New Zealand Stroke Rehabilitation: A Strategy

Part A: Recommendations for the provision of best practice rehabilitation for stroke patients

Commissioned by the Stroke Foundation

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“It was like I had fallen off a cliff...”

- Stroke survivor about the limited stroke rehabilitation support that was provided to her after discharge from hospital

EXECUTIVE SUMMARY

The purpose of this document is to guide the National Stroke Network (NSN) and Ministry of Health (MOH) in their efforts to improve the quality and outcomes of stroke rehabilitation services delivered by New Zealand DHBs for people with stroke and their families/whānau. This is Part A of the Rehabilitation Strategy which sets out what constitutes best practice stroke rehabilitation ("what to do"). A follow up Part B document will be produced which will outline implementation strategies ("how to do").

There is evidence to support the implementation of stroke specific inpatient and community rehabilitation services. The benefit arises when well organised teams, work with the patient and family/whānau to achieve goals. This benefit occurs both with inpatient and community services.

The benefit derives from:

- Offering timely rehabilitation to acute stroke patients
- Co-located organised inpatient rehabilitation services
- Well organised dedicated stroke rehabilitation teams with regular team meetings
- Skilled stroke rehabilitation therapists
- Goal setting in discussion with the patient/whānau and the interdisciplinary stroke rehabilitation team
- Sufficient rehabilitation intensity to achieve maximum recovery
- Options for community rehabilitation including (but not limited to) early supported discharge
- Staff and patient/family/whānau education
- Services to smooth transition back into the community, including return to work & driving, and
- Regular meetings with patient and family/whānau.

Stroke rehabilitation can assist patients to regain independence, and improve quality of life. Despite this evidence, previous surveys of stroke rehabilitation services in New Zealand show that service quality varies, and, in many areas, does not achieve guideline standards.

It is recommended that all New Zealand stroke rehabilitation services:

- Provide inpatient rehabilitation in freestanding Stroke Units, or in smaller DHBs as part of a general ward and with dedicated beds.
- Provide inpatient rehabilitation with sufficient intensity and frequency for most patients (some patients may be unable to tolerate very intensive rehabilitation due to fatigue or other comorbidities such as heart failure)
- Participate in quality auditing and benchmarking, preferably through AROC
- Provide smooth transition into the community with:
  - Face to face follow up within 7 calendar days by an appropriate member of the community rehabilitation team for stroke patients
  - Early Supported Discharge for stroke patients with mild-moderate disability
- Offer review and extended rehabilitation options for people with stroke
- Offer appropriate rehabilitation services for those in long term care, and
- Offer return to work and return to driving rehabilitation.

We have described Key Performance Indicators (KPIs) for specific quality domains of stroke rehabilitation. These define whether a DHB provides a Basic Stroke Rehabilitation Service, an Advanced Stroke Rehabilitation Service, or is a Centre of Stroke Rehabilitation Excellence. Each DHB will need to evaluate their current level of service, in preparation for implementing strategies to improve services as indicated by the KPIs. All DHBs that do not currently provide at least a Basic Stroke Rehabilitation Service are requested to achieve this by 1 December 2019.

Contents

1. INTENDED AUDIENCE AND PURPOSE

This document is intended for DHBs involved in the care of stroke patients, particularly clinical managers and clinicians. It is also intended as a resource for the Ministry of Health and National Stroke Network.

The purpose of the document is to describe 'what' constitutes current best practice care for stroke rehabilitation. This will enable DHBs to review current performance and take necessary steps to improve the quality of stroke rehabilitation.

2. QUALITY DOMAINS

The domains of best practice in stroke rehabilitation are described below, each followed by Key Performance Indicators (KPIs).

2.1 Inpatient rehabilitation
2.2 Provision of information, education, advice and support
2.3 Seamless transfer into the community: Early Supported Discharge
2.4 Seamless transfer into the community: Early community follow up
2.5 Follow up and later rehabilitation

All centres that provide care for stroke patients should meet the minimum standard KPIs for a Basic Stroke Rehabilitation Service.

Additional KPIs have been formulated for centres that strive to better the minimum standards to become an Advanced Stroke Rehabilitation Service, or a Centre of Stroke Rehabilitation Excellence.

Recommended implementation strategies will be provided in the Part B document of the Stroke Rehabilitation Strategy.

3. RECOMMENDATIONS FOR PRIORITISATION

We recommend that DHBs review the entire stroke rehabilitation pathway, from the acute service through to inpatient and community rehabilitation to discharge into the community and ensure provision of extended rehabilitation where needed.

Your first priority is to ensure that your service meets the minimum standards of a Basic Stroke Rehabilitation Service by 1st December 2019. The chart below is designed to help you identify the KPIs grouped according to quality domains.

We recommend that KPIs are measured quarterly to monitor improvement and assist with implementation. Once the KPIs for a Basic Service are routinely met, we recommend that you work towards the KPIs for Advanced Stroke Rehabilitation Services. Depending on the size of your DHB, you might then consider working towards the KPIs for a Centre of Stroke Rehabilitation Excellence.

Quality Domain	Basic Stroke Rehabilitation Service KPI (1,2,3,4,5,9,10,14 & 16)	Advanced Stroke Rehabilitation Service KPI (1,2,3,4,6,9,10,11,13,14,15,16 & 17)	Centre of Stroke Rehabilitation Excellence KPI (1,2,3,4,6,7,8,9,10,11,12,13,14,15,& 17)
1. Inpatient rehabilitation	KPI 1: Inpatient rehabilitation provided by a specialist interdisciplinary team		
	KPI 2: All patients should be considered for rehabilitation unless the patient has returned to premorbid function, death is imminent, coma / unresponsiveness or patient declines rehabilitation. Assessment for rehabilitation should use a comprehensive assessment process to determine the most appropriate rehabilitation setting and the degree and nature of the rehabilitation.		
	KPI 3: 80% of patients admitted with acute stroke who are transferred to inpatient rehabilitation services are transferred within 7 days of acute admission. (*Ministry of Health indicator*)		
	KPI 4: All patients screened for psychological needs, treatment plans implemented for those with unmet needs		
	KPI 5: 80% of patients receive a minimum of one hour of physical therapy (PT/OT) and 45 minutes of every other required therapy per working day	KPI 6: 80% of patients receive a minimum of 3 hours of therapy (PT/OT) and 45 minutes of aphasia therapy (where indicated) each working day	
			KPI 7: 80% of patients receive 45 minutes of required therapy each weekend
			KPI 8: All patients identified to be in need of psychological support are offered appropriate interventions including review by a psychologist where indicated.
2. Provision of information, education, advice, and support	KPI 9: All stroke patients/whanau are offered information, education, advice, and support during their inpatient stay and following discharge back into the community		
	KPI 10: All stroke patients are screened for driving needs, and have access to driving assessments where return to driving has been identified as a goal and is legally appropriate		
		KPI 11: All stroke patients are offered a specialist Return to Work service where this has been identified as a goal	
			KPI 12: All patients with identified driving needs (legally able) are offered driving assessments through the DHB or another specialist service
3. Seamless transfer into community: Early Supported Discharge		KPI 13: 60% of patients who are eligible for an ESD service are offered rehabilitation by an ESD service with home support starting within 24 hours of discharge, and rehabilitation commencing within three days	
4. Seamless transfer into community: Early community follow-up	KPI 14: 60% of patients referred for community rehabilitation are seen face to face by a member of the community rehabilitation team within 7 calendar days of hospital discharge (*Ministry of Health indicator*)		
		KPI 15: 80% of patients transferred for community rehabilitation are seen face to face by a member of the community rehabilitation team within 7 calendar days of hospital discharge	
5. Follow up and later rehabilitation	KPI 16: All patients discharged to the community are reviewed by their GP within 3 months of discharge for stroke related disability and optimisation of secondary prevention	KPI 17: All patients discharged to the community are offered specialist review (geriatrician, neurologist or rehabilitation physician, stroke nurse specialist or allied health specialist) within three months of discharge	

Quality Domain 1. Inpatient Rehabilitation

It is recommended that all patients with acute stroke are managed in an acute stroke unit or a comprehensive stroke unit (which is a dedicated ward providing both acute stroke unit care and post-acute rehabilitation). Inpatient stroke rehabilitation starts in the acute setting, hence the requirement for established pathways to access rehabilitation from acute stroke units.

