviour change for modifiable risk factors prior to discharge*	2,854	1,949	68
Patient prescribed antithrombotic medication on discharge ⁺	2,064	1,857	90
Patient prescribed lipid-lowering treatment on discharge†	2,097	1,900	91
Patient prescribed blood pressure-lowering medication on discharge ⁺	2,713	2,273	84
Patient with atrial fibrillation prescribed oral anticoagulant medication on discharge ⁺	1,312	1,097	84
Discharge planning and support for life after stroke			
Patient and/or family received information covering stroke, hospital management, secondary prevention and recovery (e.g. My Stroke Journey booklet)	3,454	2,096	61
Discharge care plan outlining post-discharge care in the community developed with the input from the team and the patient*	2,805	2,318	83
Patient offered written information addressing issues relating to sexuality post-stroke*	2,854	703	25
Post-discharge contact provided to stroke survivor or family*	2,854	2,105	74
Carer received training [^]	1,007	846	84
Carer received a support needs assessment (e.g. physical, emotional and social) [^]	1,473	978	66

* Patients discharged to their usual residence, residential aged care, transitional care services or other

+ Eligible patients without contraindications for drug

[^] Includes carers of stroke survivors discharged to a private residence

4.1 Characteristics of patients from the Clinical Audit

During the Clinical Audit, 3454 cases were audited nationally. This represents 34% of the episodes of care for patients discharged in 2023 with a stroke impairment code captured by Australasian Rehabilitation Outcomes Centre (AROC) data.¹⁰ Most patients whose records were entered in the Clinical Audit, were managed in major city rehabilitation services (2,134

cases, 62%) compared with 1,033 from inner regional (30%) and 287 from outer regional/remote (8%) locations (Table 12). There was only one remote service which participated in the Clinical Audit and their audited cases (n=16) have been combined with data for outer regional services.

Table 12. Patient demographics

Patient demographics	Australia	Major Cities	Inner Regional	Outer Regional & Remote
	(N=3,454)	(N=2,134)	(N=1,033)	(N=287)
	%	%	%	%
Age (median)	74 years	75 years	74 years	69 years
Sex – male	57	57	58	61
Patient identifying as Aboriginal and/or Torres Strait Islander background	4	2	5	16
Patient requiring interpreter	6	9	1	2
Stroke type				
Ischaemic stroke	74	72	77	77
Haemorrhagic	18	20	16	18
Undetermined stroke type	5	5	4	4
Post-stroke information				
Independence within 72 hours of admission to rehabilitation (mRS 0-2)	10	8	11	15

mRS: modified Rankin Scale

4.2 Specialised inpatient rehabilitation

According to the most recent Cochrane Review of stroke unit care¹¹, core characteristics of stroke unit care in relation to rehabilitation include:

- co-ordinated multi-disciplinary rehabilitation
- staff with a specialist interest in stroke or rehabilitation, or both
- routine involvement of carers in the rehabilitation process
- regular programmes of education and training

The review suggests that there is a reduction in poor outcomes if the patient is treated in a stroke unit compared to a general rehabilitation unit. This is particularly in relation to odds of death or institutional care, and death or dependency.

The Framework describes three different models of inpatient stroke rehabilitation:

- Mixed rehabilitation unit – a unit managing a general caseload with no dedicated stroke beds.
- Comprehensive stroke unit – a discrete unit which delivers both acute and rehabilitation stroke care.
- Stroke rehabilitation unit – a discrete unit providing rehabilitation specifically to patients with stroke.

Results

The majority of patients were treated in mixed rehabilitation wards (70%) with less than one-third of patients (27%) treated in a specialised inpatient unit (Table 13).

Table 13. The ward patients were treated on during inpatient rehabilitation

Location	Australia (N=3,454)
	%
Dedicated stroke rehabilitation unit	8
Neurorehabilitation unit	10
Combined acute/rehabilitation unit	9
Mixed rehabilitation ward	70
Other	4

4.3 Patient assessment

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

Results

The majority of patients received an allied health assessment when it was indicated (Table 14). The most significant discrepancy was reported in relation to psychology. An assessment was indicated in 829 episodes due to the identification of a mood impairment on admission, however a psychology assessment occurred in only 461 episodes (56%). As reported in the Organisational Survey, 30% of participating services do not have access to psychology services.

Table 14. Multidisciplinary team assessment

	Eligible for assessment	Received assessment
	N	n (%)
Physiotherapy	3,423	3,417 (100)
Occupational therapy	3,443	3,436 (100)
Speech pathology	2,842	2,701 (95)
Social work	2,958	2,608 (88)
Dietetics*	1,071	1,002 (94)
Psychology†	829	461 (56)

*Known N includes patients with nutrition complications identified on admission

†Known N includes patients with mood impairment identified on admission

4.4 Management of impairments

As part of the Clinical Audit, participants were asked to record patient impairments on admission to the inpatient rehabilitation service and the subsequent management of these impairments.

Results

The impairments found on admission and the use of therapy or management strategies varied (Table 15). Most patients had difficulties with activities of daily living (89%), and 75% had difficulties with upper limb or walking independently.