Inpatient stroke rehabilitation can be provided in a comprehensive stroke unit, a dedicated stroke rehabilitation ward or a general rehabilitation ward with co-located dedicated stroke rehabilitation beds.

All DHBs should ensure people with stroke with persisting stroke related disabilities/deficits receive rehabilitation under the coordinated care of an interdisciplinary team experienced in stroke rehabilitation, with individualised goal setting, regular team meetings and opportunities for team education.

Stroke patients should be offered inpatient rehabilitation for as long as they are making functional gains and achieving meaningful goals that have been set and agreed by the patient and the interdisciplinary team, where this rehabilitation cannot be provided in the community.

Stroke patients should receive appropriate therapy at an intensity and frequency that enables them to meet their rehabilitation goals in a timely manner.

People with stroke should have access to emotional and psychological support.

All staff working with people with stroke and their carers should be trained to provide emotional and psychological support.

All stroke patients should be screened for low mood, and appropriate interventions should be put in place when low mood has been identified.

People with stroke should have access to clinical psychology services during their inpatient rehabilitation stay.

People with stroke should be provided with information about how to obtain advice, and emotional and psychological support e.g. Stroke Foundation (NZ), General Practitioners, local stroke support groups.

Minimum standards for Basic Stroke Rehabilitation Services

KPI 1: Inpatient rehabilitation provided by a specialist interdisciplinary team.
The interdisciplinary team (IDT) providing inpatient stroke rehabilitation includes:

- Consultant Physician (e.g. Geriatrician, Rehabilitation Physician)
- Dietitian
- Nurse
- Occupational Therapist
- Physiotherapist
- Rehabilitation/therapy Assistant
- Social Worker
- Speech and Language Therapist
- It also includes access to ‘specialty’ services to meet psychological, spiritual and

cultural needs, opthalmolgical and palliative care needs.

KPI 2: All patients should be considered for rehabilitation unless the patient has returned to premorbid function, death is imminent, coma / unresponsiveness or patient declines rehabilitation. Assessment for rehabilitation should use a comprehensive assessment process to determine the most appropriate rehabilitation setting and the degree and nature of the rehabilitation.

KPI 3: 80% of patients admitted with acute stroke who are transferred to inpatient rehabilitation services are transferred within 7 days of acute admission. (*MOH indicator*)

KPI 4: All stroke patients are screened for psychological needs, and appropriate treatment plans are implemented to manage patients with unmet psychological needs.

KPI 5: 80% of stroke patients, in inpatient rehabilitation receive:

- a minimum of one hour per working day of physical therapy (physiotherapy and occupational therapy) and
- 45 minutes per working day of every other required therapy (e.g. aphasia therapy) for goal-related activities.

Advanced Stroke Rehabilitation Services

All of the above, except KPI 5 is replaced by KPI 6

KPI 6: 80% of stroke patients in inpatient rehabilitation receive a minimum of 3 hours physical therapy (PT/OT) per working day and 45 minutes of aphasia therapy (where indicated) per working day.

Centre of Stroke Rehabilitation Excellence

All of the above including;

KPI 7: 80% of stroke patients in inpatient rehabilitation receive 45 minutes of required therapy (physiotherapy, occupational therapy or aphasia therapy) each day of a weekend.

KPI 8: All patients identified to be in need of psychological support are offered appropriate interventions including review by a psychologist where indicated.

Action:

- Review the composition of your interdisciplinary team with reference to KPI1.
- Appoint a designated physician, nurse and allied health professional to lead stroke rehabilitation.
- Ensure that members of the interdisciplinary team receive ongoing education about stroke rehabilitation by supporting staff to participate in educational opportunities with a minimum of 8 hours per year.
- Ensure that your stroke rehabilitation nurses are well supported and trained. They are the health professionals who spend the most time with the stroke patients.
- Match your staffing levels to the size of your unit, to meet therapy intensity and frequency recommendations and achieve the patients' therapy goals.
- Hold regular interdisciplinary team meetings to discuss rehabilitation goals and monitor progress. These may be daily 'board rounds' or 'huddles' for patients in the 'acute' phase of

treatment, or weekly team meetings for ‘rehab’ patients. Co-ordination and good communication is essential.

- Participate in the Australasian Rehabilitation Outcomes Centre (AROC) to allow benchmarking and facilitate improvement in rehabilitation care, (such as the delivery of the recommended frequency and intensity of therapy).
- Use standardised scales to measure patient’s functional abilities such as the Functional Independence Measure (FIM), measured at admission, periodically (to establish change with time or ‘efficiency’), and at discharge. The use of FIM efficiency may help to plan the duration of inpatient rehabilitation for a particular patient with appropriate discharge planning.
- Review the screening of stroke patients for low mood, to see whether your service is routinely screening patients with an appropriate assessment tool.
- Review your current provision of psychological support to stroke patients and whether it is matching the needs of the local population.
- Ensure that staff working with stroke patients are trained in providing emotional and psychological support, and that training is provided as needed.

Quality Domain 2. Provision of information, education, advice, and support

People with stroke and their carers should have access to information, education, advice and support throughout the care pathway and for as long as needed.

During their inpatient stay stroke patients and carers should be provided with information, education, advice and support by the multidisciplinary team including social worker, medical and therapy staff. This will prepare people with stroke to reintegrate at home, at work and at leisure.

People with stroke who were previously in employment should be offered a Return to Work service where return to work (paid or voluntary) has been identified as a goal by the patient and MDT.

A Return to Work service will have the capacity to provide mentoring, refer to other agencies (e.g. occupational therapist), ideas for retraining and skill development, and support with job search/interview skills.

Access to Occupational Therapy Driving Assessment Services for an off-road and on-road assessment is necessary if return to driving has been identified as a goal by the patient and MDT. This service should be accessed through the patient's general practitioner or hospital specialist team.

Minimum standards for Basic Stroke Rehabilitation Services

KPI 9: All stroke patients/whānau are offered information, education, advice and support during their inpatient stay and following discharge back into the community.

KPI 10: All stroke patients are screened for driving needs, and have access to driving assessments where return to driving has been identified as a goal and is legally appropriate.

Advanced Centre of Stroke Rehabilitation and Centre of Stroke Rehabilitation Excellence

KPI 11: All stroke patients are offered a specialist Return to Work service where this has been identified as a goal.

Centre of Stroke Rehabilitation Excellence

KPI 12: All stroke patients who have been identified to have driving needs (and are legally able to drive) are offered driving assessments through the DHB or another specialist service.

Action:

- Review the information, advice and support currently available to stroke survivors and carers.
- Work closely with the Stroke Foundation (NZ)/Stroke Central to provide guidance about local services for people with stroke and their carers. Local services include stroke clubs, recreational groups and local/regional/national support networks.
- Provide the Stroke Foundation's/Stroke Central's contact information to people with stroke and their carers including details of local Community Stroke Advisors/Field Workers.
- Review your current provision of Return to Work service for people with stroke, and work with other organisations such as the Stroke Foundation (NZ) and the Ministry of Social Development to set up such as service if needed.
- Review the provision of access to driving assessment and whether it is matching the needs of your local population.

- Provide information to people with stroke and carers on how/who to contact if their needs change following discharge from hospital e.g. social worker, GP.
- Stroke patients living with aphasia should be connected with other people with aphasia, aphasia groups or support organisations.
- Stroke patients living with aphasia should be provided with written information on health, Aphasia, social and community supports in an aphasia-friendly format.

Quality Domain 3. Seamless transfer into community: Early Supported Discharge

Stroke patients with mild-moderate disability and those who meet other criteria should have access to Early Supported Discharge (ESD) in addition or as an alternative to inpatient rehabilitation. Transfer of care from hospital to home through ESD should be planned and coordinated.

Home based rehabilitation with ESD should be offered at the same level of intensity as provided in the inpatient setting and should be able to treat patients seven days a week as clinically appropriate. ESD should be provided by a specialised interdisciplinary rehabilitation team with access to staff education and professional development. The following is a representative guide for the composition of an ESD team with a nominal 100-patient-per-year-caseload (ESD Trialists).[1]

Member of ESD team	FTE
Physiotherapist	1.0
Occupational Therapist	1.0
Speech and Language Therapist	0.4
Social Worker	0 – 0.5
Nurse	0 – 1.2
Physician	0.1
Therapy Assistant	0.25

Table 1. Staffing FTE guide for a typical ESD team with a nominal 100-patient-per-year caseload

The duration of intervention offered by the ESD service should be dependent on existing community rehabilitation services. It may be reasonable to offer an ESD service for three to six weeks, or longer according to individual patient need and the availability of other community rehabilitation services.

Following discussion with the patient, and where there is scope for further functional gains the person with stroke should be transitioned from an ESD service to a less intensive community rehabilitation service. Alternative community rehabilitation services should be available for those stroke patients who still have ongoing rehabilitation needs and active goals but do not meet criteria for ESD.

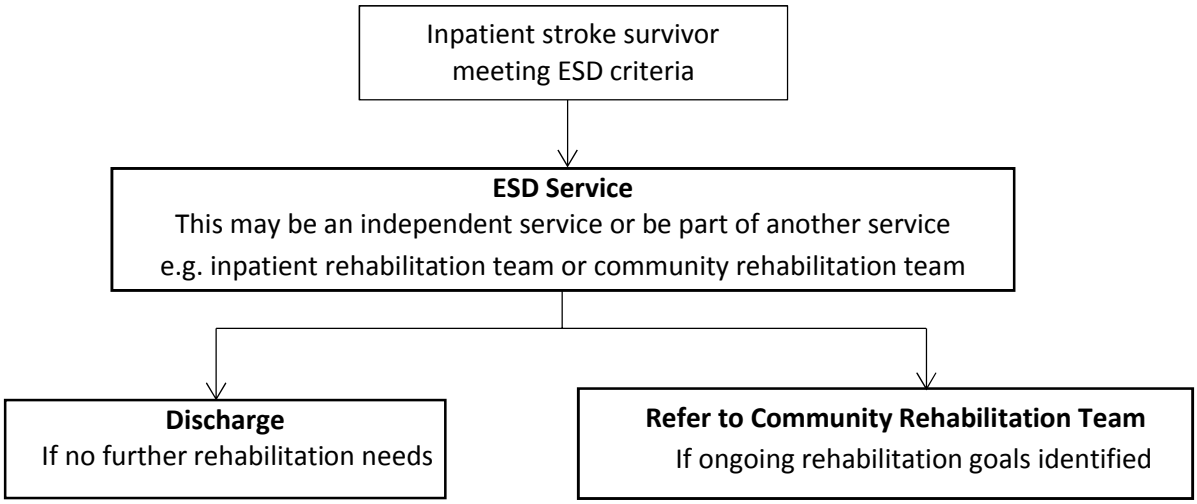

Figure 1. A suggested service set up for ESD

Advanced Stroke Rehabilitation Service and Centre of Stroke Rehabilitation Excellence

KPI 13: 60% of stroke patients who are eligible for an ESD service are offered rehabilitation by an ESD service with home support starting within 24 hours of discharge, and rehabilitation commencing within three days.

Action:

- Review the current availability of ESD service to your local population.
- Work towards formation of a multidisciplinary ESD service either as a separate team or as part of another service (inpatient therapy team or community rehabilitation service).
- Assign a keyworker or coordinator for each patient being discharged to an ESD service to facilitate smooth discharge from hospital.
- Ensure the ESD team meet weekly to discuss each patient and their goals.
- Ensure your ESD service has the capacity to provide the same level of therapy intensity as would have been provided in an inpatient setting.

Note: In some smaller DHBs formation and sustainability of an ESD service may not be feasible and/or cost-effective due to geographical, workforce, and patient volume factors.

Quality Domain 4. Seamless transfer into Community: Early Community Follow up

Community stroke rehabilitation includes access to rehabilitation in the patient's home or at an outpatient setting. All stroke patients should have early access to community rehabilitation. The service should be provided by an interdisciplinary team with stroke specific skills, with access to stroke education and training.

Minimum standards for Basic Stroke Rehabilitation Services

> **KPI 14:** 60% of patients referred for community rehabilitation are seen face to face by a member of the community rehabilitation team i.e. RN/ PT/ OT/ SLT/ SW/ Dr/ Psychologist within 7 calendar days of hospital discharge. (*Ministry of Health indicator*)

Advanced Stroke Rehabilitation Service and Centre of Stroke Rehabilitation Excellence

> **KPI 15:** 80% of patients referred for community rehabilitation are seen face to face by a member of the community rehabilitation team i.e. RN/ PT/ OT/ SLT/ SW/ Dr/ Psychologist within 7 calendar days of hospital discharge.

Action:

- Review the current availability and composition of your community stroke rehabilitation service, to see whether it has the capacity to provide up to three sessions per week of physiotherapy, occupational therapy or speech and language therapy (including therapy assistants) as long as needed in the community.
- DHBs should review their performance under Ministry of Health indicator KPI 14 and KPI 15.

Quality Domain 5. Follow up and later rehabilitation

Some stroke patients in the 'post-acute' or 'chronic' stage may have unmet needs (such as mood disorders, post-stroke spasticity) and they may have the potential for further recovery and improvement in function through extended rehabilitation.

People with stroke should have opportunities for extended rehabilitation including individual therapy, group therapy and 'green prescriptions' for exercise programmes.

People with stroke should have access to counselling and psychological services in the community, and neuropsychology input where necessary.

Minimum standards for Basic Stroke Rehabilitation Services

KPI 16: All patients discharged to the community are reviewed by their General Practitioner within three months of discharge for stroke related disability and optimisation of secondary prevention.

Advanced Stroke Rehabilitation Service and Centre of Stroke Rehabilitation Excellence

KPI 17: All patients discharged to the community are offered specialist review (geriatrician, neurologist or rehabilitation physician, stroke nurse specialist or allied health specialist) within three months of discharge.

Action:

- Review your follow up access arrangements and if unmet needs are identified, seek help from appropriate services (e.g. social worker, needs assessment service, specialist spasticity management)
- People with stroke should have opportunities for extended rehabilitation including (but not limited to) individual therapy, group therapy and 'green prescriptions' for exercise programmes.
- Review your community rehabilitation services to see if they have capacity to provide extended and 'later' therapy to people with stroke who may potentially benefit from further rehabilitation.