Table 15. Management of impairments (management by each discipline may overlap)

Impairment	Assessment documented	Assessment 'Not documented'	Impairment Present	Type of therapy / management	Therapy provided
	N*	%	n (%)*		n (%) ⁺
Difficulty walking independently	3,449	0	2,601 (75)	Tailored, repetitive practice of walking	2,427 (93)
				Circuit class therapy [^]	848 (35)
				Treadmill training with or without body weight support [^]	220 (9)
				Other therapy	1,533 (59)
Difficulties with ADLs	3,439	0	3,063 (89)	Task specific practice	2,886 (94)
				Trained use of appropriate aids	2,264 (74)
				Other	412 (13)
Aphasia	3,373	2	1,240 (37)	Speech and language therapy 2-3 times per week	1,097 (91)
				Communication partner training provided to primary communication partner	668 (70)
				Other therapy	531 (43)
Neglect/ inattention	3,213	7	881 (27)	Visual scanning training	691 (78)
				Eye patching	27 (3)
				Mental practice	229 (34)
				Other therapy	281 (32)
Nutrition complication	3,336	3	1,134 (34)	Ongoing monitoring by dietitian	1,015 (90)
				Nutritional supplementation	912 (80)
				Alternative feeding	225 (20)
Mood impairment	2,203	3	977 (44)	Antidepressants	514 (53)
				Psychological interventions	498 (51)
				Other therapy	240 (25)
Upper limb difficulty	3,411	1	2,564 (75)	Constraint-induced movement therapy (in selected people)	308 (12)
				Repetitive task-specific training	2,161 (84)
				Other therapy	1,495 (58)

ADLs: Activities of daily living; *Known N includes all patients with assessment recorded (excludes not documented responses)
 +N (denominator) is all patients with impairment present;
 ^N (denominator) is all patients who received tailored, repetitive practice of walking

4.4.1. Incontinence

The presence of urinary incontinence after stroke has an impact on discharge destination, as patients with urinary incontinence are more likely to be in residential care 12 months after their stroke. It is also associated with decreased quality of life and an increased dependence on others.

Results

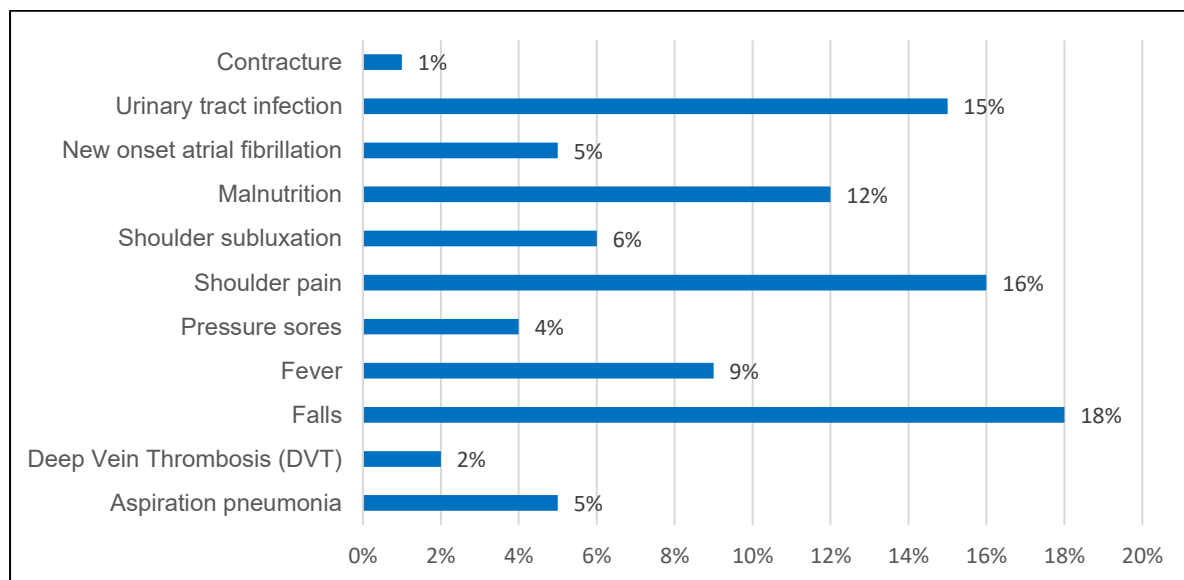
The majority of patients were reported as being assessed for urinary incontinence within 72 hours of admission to rehabilitation (89%), with 42% of patients having documented urinary incontinence during their rehabilitation episode of care. A structured urinary incontinence management plan was provided to only 51% of these patients.

4.5 Complications during inpatient admission

Complications after stroke that occur in hospital are strongly associated with stroke recurrence and increased risk of dependency or death.

The complications documented during rehabilitation admission for all cases included in this Audit (n=3454) are shown in Figure 6. Notably, falls were reported in 622 admissions (18%), shoulder pain in 540 admissions (16%), urinary tract infection in 533 admissions (15%) and malnutrition in 401 admissions (12%).

Figure 6. Complications during inpatient rehabilitation



4.6 Communication with patients

Communication with the patient (or family in the case of severe aphasia or cognitive impairment) is an integral component of stroke rehabilitation. It is important that they are provided the opportunity to discuss their desired goals for rehabilitation and that goal setting

is a joint process with the MDT. This ensures the goals are relevant to the stroke survivor and enables the team to evaluate the progress of the patient throughout their admission.

Results

In the Organisational Survey, 96 services (93%) reported that they had a formal process in place for developing and documenting goals with patients. The processes used for establishing goals are outlined in Table 16. Most services (67%) reported that each discipline met with the patient separately followed by a discussion of the goals at the team meeting.

During the Clinical Audit, services reported that in 3,105 episodes of care (90%), goals were documented as having been set with input from the team and the patient or family, with 61% of episodes documenting the provision of information to the patient and/or family, covering stroke, hospital management, secondary prevention and recovery.

Table 16. Patient involvement in goal setting processes and methods that goals are usually established (combined Clinical Audit and Organisational Survey data)

	Australia n (%)
Clinical Audit	
Goals set with input from the team and patient or family	3,105 (90)
Patients/family received information regarding stroke	2,096 (61)
Organisational Survey – patient-directed goals usually established:	
Patient interviewed by each discipline only	6 (6)
Goals discussed and reviewed at team meeting after patient meets with each discipline separately	69 (67)
Patient and full multidisciplinary team set goals together	25 (24)
Ad hoc (no consistent processes used)	2 (2)
Other	1 (1)

4.7 Secondary prevention

Two in five survivors of stroke will go on to experience recurrent stroke within 10 years.⁴ The Clinical Guidelines provide clear recommendations for the use of blood pressure–lowering, lipid-lowering and antithrombotic or anticoagulation pharmacotherapy to prevent further vascular events.⁵ All survivors of stroke should also be assessed and educated on lifestyle risk factor modification.