4. HOW DO NZ STROKE REHABILITATION SERVICES PERFORM?

Intensity of rehabilitation:

A 2013 survey of stroke rehabilitation in New Zealand has shown that only 50% of NZ rehabilitation units achieved the recommendation of one hour of direct therapy contact per weekday at least 90% of the time.[2]

Early Supported Discharge & Community Follow up:

Only five rehabilitation units (18%) had access to ESD. The delay from discharge to first therapy contact was about two weeks, with a range from a few days to several weeks. Furthermore, there has been no improvement in the most recent audit when compared to the previous survey in 2007.[3] Most units provided outpatient (82%) and/or home/community rehabilitation (82%) services. Time to first therapist contact was about two weeks after discharge.[2]

Staff Education:

Only 32% of rehabilitation units had regular staff education programmes.[2]

Stroke rehabilitation units:

Only seven (35%) of DHBs had a 'specific stroke rehabilitation unit', or 'designated stroke rehabilitation area'. All of these seven DHBs were 'large' each serving a catchment population of >200,000. Overall 62% of NZ population (covered by these seven large DHBs) are covered by a specific stroke rehabilitation unit or designated stroke rehabilitation area[2]; which is an increase from 49% in 2007.[3] None of the 'small' DHB (catchment population <120,000) or 'medium' DHB (120,000-200,000) which account for the remaining 38% of NZ population had designated stroke rehabilitation beds.[2] Rehabilitation units, in some areas, are still divided on the basis of age. This is no longer appropriate.[2]

5. MINISTRY OF HEALTH NATIONAL INDICATORS

DHBs are required to report to MOH on the following stroke rehabilitation measures to assess processes of care.

Inpatient Stroke Unit care indicator:

- 80% of stroke patients admitted to a stroke unit or organised stroke service with demonstrated stroke pathway.

Inpatient rehab indicator:

- 80% of patients admitted with acute stroke who are transferred to inpatient rehabilitation services are transferred within 7 days of acute admission.

Community indicator:

- 60% of stroke patients referred for community rehabilitation are seen face to face by a member of the community rehabilitation team i.e. RN/PT/OT/SLT/SW/Dr/Psychologist within 7 calendar days of hospitals discharge

6. NZ ORGANISED STROKE REHABILITATION SERVICE SPECIFICATIONS

https://cdn- flightdec.userfirst.co.nz/uploads/sites/strokenetwork/files/pdf_word_files/service_definitions/NZ_Organised_Stroke_Rehabilitation_Service_SpecificationsFINAL.pdf

7. WORKPLACE PLANNING

The 40% projected increase in stroke volumes by 2028[4] necessitates that all stakeholders (including MOH, DHBs, Health Workforce NZ and educational institutions) work hand-in-hand to ensure this demand will be met by the required numbers of adequately trained members of the Stroke rehabilitation team (consisting of consultant physicians, nurses, physiotherapists, occupational therapists, speech and language therapists, clinical psychologists, rehabilitation assistants and social workers). This also extends to inter-sector collaboration among government organisations such as the Ministry of Health and the Ministry of Social Development.

The REGIONs study (recently commenced) will provide, in approximately two years, baseline and benchmark information for all DHBs which will assist in service planning.

8. GUIDELINES AND REVIEW OF EVIDENCE

Summary of Recommendations from the 2017 Australian Clinical Guidelines for Stroke Management.[5]

These guidelines may be updated. It is important that these recommendations are interpreted in the appropriate context and clinical setting.

Strong recommendations for

a) Where appropriate stroke services are available, early supportive discharge services should be offered to stroke patients with mild to moderate disability.

b) Health professionals should initiate the process of setting goals and involving stroke survivors and their families and carers throughout the process. Goals for recovery should be client-centred, clearly communicated and documented so that both the stroke survivors (and their families/carers) and other members of the rehabilitation team are aware of goals set.
Goals should be set in collaboration with the stroke survivor and their family/carer (unless they choose not to participate) and should be well defined, specific and challenging. They should be reviewed and updated regularly.

c) All stroke patients should commence mobilisation (out-of-bed activity) within 48 hours of stroke onset unless otherwise contraindicated (e.g. receiving end-of-life care).

d) For stroke survivors with reduced strength in their arms and legs, strength training should be provided.

e) For stroke survivors, rehabilitation should be structured to provide as much scheduled therapy (occupational therapy and physiotherapy) as possible.
For stroke survivors, group circuit class therapy should be used to increase scheduled therapy time.

f) For stroke survivors, rehabilitation should include individually-tailored exercise interventions to improve cardiorespiratory fitness.

g) For stroke survivors who have difficulty sitting, practicing reaching beyond arm's length while sitting with supervision/assistance should be undertaken.

h) For stroke survivors who have difficulty in standing up from a chair, practice of standing up should be undertaken.

i) For stroke survivors who have difficulty standing, tasks specific standing balance should be provided. Strategies could include:
    - Practicing functional tasks while standing
    - Walking training that includes challenge to standing balance (e.g. overground walking, obstacle courses)
    - Providing visual or auditory feedback

j) Stroke survivors with difficulty walking should be given the opportunity to undertake tailored repetitive practice of walking (or components of walking) as much as possible.

k) The following modalities may be used:
    - Circuit class therapy (with a focus on overground walking practice)
    - Treadmill training with or without bodyweight support

l) For stroke survivors with some active wrist and finger extension, intensive constraint-induced movement therapy (minimum of 2 hours of active therapy per day for 2 weeks, plus restraint for at least 6 hours a day) should be provided to improve arm and hand use. Trunk restraint may also be incorporated into the active therapy sessions at any stage post-stroke.

m) Community-dwelling stroke survivors who have difficulty performing daily activities should be assessed by a trained clinician.
Community-dwelling stroke survivors with confirmed difficulties in personal or extended ADL should have specific therapy from a trained clinician (e.g. task specific practice and training in the use of appropriate aids) to address these issues.

n) For stroke survivors with aphasia, speech and language therapy should be provided to improve functional communication.

Weak recommendations for

a) Home-based rehabilitation may be considered as a preferred model for delivering rehabilitation in the community. Where home-based rehabilitation is unavailable, stroke patients requiring rehabilitation should receive centre-based care.
b) For patients with mild to moderate stroke, frequent, short sessions of out-of-bed activity should be provided, but the optimal timing within the 48 hour post stroke time period is unclear.
c) For stroke survivors with reduced strength in their arms or legs (particularly for those with less and antigravity strength), electrical stimulation may be used.
d) For stroke survivors with sensory loss of the upper limb, sensory-specific training may be provided.
e) A minimum of 3 hours a day of scheduled therapy (occupational therapy and physiotherapy) is recommended, ensuring at least 2 hours of active task practice occurs during this time.
f) For stroke survivors who have difficulty with standing balance, virtual reality including treadmill training with virtual reality or use of Wii balance boards may be used.
g) For stroke survivors with difficulty walking, one or more of the following interventions may be used in addition to those listed above:
    - Virtual reality training
    - Electromechanically assisted gait training
    - Biofeedback
    - Cueing of cadence
    - Electrical stimulation
h) For stroke survivors, individually fitted lower limb orthosis may be used to minimise limitations in walking ability. Improvement in walking will only occur while the orthosis is being worn.
i) For stroke survivors with mild to severe arm weakness, mechanically assisted arm training (e.g. robotics) may be used to improve upper limb function.
j) For stroke survivors of mild to moderate arm impairment, virtual reality and interactive games may be used to improve upper limb function. Virtual reality therapy should be provided for at least 15 hours total therapy time and is most effective when used in the first six months after stroke.
k) For stroke survivors with mild to severe arm or hand weakness, electrical stimulation in conjunction with motor training may be used to improve upper limb function.
l) For stroke survivors with mild to moderate weakness of the arm, mental practice in conjunction with active motor training may be used to improve arm function.
m) For stroke survivors with mild to moderate weakness, complex regional pain syndrome and/or neglect, mirror therapy may be used as an adjunct to routine therapy to improve arm function after stroke.
n) For stroke survivors with at least some voluntary movement of the arm and hands, repetitive task-specific training may be used to improve arm and hand function.
o) For stroke survivors, selective serotonin reuptake inhibitors may be used to improve performance of ADLs.
p) For stroke survivors, virtual reality technology may be used to improve ADL outcomes in addition to usual therapy.
q) For stroke survivors with aphasia, intensive aphasia therapy (at least 45 minutes of direct language therapy for 5 days a week) may be used in the first few months after stroke.
r) For stroke survivors with dysarthria, individually tailored interventions provided by speech and language pathologist or trained communication partner may be provided.
s) For stroke survivors with apraxia of speech, individually tailored interventions incorporating articulatory-kinematic and rate/rhythm approaches may be used.
   In addition therapy may incorporate:
    - Use of modelling and visual cueing

- Principals of motor learning to structure practice sessions
- Prompts for Restructuring Oral Muscular Phonetic Targets (PROMT) therapy
- Self-administered computer programs that use multimodal sensory stimulation
- For functional activities, the use of augmentative and alternative communication modalities such as gesture or speech-generating devices is recommended.

t) For stroke survivors with cognitive impairment, meta-cognitive strategy and/or cognitive training may be provided.
u) For stroke survivors with attention and concentration deficits, cognitive rehabilitation may be used.
v) For stroke survivors with attention and concentration deficits, exercise training and leisure activities may be provided.
w) For stroke survivors with limb apraxia, interventions such as gesture training, strategy training and/or errorless learning may be provided.
x) For stroke survivors with symptoms of unilateral neglect, cognitive rehabilitation (e.g. computerised scanning training, pen and paper tasks, visual scanning training, eye patching, mental practice) may be provided.
y) For stroke survivors with symptoms of unilateral neglect, mirror therapy may be used to improve arm function and ADL performance.

Weak recommendations against

a) Upper limb activity - Brain stimulation (transcranial direct stimulation or repetitive transcranial magnetic stimulation) should not be used in routine practice for improving function and only used as part of research framework.
b) For older stroke survivors living in a nursing home, routine occupational therapy is not recommended to improve ADL function.
c) Activities of daily living - Brain stimulation (transcranial direct stimulation or repetitive transcranial magnetic stimulation) should not be used in routine practice to improve ADL and only used as part of research framework.
d) Aphasia - Brain stimulation (transcranial direct current stimulation or repetitive transcranial magnetic stimulation) with or without traditional aphasia therapy, should not be used in routine practice for improving speech and language function and only used as part of a research framework.
e) For stroke survivors with dysarthria, non-speech oromotor exercises have not been shown to provide additional benefit to behavioural speech practice and are not recommended.
f) Non-invasive brain stimulation should not be used in routine clinical practice to decrease unilateral neglect, but may be used within a research framework.

Strong recommendations against

a) For stroke patients, starting intensive out-of-bed activities within 24 hours of stroke onset is not recommended.
b) Hand and wrist orthoses (splints) should not be used as part of routine practice as they have no effect on function, pain or range of movement.
c) For stroke survivors in the acute, subacute or chronic phase post-stroke, acupuncture should not be used to improve ADL.
d) Administration of amphetamines to improve ADL is not recommended.

9. SELECTED EVIDENCE FROM LITERATURE REVIEW

The full literature review is provided in the Appendix. Here is a summary of the evidence.

Stroke Unit care

- Organised stroke unit care (through management of patients in exclusive stroke wards, mixed rehabilitation wards and mobile stroke teams) reduces death and disability irrespective of patient's stroke severity, stroke type. But the best evidence of benefit was noted in centres where stroke patients were rehabilitated in exclusive stroke units.[6]
- Inpatient stroke rehabilitation should be provided by a specialised stroke rehabilitation team (consisting of consultant physicians, nurses, physiotherapists, occupational therapists, speech & language therapists, clinical psychologists, rehabilitation assistants and social workers), with goal setting, regular team meetings, use of agreed protocols, and opportunities for team education to keep up-to-date with evidenced based care.
- Stroke units are cost-effective.[7] [8] [9]
- Stroke units need to be adequately staffed but there is insufficient evidence to define minimum staffing levels.

Inpatient rehabilitation

- All stroke patients should be assessed for rehabilitation; unless there is an exception or overarching reason (e.g. patient has returned to premorbid function, death is imminent, coma/unresponsiveness, patient refusal to participate in rehabilitation).[10]

Intensity and amount of rehabilitation

- Within the first 24 hours high intensity mobilisation has been associated with poorer outcomes.[11]
- After 24 hours there seems to be a dose-response relationship between the intensity of rehabilitation and functional gains.[12] [13] [14] [15]
- The required intensity of therapy could be provided using circuit class, physiotherapy and self-administered patient therapy strategies.
- Additional therapy at weekends may reduce length of stay for inpatient rehabilitation. There may also be a beneficial effect on (improved) functional status at discharge but the evidence for this is weak.

Early Supported Discharge

- Stroke patients with mild-moderate disability who are transitioned from hospital to their home through an Early Supported Discharge (ESD) service have significantly reduced length of hospital stay, and at 6 months are more likely to be living at home and with better extended ADL scores.[1]

Duration of Rehabilitation

- Stroke patients may have unmet needs (cognitive problems, fatigue or psychosocial issues from activity limitations e.g. driving, & return to work issues) long after their stroke.
- Stroke patients may benefit from additional episodes of rehabilitation many years after their stroke (up to 5 years). The sustained long-term effect of such therapy interventions is unknown.[14]

Aphasia

- Speech and Language Therapy (SLT) for stroke patients with aphasia improves outcomes through gains in functional communication, reading, writing and expressive language compared to no therapy.
- Higher intensity of aphasia therapy led to better functional communication.[16]

Therapy-based rehabilitation at home

- 'Therapy-based rehabilitation' (defined as input from OT, PT or a multidisciplinary team) reduces the odds of poor outcome, death or deterioration in ADLs. It also improves ADLs. For every 100 community-based stroke patients poor outcome is avoided in 7 patients.[17]
- OT at home delivered within 1 year of stroke significantly improves both personal and extended ADLs.[18]
- Functional outcomes were significantly better with home-based compared to centre-based rehabilitation. There were no differences in benefit at later follow up. Cost-benefits and greater carer satisfaction were also seen with home-based rehabilitation.[19]
- Stroke patients with residual stroke-related disability living in long term residential care were less likely to deteriorate in their ability to perform ADLs if they received occupational therapy intervention.[20]
- Physical rehabilitation offered to stroke patients in long-term care led to significant improvements in physical condition, reduction in disability, and was noted to be safe.[21]

Support and provision of information to patients and care givers

- Providing information to patients and carers improves patient/carer knowledge, patient satisfaction and reduces patient depression.[22]
- Stroke patients with mild-moderate disability benefitted from a stroke liaison worker with 11 fewer dead or dependent patients for every 100 patients seen.[23]

Return to work

- Stroke patients are five times more likely to return to work if they have an individualised return to work programme. Patients who returned to work reported better quality of life.[24]

Projected stroke volumes

- There is a projected 40% increase in stroke volume from 2015 to 2028.[4]

10. ABBREVIATIONS

ADLs – Activities of Daily Living

DHB – District Health Board

ESD – Early Supported Discharge

FTE – Full time Equivalent

FIM – Functional Independent Measure

GP – General Practitioner

MOH – Ministry of Health

NZ – New Zealand

PEG – Percutaneous Endoscopic Gastrostomy

PT – Physiotherapist

OT – Occupational Therapist

QALY – Quality Adjusted Life Year

RCT – Randomised Controlled Trial

SLY – Speech and Language Therapist

UK – United Kingdom

11. APPENDIX

Literature Review

A non-systematic literature search was conducted. The search was limited to general rehabilitation strategies following stroke in adults including models of care, duration and intensity of rehabilitation, inpatient rehabilitation and community rehabilitation. Domain-specific rehabilitation interventions (such as constraint induced movement therapy) were not included in this review.