Results

Antithrombotics were prescribed on discharge to 90% of patients with ischaemic stroke, while approximately two-thirds of patients (68%) received education about risk factor modification prior to discharge (Table 17). Patients for whom these medications were contraindicated have not been included in this analysis, noting that contraindications were very low (2-5%).

Table 17. Secondary prevention measures on discharge

	Australia
	n (%)
On antithrombotics on discharge*† (N=2,064)	1,857 (90)
On antihypertensives on discharge† (N=2,713)	2,273 (84)
On lipid-lowering treatment at discharge*† (N=2,097)	1,900 (91)
On oral anticoagulants at discharge*†^ (N=1,312)	1,097 (84)
Received advice about risk factor modification on discharge† (N=2,854)	1,949 (68)
Smoking cessation advice provided for patients currently smoking or recently quit (N=642)	299 (47)

*Ischaemic strokes only.

†Patients with no contraindication who are discharged to their usual residence, residential aged care, transitional care services or other

^Patients with atrial fibrillation

4.8 Preparation for discharge

A range of physical, psychosocial, social and financial consequences can create challenges for the survivor of stroke's adjustment to life in the community following discharge.¹² Effective discharge planning facilitates the transfer of the stroke survivor to the community by maximising independence, minimising social isolation and ensuring that the needs of the patient and carer are addressed. Carers (and patients) have often reported they are underprepared to support the survivor of stroke once back in the community.

Results

According to the Organisational Survey responses, 77% of rehabilitation services routinely provide patients with a discharge care plan on discharge from hospital. In the Clinical Audit, services reported the patient was provided with a discharge care plan in 2,318 episodes (83%) with a medical discharge summary being sent to the general practitioner or community providers in 2,674 (95%) of episodes (Table 18).

Table 18. Use of discharge-planning processes

	Australia
	n (%)
Discharge care plan provided (N=2,805)	2,318 (83)
General practitioner and/or community providers sent discharge summary (N=2,801)*	2,674 (95)
Contact provided for post-discharge programs (N=2,854)*†	2,105 (74)

*Known N is limited to eligible patients discharged to their usual residence, residential aged care, transitional care services or other

†Contact provided to patient or family

4.9 Life after stroke for patient and family

The Clinical Guidelines cover a range of topics including return to driving, return to work, leisure activities, sexuality, and accessing support for the patient and their carer.

Results

The information provided to survivors of stroke and carers regarding preparation for life in the community varied (Table 19 and 20). Support to return to driving was offered in the majority of episodes (90%) but only 25% of patients were offered written information on sexuality. Almost half of all patients were offered information about peer support (44%).

Table 19. Preparation of stroke survivor for life in the community

	Australia
	n (%)
Offered written information on sexuality* (N=2,854)	703 (25)
Offered information about peer support* (N=2,854)	1,246 (44)
Offered assistance to return to work if the patient wanted to return to work† (N=376)	231 (61)
Offered some assistance to return to driving if the patient wanted to return to driving† (N=840)	759 (90)

*Known N is limited to eligible patients discharged to their usual residence, residential aged care, transitional care services or other

†For patients discharged to a private residence.

More than three quarters of carers were provided with training (84%), however information about peer support was only offered to half of the carers (51%).

Table 20. Preparation of carer for life in the community

	Australia
	n (%)
Number of reported carers* (N=2968)	1,473 (50)
Carer provided with training†^ (N=1,007)	846 (84)
Carers identified and discussed post-discharge needs†^ (N=1,015)	698 (69)
Carers offered information about peer support† (N=1,031)	529 (51)

* Total cohort

† Known N is limited to carers of stroke survivors who were discharged to private residence

^Excludes where carer declined

4.10 Patient outcomes

Outcome measures allow health professionals to evaluate the effectiveness of rehabilitation interventions and therapies. Patient outcomes collected in the Clinical Audit include discharge destination, length of stay and function on discharge (Functional Independence Measure – [FIM]¹⁴). The FIM scores were recorded on admission and discharge (Table 21).

Table 21. Distribution of Functional Independence Measure (FIM) scores on admission and discharge

FIM Range	Rurality					
	Australia		Major cities		Regional/Remote	
	Admission (%)	Discharge (%)	Admission (%)	Discharge (%)	Admission (%)	Discharge (%)
18–60	38	12	40	13	35	9
61–78	22	8	23	9	21	6
79–99	26	20	25	20	27	19
100–126	13	60	12	57	16	65
Median FIM change	24		24		23	