Stroke Unit care

The evidence of benefit for stroke unit care was established by the Stroke Unit Trialists in the 1990s. A subsequent Cochrane review in 2013 of 28 trials concluded that organised stroke unit care reduces death and disability, irrespective of stroke severity, stroke type, or age of the patient. A variety of models have come into existence which include exclusive stroke wards, mixed rehabilitation wards, and mobile stroke teams. The best evidence of benefit was noted in centres where stroke patients were rehabilitated in exclusive stroke units.[6]

What actually happens in stroke units that equates to this patient outcome benefit does not seem clear, but is likely to be centred on the delivery of holistic care for stroke patients with appropriately staffed and skilled multi-disciplinary professionals. Other factors in stroke units which may differ from general rehabilitation wards are better organisation of stroke care including multidisciplinary team work, better education of staff members, family participation and early onset of therapy.

Stroke rehabilitation guidelines from the UK have defined the list of multidisciplinary stroke rehabilitation team professionals.[25] These include: consultant physicians, nurses, physiotherapists, occupational therapists, speech and language therapists, clinical psychologists, rehabilitation assistants and social workers. Inpatient stroke rehabilitation should be provided by such specialised stroke rehabilitation teams, with goal setting, regular team meetings, use of agreed protocols, and opportunities for team education to keep up-to-date with evidenced based care.

Staffing and cost

The evidence for what constitutes minimum staffing levels in stroke units is unclear. But there is observational evidence that patients admitted after-hours to stroke units (when staffing levels were less) experience poorer short-term outcomes compared to in-hours admissions.[26] [27] The formation of centralised hyperacute stroke units in large metropolitan areas resulted in the provision of better evidence-based interventions. Whilst this service reconfiguration consisted of many components of best practice such as early access to reperfusion treatment and imaging, the standards for minimum staffing levels on stroke units were also defined and formulated.[28] This evidence led the UK Intercollegiate Stroke Working Party to come up with recommendations for staffing (Table 2).[29] The size of a stroke unit should be dependent on local population needs and expected stroke volumes, as well as the provision of rehabilitation services both inpatient and in the community.

	Physiotherapist	Occupational Therapist	Speech and language therapist	Clinical neuro-psychologist/ clinical psychologist	Dietician	Nurse	Consultant Stroke Physician
	Whole-time equivalent (WTE) per 5 beds					WTE per bed	
Hyperacute Stroke Unit	0.73	0.68	0.34	0.20	0.15	2.9 (80:20 registered: unregistered)	24/7 availability; minimum 6 thrombolysis trained physicians on rota
Acute Stroke Unit	0.84	0.81	0.40	0.20	0.15	1.35 (65:35 registered: unregistered)	Consultant – led ward round 5 days/week

Table 2. Recommended staffing levels for stroke units (Illustration obtained from National Clinical Guidelines for stroke. Fifth Edition 2016. Royal College of Physicians)[29]

There is evidence that stroke units are cost effective, although this was not consistently proved in all related studies. A systematic review of three European studies found no significant different in cost between stroke unit and general ward care.[30] In a UK study the cost-effectiveness of three different care strategies was assessed: stroke unit care, stroke team care and domiciliary care. Stroke unit care was found to be more effective but expensive compared to the other two strategies. Based on an incremental comparison of stroke unit care with domiciliary care, stroke unit care was found to cost an additional £64000 to £136000 per quality-adjusted life year (QALY) gained.[7] A more recent UK study found that compared to general medical wards stroke unit care is in fact cost-saving, with fewer deaths and improved quality-adjusted survival. These results were obtained through reduced hospital length of stay.[8] A NZ study noted that stroke unit care was cost-effective per QALY gained over a lifetime compared to standard care.[9]

Assessment for Rehabilitation

There is no evidence that any particular group of stroke patients do not benefit from rehabilitation. A Cochrane review from the Stroke Unit Trialists Collaboration states that 'there are no firm grounds for restricting access according to a person's age, sex, stroke severity or pathological stroke type'.

The Australian Stroke Coalition Rehabilitation Working Group produced a consensus-based assessment and decision-making tool to help achieve the goal that all stroke patients are assessed for rehabilitation, unless there is an exception or overarching reason (e.g. stroke patient has returned to premorbid function, death is imminent, coma/unresponsiveness, patient refusal to participate in rehabilitation).[10]

When to start mobilisation after acute stroke?

One of the components that lead to outcome benefit with stroke unit care was thought to be early mobilisation, through the reduction of immobility-related complications and the negative effects of bed-rest on various body systems. However what exactly constitutes early mobilisation was poorly defined.

The AVERT trial noted that very early mobilisation (within 24 hours) of stroke patients and with higher dose of therapy resulted in less favourable outcome at 3 months compared to the usual care. Very early mobilisation led to greater disability with no effect on immobility- related complications or walking recovery. Patients randomised to the very early mobilisation treatment arm of the study also received more frequent and higher amount of out-of-bed activity.[11]

Further analysis of this dose-response characteristics revealed that frequent short sessions out of bed were associated with better outcomes.[31] Patients in the usual care arm were still mobilised early but slightly later (93% of patients were mobilised within 48 hours of stroke onset). The AVERT trial researchers concluded that starting very early rehabilitation after stroke may interfere with recovery, and that too many long sessions over the day may be harmful. Better outcomes were noticed with slightly later mobilisation (within 48 hours) with sessions that were shorter in duration and less frequent.

A systematic review performed in 2014 attempted to clarify the optimum time of when to commence physiotherapy following stroke. In this review three low quality studies indicated some evidence towards benefit with commencing physiotherapy within 3 days, and with no associated harm.[32]

Intensity and Amount of Rehabilitation

Intensity of rehabilitation may be defined as the amount of the rehabilitation time or the frequency of rehabilitation sessions, or a combination of both. A systematic review by Kwakkel et al noted that that extra rehabilitation led to small but significant improvement in ADLs.[12] The positive effects were mainly seen in studies where therapy was focussed on the lower limb and ADLs in general, and where a minimum of 16 hours additional exercise therapy time was provided within the first 6 months of stroke. A further meta-analysis of 11 RCTs found that extra lower limb rehabilitation (37 minutes per working day of augmented exercise therapy during a mean of 5.7 weeks compared to usual care) within 6 months of stroke improved walking ability and walking

speed. There was significant heterogeneity in the control arm that provided 'usual' care and this review focussed on calculating the effect size of the additional therapy intervention.[13]

A meta-analysis of RCTs in relation to 'therapy time' concluded that greater amounts of scheduled therapy time lead to better outcomes in function and impairment.[14] A positive dose-response relationship was noted across studies rehabilitating different impairments and functions, with different therapy interventions, and measuring outcomes with different tools. There was no interaction between the time of scheduled therapy and time after stroke, suggesting that benefits from increased therapy times were applicable across a range of post-stroke times (with the exception of very early mobilisation within 24 hours of stroke onset). The authors concluded that time scheduled for therapy significantly predicts functional outcomes. However, only a handful of studies in this review specified 'active' therapy time or patient-led activities. There was also much heterogeneity in the comparator arm of several studies. Some trials compared the effect of rehabilitation with no rehabilitation, and others compared extra rehabilitation with 'usual' rehabilitation.