FIM: Functional Independence Measure

Regional/Remote is a combined score of inner regional, outer regional and remote

4.10.1 Mortality, length of stay and functional outcomes

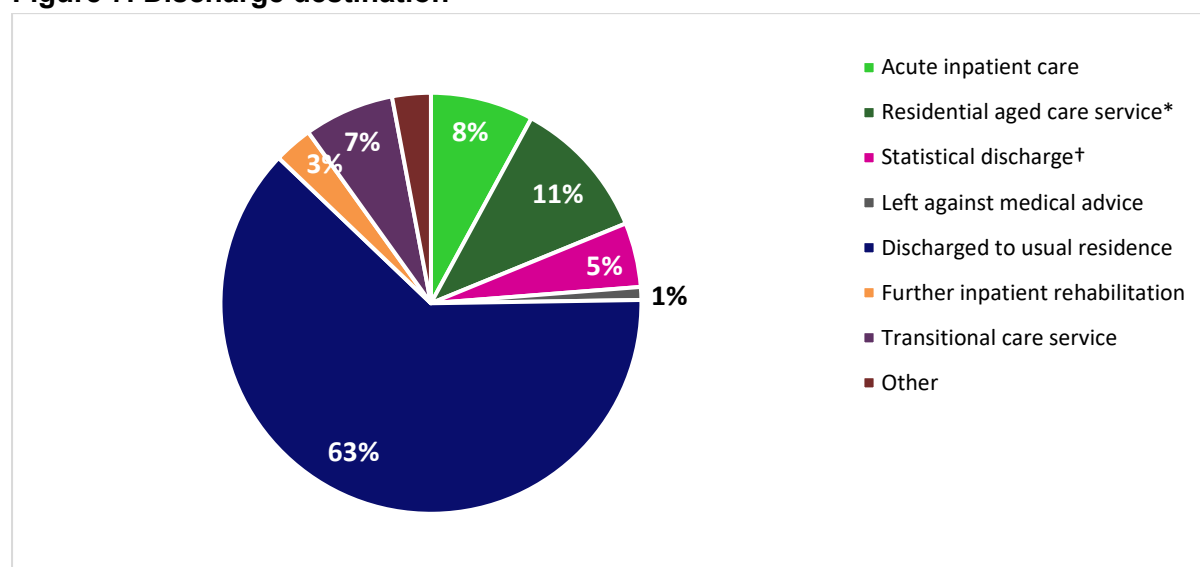
Of the 3,454 episodes audited, 25 people (1%) died while in hospital, with the median time from admission to death being 15 days. The median length of stay for all patients in inpatient rehabilitation was 24 days.

The median total FIM score on discharge was 106. The FIM efficiency for all patients with stroke discharged in this Audit were 1.2 per day. FIM efficiency is defined as the mean change in FIM score from the beginning to the end of rehabilitation divided by the mean length of stay. The higher the value, the greater the level of functional improvement per day. The case-mix adjusted FIM efficiency reported by AROC for all patients with stroke in 2023 was 0.82.¹⁰ Any comparison between AROC FIM efficiency and the Audit results must be made with caution as the Audit data are not case-mix adjusted.

4.10.2 Discharge destination

The discharge destinations of the audited patient cases are outlined below (Figure 7). Of the 2,145 stroke survivors discharged to their usual residence, 337 (16%) had formal supports in place on discharge.

Figure 7. Discharge destination



* Includes high- and low-level supported accommodation

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

4.11 Access to community rehabilitation

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

Based on 103 responses to the Organisational Survey, most participating services (94%) had access to at least one form of community rehabilitation service. Table 22 represents the survivors of stroke referred for community rehabilitation regardless of discharge destination. Of the 3,454 episodes audited, 67% of patients were referred for further rehabilitation in the community.

Table 22. Patients referred for community rehabilitation

	Australia (N=3,454) n (%)
Referred for further rehabilitation	2,324 (67)
Not known if referral made for further rehabilitation	50 (1)
Inpatient rehabilitation*	312 (13)
Outpatient rehabilitation*	564 (24)
Home-based community rehabilitation*	641 (28)
Day hospital-based community rehabilitation*	267 (11)
Early Supported Discharged service*	118 (5)
Other*	422 (18)

*If referred for further rehabilitation

4.12 Key performance indicators based on location

The following presents adherence to select clinical indicators with results split by hospital location (Table 23) and hospital volume (Table 24).

Table 23. Adherence to key performance indicators by hospital location

	Location								
	Australia		NSW	NT	QLD	SA	TAS	VIC	WA
	%	95% CI	%	%	%	%	%	%	%
Patient-centred care									
Goals set with input from the team and patient or family	90	89-91	89	83	91	96	100	89	85
Patient's mood assessed during admission	66	64-67	63	61	61	89	67	67	63
Discharge planning									
Evidence that care plan was developed with the team and patient (or family alone if patient has severe or cognitive impairments)*	83	81-84	80	91	77	100	93	82	87
Patient and/or family received information covering stroke, hospital management, secondary prevention and recovery (e.g. My Stroke Journey booklet)	61	59-62	59	70	63	78	78	56	53
Carer provided with training†	84	82-86	84	100	85	86	84	81	85
Secondary prevention									
Received advice about risk factor modification on discharge*	68	67-70	66	56	74	73	92	58	80
On antihypertensives on discharge^	84	82-85	87	82	83	85	93	78	85

CI: confidence interval

* Eligible patients discharged to their usual residence, residential aged care, transitional care services or other

† Included carers of stroke survivors discharged to a private residence, excluding if the carer declined training

^ Eligible patients only, without contraindications for drug

Table 24. Adherence to key performance indicators by stroke admission volume

	Australia		Volume		
			≥80 N=39	30-79 N=50	≤29 N=14
	%	95% CI	%	%	%
Patient-centred care					
Goals set with input from the team and patient or family	90	89-91	88	91	93
Patient's mood assessed during admission	66	64-67	65	65	72
Discharge planning					
Evidence that care plan was developed with the team and patient (or family alone if patient has severe or cognitive impairments)*	83	81-84	84	79	98
Patient and/or family received information covering stroke, hospital management, secondary prevention and recovery (e.g. My Stroke Journey booklet)	61	59-62	62	59	65
Carer provided with training†	84	82-86	85	83	81
Secondary prevention					
Received advice about risk factor modification on discharge*	68	67-70	71	66	66
On antihypertensives on discharge^	84	82-85	83	85	78

CI: confidence interval

* Eligible patients discharged to their usual residence, residential aged care, transitional care services or other

† Included carers of stroke survivors discharged to a private residence, excluding if the carer declined training

^ Eligible patients only, without contraindications for drug

4.13 Key performance indicators based on specialisation of rehabilitation service

The following table presents adherence to key quality indicators with results split to show care provided on a dedicated stroke rehabilitation unit or neurological rehabilitation unit (Table 25). Patients treated in a mixed rehabilitation unit were reported to have lower adherence to the following indicators than the dedicated stroke rehabilitation unit:

- Mood assessment during admission - statistically significant
- Evidence of discharge care plan developed with team and patient and/or family
- Behaviour change education for modifiable risk factors

Table 25. Adherence to key performance indicators for specialist and general rehabilitation services

	General/mixed rehabilitation unit (N=2,551) n (%)	Dedicated stroke/neuro rehabilitation unit (N=903) n (%)	P value*
Patient-centred care			
Goals set with input from the team and patient or family	2,294 (90)	811 (90)	0.26
Patient's mood assessed during admission	1,613 (63)	653 (72)	0.001
Discharge planning			
Evidence that care plan was developed with the team and patient (or family alone if patient has severe or cognitive impairments)†	1,660 (80)	658 (90)	0.36
Patient and/or family received information covering stroke, hospital management, secondary prevention and recovery (e.g. My Stroke Journey booklet)	1,559 (61)	537 (59)	0.32
Carer provided with training^	604 (84)	242 (84)	0.92
Secondary prevention			
Patient received education about behaviour change for modifiable risk factors prior to discharge†	1,383 (66)	566 (76)	0.43
Discharged on blood pressure-lowering medication (antihypertensives)#	1,703 (84)	570 (83)	0.75

* Significant different (p<0.05) from multivariable regression models adjusted for hospital clustering

† Eligible patients discharged to their usual residence, residential aged care, transitional care services or other

^ Included carers of stroke survivors discharged to a private residence, excluding if carer declined training

Eligible patients only, without contraindications for drug

Chapter 5: Clinical Audit changes over time

Changes in key performance indicators and recommended processes of care over time provide a useful comparator to assess improvements, stagnation, or deterioration in clinical practice. Adherence to selected recommended care indicators are shown in Table 26 over the last two Audit cycles, noting that there was no Audit in 2022, due to a program review and COVID-19.

Additional analysis is provided in Table 27, demonstrating adherence to key indicators by services who have consistently participated in each Audit cycle from 2016 to 2024. This analysis allows a direct comparison of questions which have remained unchanged across each of the last four Audit cycles.

The matched data (Table 27) demonstrates consistent improvement against the majority of indicators from 2016 to 2020. Adherence to five of the key indicators continued to improve between 2020 and 2024, with 5% improvement noted from 2020 to 2024 in the development of a discharge care plan with the team and patient.

Table 26. Key performance indicators and recommended processes of care

Adherence by year	2020	2024*
Goals set with input from the team and patient or family	92%	90%
Patient's mood assessed during admission	63%	66%
Patient received education about behaviour change for modifiable risk factors prior to discharge	65%	68%
Discharged on antithrombotic medication if ischaemic stroke and not contraindicated	94%	90%
Discharged on lipid-lowering medication if ischaemic stroke and not contraindicated	87%	91%
Discharged on anti-hypertensive medication if not contraindicated	79%	84%
Evidence that a discharge care plan was developed with the team and patient (or family alone if patient has severe or cognitive impairments)	78%	83%
Patient and/or family received information covering stroke, hospital management, secondary prevention and recovery (e.g. My Stroke Journey booklet)	63%	61%
Post-discharge contact provided to stroke survivor/family	75%	74%
Patient received written information on sexuality post stroke	27%	26%
Carer received relevant training [^]	84%	84%
Post-discharge needs discussed with carer [^]	76%	69%
Carer offered information about peer support	55%	51%
Access to any community rehabilitation services	93%	94%

* Discharge processes of care include patients discharged to their usual residence, residential aged care, transitional care services or other

† Excluded 'unknown' responses in 2020

[^] Included carers of stroke survivors discharged to a private residence, excluding if carer declined training

Table 27. Key performance indicators and recommended processes of care in matched analysis

	National Matched Data* 6728 records, 49 sites				
Recommended Care	2016 %	2018 %	2020 %	2024 %	2024 vs 2016 odds ratio (95% CI)†
Goals set with input from the team and patient or family	87	95	93	89	1.20 (0.95, 1.51)
Patient's mood assessed during admission	56	59	66	67	1.75 (1.51, 2.03)
Patient received education about behaviour change for modifiable risk factors prior to discharge	55	65	71	67	1.78 (1.51, 2.09)
Patient prescribed antithrombotic medication on discharge	96	95	97	90	0.36 (0.25, 0.53)
Patient prescribed lipid-lowering medication on discharge	79	86	87	88	2.05 (1.61, 2.61)
Patient prescribed antihypertensive medication on discharge	80	82	81	85	1.42 (1.16, 1.74)
Evidence that a discharge care plan was developed with the team and patient (or family alone if patient has severe or cognitive impairments)	76	79	76	85	1.95 (1.58, 2.41)
Patient received written information on sexuality post stroke	20	29	35	26	1.51 (1.23, 1.86)
Post-discharge contact provided to stroke survivor/family	65	68	76	74	1.57 (1.31, 1.89)
Care received relevant training^	74	75	82	84	2.32 (1.63, 3.32)
Carer received a support needs assessment^	65	67	79	68	1.09 (0.81, 1.47)
Carer offered information about peer support	42	47	59	52	1.37 (1.03, 1.83)
Patient and/or family received information covering stroke, hospital management, secondary prevention and recovery (e.g. My Stroke Journey booklet)	49	62	64	60	1.67 (1.44, 1.93)

CI: confidence interval; Bold values represent statistically significant results.