A more recent meta-analysis of studies that provided additional time of the same rehabilitation activity (extra rehabilitation with same content as usual rehabilitation with the aim of reducing activity limitations of the lower and/or upper limbs) improved activity after stroke. The authors concluded that the positive outcome effect was purely a result of increase in the amount of rehabilitation. They were also able to calculate that 240% extra addition of active therapy time was required to achieve a beneficial effect over usual practice. With a mean usual care therapy time of 25 minutes, this meant an additional therapy type of 90 minutes, equating to an average 2 hours per day.[15]

In a resource-constrained healthcare environment provision of intense rehabilitation may be challenging. English et al found that group circuit class physiotherapy (3 hours per day for five days of the week) increased therapy time that patients received, and with walking outcomes that were equivalent to usual care.[33] A recent Cochrane review noted that circuit class therapy improves walking mobility (ability to walk further, more independently and faster).[34]

Another way to increase the intensity of rehabilitation is to incorporate self-administered patient therapy such as the 'graded repetitive arm supplementary program' (GRASP) where feasible for patients with upper limb weakness. Improved upper limb function was seen in patients who took part in GRASP.[35]

The UK Stroke guidelines state that stroke patients should be offered 45 minutes of 'each appropriate therapy' every day and for as long as beneficial (National Clinical Guideline for stroke 5th edition).[29] The 2017 Australian Stroke guidelines make a weak recommendation to provide 3 hours per day of scheduled occupational therapy and physiotherapy.[5] This level of intensity may not be appropriate for all stroke patients. For instance some frail older patients may not be able to tolerate or participate in such intensive rehabilitation due to various reasons such as comorbidities, fatigue or cognitive impairment. Thus it is important that intensity of rehabilitation, like all aspects of rehabilitation, is tailored to an individual patient. Aphasia rehabilitation will be addressed later in this section.

Weekend therapy

Evidence of benefit with weekend therapy has shown mixed results. A systematic review of after-hours or weekend therapy, where 3 out of the 7 trials included only patients with stroke, found no beneficial effect of additional therapy on physical function or walking speed, but a small positive effect on ability to perform ADLs.[36] A more recent meta-analysis of patient level data which included results from the CIRCIT trial[33] noted that additional therapy time at weekends led to shorter length of inpatient rehabilitation hospital stay, but without any benefit in walking speed or ADLs.[37] A Japanese trial compared outcomes for stroke patients who received 7 day therapy with conventional rehabilitation 5 days of the week. Patients in the high intensity therapy arm were also encouraged to remain active outside of the structured sessions. Patients who received the higher intensity therapy achieved significantly higher discharge FIM and shorter length of stay.[38]

The use of Rehabilitation Support Workers at Guy's and St Thomas' Hospital was trialled as a way of providing a 7-day therapy service. The rehabilitation support workers provided 20 minute sessions to stroke patients with the aim to increase rehabilitation activities for patients over

weekends and public holidays. Existing ward healthcare assistants were trained to provide these sessions which were 20 minutes (and therefore did not meet UK minimum rehabilitation guidelines). It was noted that the total number of rehabilitation contacts had increased but not those delivered by qualified therapists. The model helped to improve nursing awareness of rehabilitation concepts and implementation strategies as part of day to day nursing, and feedback from patients and staff showed these weekend sessions were valued.[39]

Finally, there may also be a benefit from reduced hospital readmissions as noted in an observational study where more intensive rehabilitation was associated with decreased risk of hospital readmission.[40]

Early Supported Discharge

The significant cost associated with providing inpatient stroke unit care has led to the development of accelerated hospital discharge programmes, aimed at continuing the early post-stroke rehabilitation in the community with the same level of intensity and breadth of specialist input as would have been provided in a stroke unit. These schemes have come under the umbrella of 'Early Supported Discharge' (ESD) with the aim of providing a seamless transfer from hospital to home and enable rehabilitation in the home-setting.

A Cochrane review of 17 trials comparing ESD versus standard care found that ESD significantly reduced length of hospital stay, and at 6 months stroke survivors who received ESD input were more likely to be living at home. Improvements were also seen in participants' extended ADL scores with ESD. Most patients included in these trials had mild to moderate strokes with persisting disability necessitating rehabilitation. The greatest reductions in death or dependency with ESD were seen in trials where the team arranged a planned and coordinated discharge from hospital to home, with rehabilitation and support at home. The associated expenses of providing ESD were variable, from a cost saving of 23% to a cost increase of 15%.[1]

The accumulating evidence of benefit with ESD led the Department of Health (UK) to make formation of this service a key recommendation in its' National Stroke Strategy.[41] To help guide commissioners and service providers, the ESD trialists provided a consensus statement to guide service implementation.[42] This also included recommendation on team composition for a nominal 100-patient-per-year caseload (see QD3).

The trialists agreed that ESD teams should be hospital-based (rather than community-based), meet on a weekly basis, and should be well coordinated to allow for a planned and smooth discharge from hospital leading to the provision of rehabilitation and support at home. It was also recognised there would be added benefit from ESD other than just rehabilitation. Patients with particular requirements may be referred to key services such as support groups and other disciplines such as psychological support. No consensus was reached on the length of intervention provided by the ESD team, and it was recognised that any particular ESD service will need to be set up based on the 'existence and type of other community based stroke services operating in the area'.

In NZ the first ESD service was implemented at Counties Manukau DHB as part of the 'Supporting Life After Stroke' project. Patients received an intensive three-week period of rehabilitation and were then transitioned to another community team. Results were impressive, with an average reduction in length of stay on rehabilitation ward from 22 days to 6 days. The cumulative bed days saved over a 10 month period were 492. Almost all (99.5%) patients were satisfied with the ESD service. Patients achieved functional improvements comparable to those managed with inpatient rehabilitation.[43]

The 2017 Australian Clinical Guidelines for Stroke Management make a strong recommendation that 'early supported discharge services should be offered to stroke patients with mild to moderate disability'.[5] The 2016 organisational audit from the Sentinel Stroke National Audit Programme (SSNAP) noted that 81% of hospitals in the UK have access to an ESD service.[44]

Duration of Rehabilitation

Those who survive from stroke may experience unmet clinical and social needs long after their stroke.[45] These could be unidentified cognitive problems, fatigue or psychosocial issues from

activity limitation such as driving, and return to work issues. In the review by Lohse et al[14] most studies provided rehabilitation up to 5 years after stroke, and benefits were seen regardless of post-stroke time. While there is some evidence that stroke patients may benefit from rehabilitation many months or years after their stroke, what is less clear is how long such services should be provided to stroke survivors. Many clinical rehabilitation trials perform their 'interventions' over a period of 6- or 12- weeks and then collect functional outcomes 3-12 months after stroke.[17] In the more recent meta-analysis by Schneider et al (2016)[15] on additional rehabilitation compared to usual care most studies (12 out of 14) provided rehabilitation to study participants up to 6 months following stroke. Therefore the effect of the therapy interventions beyond this time period is unknown. An earlier Cochrane review of 5 trials incorporating 487 participants evaluating therapy-based rehabilitation intervention one year after stroke, found there was no conclusive evidence for this. The authors surmised there was lack of evidence of benefit from long-term rehabilitation interventions for patients with stroke.[46]

While the evidence for ongoing rehabilitation for stroke patients in the longer term may be lacking, it should be noted that timely reassessment and targeted intervention to facilitate recovery, and exercise of rehabilitation may prevent loss of physical or cognitive gains that may have been achieved in the early stages of recovery. There is much variation in recovery rates between patients. This may be influenced by initial stroke severity, early rehabilitation, and other patient factors which may influence patient participation such as cognitive impairment and serious comorbidities. Some stroke patients may start or continue to improve many months after the event, and such patients may benefit from assessment and rehabilitation at that stage. This led the UK Stroke Guidelines to recommend that all stroke patients including those in long-term care should be offered a 'structured health and social care review' at 6 months and 1 year after their stroke, and then annually.[29]

Aphasia

Speech and Language Therapy (SLT) for stroke patients with aphasia improves outcomes through gains in functional communication, reading, writing and expressive language compared to no therapy.[16] The trials included in this review were heterogeneous, with a range of participants, interventions (frequency of therapy), differing stroke characteristics (such as time since stroke, stroke severity), and outcomes (follow up times and choice of outcome measure). Based on small numbers, there was no evidence of benefit at long-term follow-up.