Data is for the 49 services who took part in all four cycles of the Rehabilitation Audit between 2016 and 2024

* All variables calculated according to 2024 methodology

† year of cycle as independent variables, clustered by hospital

^ 2020 and 2024 values exclude <3% of carers who declined training or needs assessment

Chapter 6: Impact of COVID-19

In 2024, for the first time, the National Audit included questions relating to the impact of the COVID-19 pandemic on stroke rehabilitation services and the delivery of care. This was to follow up survey questions that AROC had been monitoring during and after the COVID-19 pandemic. Respondents were asked to provide information on the impact of the pandemic on the structure of their service, such as: a relocation, or reduction in the number, of rehabilitation beds; a change in the format of ward rounds whether that was a reduction in frequency or reduced direct patient contact; redeployment of staff.

Results

During and as a result of the COVID-19 pandemic, respondents reported the following occurred:

- a reduction in rehabilitation beds (60%)
- an increase in use of ESD services (31%)
- staff shortages (96%)
- staff redeployed to other duties (63%; Table 28)

At the time of the Audit, 75% of services reported that all redeployed staff had returned to their previous positions in the rehabilitation unit, however 20% of services reported that they have not yet returned to their pre-pandemic structure and staffing.

Table 28. Impact of COVID-19 on rehabilitation services

Impact of COVID-19	Australia (N=103)
	n (%)
Delivery of inpatient rehabilitation services was impacted in any way	91 (88)
Rehabilitation ward relocated	23 (25)
Rehabilitation ward dissolved	12 (13)
Inpatient rehabilitation bed numbers reduced	55 (60)
Increased use of community rehabilitation	30 (33)
Increased use of hospital substitution models (ESD, RITH)	28 (31)
Staff shortages	87 (96)
Other	35 (38)
Changes to ward rounds	
Change in format/structure of ward rounds	50 (55)
Reduced staff involved	40 (80)
Less frequent	14 (28)
More frequent	3 (6)
Reduced direct patient contact	40 (80)
Other	10 (20)
Staff redeployment	
Staff have been redeployed to other duties	57 (63)
All redeployed staff have now all returned to their previous position in the rehabilitation unit	43 (75)
Disciplines redeployed	
Nursing	49 (86)
Medical	15 (26)
Physiotherapy	37 (65)
Occupational therapy	30 (53)
Speech therapy	25 (44)
Social work	22 (39)
Dietetics	18 (32)
Psychology	10 (18)
Reason for staff redeployment	
To cover shortages in other departments	46 (81)
Change in structure of unit (dissolved/relocated/reduced beds) so reduced requirement for staff	25 (44)
Redeployed to COVID-19 specific role (i.e. COVID-19 virtual/inpatient ward, COVID-19 testing)	37 (65)
Other	9 (16)
Return to pre-COVID-19 service	
The rehabilitation service has returned to the structure and staffing levels in place prior to the COVID-19 pandemic	73 (80)

ESD: early supported discharge. RITH: rehabilitation in the home

Chapter 7: Discussion and recommendations

The National Stroke Audit - Rehabilitation Services Report 2024 provides a snapshot of the care provided by inpatient rehabilitation services for stroke in Australia. Importantly, the results are presented according to the Framework and Clinical Guidelines.

The objective of the Audit is to assist stroke rehabilitation teams by providing data and commentary that identifies areas of excellence to be celebrated, processes of care where clinical improvements are required and areas requiring advocacy for systems level change. Rehabilitation services are encouraged to assess their service's performance by comparing themselves to the national, state and annual admission-specific averages presented.

While there have been incremental positive changes across a range of stroke rehabilitation care indicators over the last four Audit cycles, many processes of care remain sub-optimal, and the areas below warrant immediate attention and decisive action for improvement.

Ongoing impact of COVID-19 on rehabilitation services

Clinical services around the country were impacted during the COVID-19 pandemic and continue to be affected in the post pandemic era. For many services, staff redeployment and wards being converted to care for the high numbers of affected patients, directly impacted the level of specialist knowledge available to guide and support the delivery of evidence-based stroke care.

Redeployment of staff was reported by 63% of services, with nursing being listed as the main discipline affected (86%). Shortages in other departments was reported as the main reason for redeployment (81%). According to the 2024 Organisational Survey, redeployed staff had returned to the rehabilitation service in the majority of cases, however, 25% of services reported ongoing redeployments.

Concerningly, 20% of services had not returned to pre-pandemic structure and function and this decrease in resourcing must be taken into account when considering the lack of significant improvement in stroke rehabilitation care since the Rehabilitation Stroke Services Audit in 2020. Further work must be done to understand the impact of these changes on the quality of rehabilitation services across inpatient and community settings, and the necessary action taken to improve the circumstances under which health professionals provide care.

Quality improvement and professional development

Quality improvement activities are an essential part of healthcare as a way of improving processes and practices. Clinicians frequently voice a desire to be involved in quality improvement activities however often find themselves limited by their workload and available time.

Sub-optimal use of documented systems to monitor use of evidence-based guidelines (61%), involvement in quality improvement activities (76%), and having a stroke education program for staff delivering this specialist care (70%), were reported in the Organisational Survey.

These elements are fundamental to providing best-practice care and the ongoing impact of resourcing shortages, and the challenges this poses to dedicating time to activities that are not patient facing, including staff education and monitoring and improving care, must be resolved.

Access to rehabilitation

Access to rehabilitation is dependent on the assessment for suitability and acceptance of the patient by a rehabilitation service. Consideration for further rehabilitation needs is done in the acute setting but may involve rehabilitation team members. Only 55% of services, however, reported that standardised and early assessment for neurorehabilitation was routine practice, when the patient was in the acute phase of care. Furthermore, effective links with acute stroke service providers (including having a dedicated person to liaise with acute services and regular meetings), was reported in less than half (43%) of the participating rehabilitation services. These links must be strengthened to ensure that all patients with stroke receive appropriate assessment and referral during the acute phase of care.