High-intensity (4 to 15 hours SLT therapy time per week), high-dose (60 to 208 hours total SLT therapy time) and therapy over a longer duration (3 weeks to 22 months) lead to greater improvements in functional communication (2 studies including 84 participants) and the severity of aphasia (5 studies involving 187 participants). However drop-out rates were significantly higher in the high-intensity and high-dose intervention group, suggesting that this amount of SLT input may not be appropriate for all stroke patients.

The Australian Stroke guidelines[5] make a weak recommendation that 'intensive aphasia therapy (at least 45 minutes of direct language therapy for 5 days of the week) may be used in the first few months after stroke'. A systematic literature review[47] identified that community and outpatient group participation can improve specific linguistic processes. There is also some evidence that group participation can benefit social networks and community access. However, there is limited evidence demonstrating improvement in functional communication as a consequence of group participation. More information on aphasia rehabilitation is available through the Australian Aphasia Rehabilitation Pathway.[48]

A 2017 NZ survey of SLT practitioners from 16 out of 20 DHBs revealed that a range of interventions are used to provide treatment for patients with aphasia (including use of gesture, supported conversation techniques, treatment of aspects of language following models derived from cognitive neuropsychology, conversational partners and computer-aided delivery of therapy). A reduction in group therapy was noted: from 65% in 2013 to 42% in 2017. The provision of aphasia-friendly written educational materials increased from 67% in 2013 to 89% in 2017.[49]

Home-based Rehabilitation services using specialist therapists

In a Cochrane review of 14 trials (Outpatient Service Trialists, 2003) 'therapy-based' rehabilitation (defined as input from occupational therapy, physiotherapy or a multidisciplinary team) reduced the odds of poor outcome (death or deterioration in ADLs) and with improvement in ADLs (for every 100 community-based stroke patients receiving therapy-based rehabilitation services, poor outcome would be avoided in 7 patients).[17] There was significant heterogeneity in these trials including patient selection criteria, baseline stroke severity and duration of follow up. For instance, there were three types of services offering rehabilitation at home: occupational therapy, physiotherapy or multidisciplinary team input. There were also limitations in trial design and quality, such as inability to blind the therapist and patient. In addition, contamination (when participants in the control group of study receive intervention) and co-intervention (when the same therapist unintentionally offers additional care to either the treatment or control group) could have contributed to performance bias. In view of these limitations, the authors concluded that further research is required to define the most effective interventions, the most appropriate level of service delivery and the economic benefits of such services.

An individual patient data meta-analysis of 8 RCTs incorporating 1143 patients noted that occupational therapy at home delivered within 1 year of stroke significantly improved both personal and extended ADLs.[18] A review by Steultjens et al evaluated the benefit of several occupational therapy interventions and found that that 'comprehensive' occupational therapy improved ADLs and social participation. Occupational therapy was regarded as 'comprehensive' if it provided 6 specific interventions: training of sensory-motor functions; training of cognitive functions; training of skills such as dressing, cooking, performing domestic ADLs; advice and instruction in the use of assisted devices; provision of splints and slings; and education of family/primary caregivers.[50]

A systematic review of 11 RCTs incorporating 1711 participants explored the benefit between home-based and centre-based rehabilitation and noted that functional outcomes, at 6-8 weeks and at 3-6 months, were significantly higher in participants who received intervention at home. In studies which followed-up patients at 6 months, there was no difference in outcomes between the two groups. The main limitation in study quality was lack of blinding. Home-based rehabilitation was cost-saving (less expensive than hospital-based rehabilitation) and lead to greater carer satisfaction. The authors' concluded that home-based rehabilitation was superior to centre-based rehabilitation (where patients attend a rehabilitation institute/centre/clinic for their therapy sessions) at least in the short-term.[19]

In a UK study patients in care homes with residual stroke-related disability were less likely to deteriorate in their ability to perform ADLs if they received occupational therapy intervention. What is noteworthy in this RCT is that this benefit was seen with a relatively small level of occupational therapy intervention (median 2.7 visits per resident per month, and median time 4.5 hours spent with the therapist per resident per month).[20]

A Cochrane review of physical rehabilitation offered to stroke patients in long-term care showed that physical rehabilitation led to statistically significant improvements in physical condition, reduction in disability, and was noted to be safe. Most interventions consisted of 30 to 45 minutes group sessions per week, and with the overall duration of intervention lasting less than 20 weeks. Frailer participants seem to benefit from individualised interventions, while group therapy sessions were successful for the less disabled. A wide variety of outcome measures were used and as a result the studies could not be statistically summarised. The authors' concluded that several different physical rehabilitation interventions can be successful and safe for stroke patients in long-term care, but there was insufficient evidence to comment on the best intervention, cost effectiveness, and the size and duration of positive effect.[21]

Support and provision of information to patients and care givers

Providing information to patients and carers has been shown to improve patient/carer knowledge, patient satisfaction and reduces patient depression. The authors' in this review also noted that although the best way to provide information is unclear, most benefit was seen where patients and carers were actively involved and with a planned follow-up for clarification and reinforcement of information.[22]

The intervention of a 'stroke liaison worker' (defined as 'someone whose aim is to increase participation and improve wellbeing for patients and carers') to provide (emotional and social) support and information to stroke patients and families was trialled in several studies. The review noted that the service can be provided under a range of different names including 'social work', 'specialist nurse support', 'stroke family care worker' and 'stroke family support organiser'. No overall significant benefit for the outcome of patient or carer subjective health status, or patient's extended ADLs was found. However the subgroup of patients with mild-moderate disability benefitted from reduction in death and disability with the input from this service, equating to 11 fewer dead or dependent patients for every 100 patients seen by the stroke liaison worker. Improved patient and carer satisfaction was also reported with some aspects of this service provision.[23] In the NZ setting, the role of a stroke liaison worker is likely to be that of a social worker in the inpatient setting, transitioning to local Community Stroke Advisors and Stroke Foundation workers following discharge from hospital.

Return to Work

The ability to return to work may be an important goal for some stroke survivors. In one RCT involving 80 participants who were employed at the time of stroke onset, patients in the intervention group received an individualised workplace intervention programme tailored according to functional ability and workplace challenges while those in the control group received usual care which took into consideration job requirements but without any specific workplace intervention.

At 6 months 60% (24 participants) in the intervention group returned to work compared to 20% (8 participants) in the control group, which was statistically significant (odds ratio for return to work with intervention was 5.2). The odds of return to work increased with associated increments in ADLs and cognitive assessment scores. Patients who returned to work also reported better quality of life.[24]

Stroke volume projections

A 40% increase in stroke volumes is projected between 2015 and 2028. This is chiefly driven by the ageing demographic across New Zealand. Workforce planning will need to be undertaken to meet this anticipated demand.[4]

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