The majority of patients who received inpatient rehabilitation (63%) were discharged home to their usual residence. Whilst the Audit captures the types of community rehabilitation services available for ongoing rehabilitation, there has not been the opportunity to date to measure the type, suitability, availability or access to services that patients are referred on to. It is imperative that an audit and feedback process that evaluates the quality of the entire patient journey across the continuum of care is developed, from pre-hospital and hyperacute, to long-term care in the community. This will direct the development and monitoring of rehabilitation systems and practices that optimise patient outcomes.

Specialised inpatient rehabilitation units

The Organisational Survey 2024 found only 13% of services identified the presence of a dedicated stroke rehabilitation unit at their site. In the Clinical Audit only 8% of patients with stroke were treated on a stroke specific rehabilitation unit. Overall, 27% were cared for in specialised inpatient rehabilitation services (stroke rehabilitation unit, comprehensive [acute and rehabilitation] stroke unit, or a specialist neurological rehabilitation unit). Sites with specialised inpatient rehabilitation units were shown to provide a higher level of adherence to three key indicators (mood assessment, provision of education on modifiable risk factors, and development of discharge care plan) compared to general rehabilitation units, demonstrating the value of this specialised care.

Amount of rehabilitation

In the 2024 Audit, only 62% of services reported having documented processes in place to ensure patients receive evidence-based intensity of therapy and only 23% reported having an average of three or more hours of active therapy per day for patients with motor impairments. The average amount of active practice reported was 10 hours (600 minutes) per week (600 active minutes per week also reported in 2020). Ensuring a patient receives the recommended amount of practice is a fundamental component to promoting recovery and is a priority area for improvement in stroke recovery.

Early Supported Discharge (ESD) services for stroke

There were 29% of services who reported having a stroke-specific ESD service in the 2024 Audit, a decline from the 42% in 2020. ESD services are recommended in the Guidelines based on a robust Cochrane review and it is estimated that approximately 10% of patients would be eligible and would benefit from this service model providing it is staffed appropriately with a specialist multi-disciplinary team who can provide almost daily input over several weeks.

Two Victorian ESD services participated in this year's Clinical Audit and were compared to traditional Victorian rehabilitation inpatient settings. The average number of minutes of active therapy was 315 and 450, well below the 600 minutes in traditional services. All models of inpatient services for stroke rehabilitation must be sufficiently resourced and coordinated to provide adequate amounts of rehabilitation to maximise recovery.

Access to ESD services is recommended for patients with mild to moderate severity stroke. Unsurprisingly, those admitted to ESD services had a lower modified Rankin Score (mRS) on admission to rehabilitation (mRS of 0-2 in ESD = 43% vs 9% in other Victorian services). Complications during ESD admissions were fewer in most domains including falls (16% vs 24%), malnutrition (10% vs 17%) and urinary tract infection (2% vs 14%). Patients in ESD were also more likely to be referred for further rehabilitation upon discharge from inpatient care (92% vs 69%).

Given the small sample size, and participation from Victorian services only, it is not possible to draw any broad conclusions and a more comprehensive audit including a greater number of ESD services across the country would be beneficial.

Mood assessment

Mood disturbances are common after stroke and screening and assessment is the first step towards ensuring that critical treatment is provided. There has been a slow but steady increase in adherence to this key indicator over the last four Audit cycles, improving from 56% in 2016 to 67% in 2024 in the matched analysis.

When considering all services who participated in the 2024 Audit, only 66% of patients who were deemed to be eligible received a mood assessment. This was higher in specialist services (72%) compared to general/mixed rehabilitation services (63%).

In this Audit, 30% of services reported they did not have access to clinical psychology or neuropsychology staff. Immediate consideration should be given to the impact this gap has on patient well-being and participation in recovery activities and ways to improve access to this vital service should be sought.

Incontinence assessment and management

In the 2024 Audit, 89% of patients were assessed for urinary incontinence within 72 hours of admission and 42% were found to be incontinent of urine during their rehabilitation care. Just over half of these (51%) received a structured urinary incontinence management plan. Having a structured plan can support significant recovery in the inpatient setting and as incontinence can impact both discharge destination and quality of life, processes should be developed to make it standard practice to provide one to all those requiring it.

Supporting patients and family through education and information

Ensuring that patients and their carers/family are as prepared as possible for their return to the community should be a priority for all rehabilitation services. An alarming 39% of people reportedly missed out on receiving information about stroke, stroke care and recovery in the 2024 Audit. 'My Stroke Journey' (MSJ) is Stroke Foundation's information booklet that clinicians can provide to people after stroke. The number of MSJ booklets provided to stroke services nationally, is equal to 80% of the number of patients who are admitted with stroke. It is unclear if patients are missing out or if it was assumed that MSJ had already been provided during the acute admission or if provision of the booklet is not being documented

properly. Importantly, it should not be assumed that information has been provided to the patient during their acute episode of care, or that information that was provided, has been understood and retained by the patient.

Information provision regarding sex, intimacy and relationships after stroke remains very low. Stroke survivors have frequently reported a desire for information on this topic, but it continues to be an area requiring vast improvement for stroke rehabilitation services. Only 18% of patients were offered the opportunity to discuss issues relating to sex and relationships and 25% of patients were offered written information.

Additionally, only 72% of the patients who were employed at the time of their stroke were asked if they wished to return to work, and information relating to services to assist them in returning to work was provided to 61% of these patients. It is of paramount importance that stroke survivors are discharged with the necessary information to empower them in their recovery so they can live well and stay well.

Discharge planning

Effective discharge planning is key to a successful transition from hospital to the community. If this is done poorly, it can lead to an inability to cope with the changes post-stroke and an increase in unmet care needs. If done well however, the patient and family can be empowered and supported to manage their own health.¹³ Carers (and patients) have often reported they are underprepared to support the stroke survivor living with stroke in the community.

When considering the national matched data, it is encouraging to note that there has been an increase in the number of patients involved in the development of a discharge care plan with their treating team (85% in 2024, 76% in 2020). For the whole cohort this year, 83% received a jointly developed discharge care plan (specialist rehabilitation units 90%, general/mixed rehabilitation units 80%). This does mean, however, that 17% of patients missed out on this essential process for supporting the challenges of hospital discharge and transition to the community.

Preparing carers for their new role post discharge is also an important element of rehabilitation. Carer training in this Audit has remained at similar levels (84%). Encouragingly this appears to have increased overtime in the matched analysis (74% in 2016 to 84% in 2024). The assessment of carer needs dropped for all respondents (68% 2024 from 79% in 2020) to similar levels in the 2016 and 2018 Audit. This is a necessary requirement to determine the most appropriate training and an area requiring action and improvement.

Preventing further stroke events

It is strongly recommended that all eligible patients with stroke are prescribed secondary prevention medication and receive education about lifestyle risk factors they could change to prevent further strokes. In the matched analysis lipid-lowering medication and blood pressure-lowering medication on discharge are at their highest levels ever (88% and 85%). However, antithrombotic medication dropped and is the lowest level (90%) in a decade (97% in 2020). Prescription prior to discharge is important and the evidence suggests that commencing therapy prior to discharge improves long-term adherence.

Advice on modifiable risk factors such as diet, smoking cessation, exercise, and reducing excess alcohol remains suboptimal. In the matched analysis education has dropped from

71% in 2020 to 67% in 2024. Every patient requires discussion about their modifiable risk factors and more needs to be done to ensure over 30% of people do not miss out on appropriate advice.

6.1 Strengths and limitation of the data

Strengths of the data

The National Stroke Audit - Rehabilitation Services provides a cross-sectional overview of stroke rehabilitation services in Australia. The sample size provides a robust and reliable overview of inpatient rehabilitation services and their adherence to stroke clinical guidelines.

Furthermore, the following strategies were used to minimise potential biases:

- Use of a thorough process of standardised training for data auditors/abstractors, with ongoing support throughout the Audit process.
- A comprehensive data dictionary was provided to assist interpretation of both the Organisational Survey and Clinical Audit questions.
- Each service conducted a reliability check in which data from three to five cases were entered by two auditors for comparison.
- Programmed logics were built into the AuSDaT to verify data at the point of entry and then independent logic checks were conducted with each service for verification.
- Data were analysed by an independent organisation, which minimised interpretation bias.

Limitations of the data

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

- Participation in the National Stroke Audit is voluntary and data self-reported, therefore, may be subject to reporting bias or response bias.
- Documentation issues should be considered; the Clinical Audit assumes that if a process was not documented, it was not performed, which may not always be the case. This is highlighted when data from the Organisational Survey and Clinical Audit provide conflicting information. However, as documentation of care is a medico-legal responsibility, where proof that care was delivered is required, care cannot be assumed in the absence of documentation. Better documentation will provide the ability to gather more robust data for monitoring stroke care and should be factored into all quality improvement activities.
- No case-mix adjustments were undertaken for outcomes, except the p-values in Table 25 (Adherence to key performance indicators for specialist services).
- The Audit is undertaken once every two years, and the patient cohort were relatively small in several of the participating services. Application of exclusion criteria and missing data further reduced the sample size for some indicator level analyses e.g. carer training.

6.2 Recommendations

This report outlines evidence of incremental improvements in some aspects of resourcing and clinical care. Significant gaps remain, however, and it is recommended that national, state-wide and local services, both administrative and clinical, use the feedback to examine the current state of stroke rehabilitation, and the quality of care provided during inpatient rehabilitation.

A significant proportion of the Australian population is impacted by stroke. The cost of poor outcomes and the benefits that can be achieved by the delivery of appropriate interventions

highlight the value of regular monitoring of the availability and quality of best-practice rehabilitation care and ongoing efforts for its improvement. This is only possible if adequate resourcing is available to services and proper supports are available to the clinicians who commit themselves to supporting patients in their recovery from stroke. Rehabilitation must not be seen as a 'nice to have' but be recognised as an important component of stroke treatment, a key element of recovery and a vital determinant of quality of life after stroke. The National Rehabilitation Services Audit 2024 key recommendations are:

Federal and state governments

- Support the development of a national Rehabilitation Stroke Care Standard.

State health departments and clinical networks

- Support improvements in integration between acute and rehabilitation services to ensure a streamlined flow of care.
- Ensure rehabilitation services provide ongoing, stroke-specific education and training to all staff. A specialised interdisciplinary stroke (or neurorehabilitation) team should be encouraged to routinely use Clinical Guidelines for Stroke Management to guide practice.
- Ensure staffing, equipment and processes are available to support delivery of evidence-based stroke rehabilitation and are at least similar to pre-COVID resourcing.

Rehabilitation services

- Improve provision of stroke information and education about stroke and recovery for patients and their family/carers. This includes tailored advice on stroke risk factors, intimacy and relationships after stroke, returning to work, and smoking cessation.
- Ensure all patients with suspected altered mood are assessed and that those identified with mood impairment receive adequate management and referral for ongoing care in the community.
- Ensure that patients with urinary incontinence receive a structured urinary incontinence plan.
- Ensure patients receive the recommended amount of practice to maximise recovery for all inpatient rehabilitation (including early supported discharge services) and referral to appropriate outpatient services as required.
- Ensure carers of people affected by stroke have the training and ongoing support required.

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