Clinical Guidelines for Stroke Rehabilitation and Recovery

National Stroke Foundation 2005

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NATIONAL STROKE FOUNDATION

The following organisations have agreed to endorse the *Guidelines for Stroke Rehabilitation and Recovery:*

Australasian Faculty of Rehabilitation Medicine
Australasian Stroke Unit Network
Australian College of Rural and Remote Medicine
Australian Physiotherapy Association
Australian Society for Geriatric Medicine
Dietitians Association of Australia
Occupational Therapy Australia
Royal Australian and New Zealand College of Radiologists
Royal College of Nursing
Speech Pathology Australia
Stroke Society of Australasia
The Royal Australian and New Zealand College of Psychiatrists

Approved by the NHMRC on 8th September 2005

Australian Government
National Health and Medical Research Council

Disclaimer

This document is a general guide to appropriate practice, to be followed subject to the clinician's judgement and the patient's preference in each individual case. The guidelines are designed to provide information to assist decision-making and are based on the best evidence available at the time of publication. These guidelines can be downloaded from the National Health and Medical Research Council website: www.nhmrc.gov.au/publications.

Copies of the document can also be downloaded through the National Stroke Foundation website: www.strokefoundation.com.au.

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KEY MESSAGES

The *Clinical Guidelines for Stroke Rehabilitation and Recovery* has been developed to provide a series of evidence-based recommendations related to stroke rehabilitation and recovery. These recommendations are based on the most comprehensive review of the evidence for stroke rehabilitation ever conducted in Australia Development of the guidelines has been undertaken by a multidisciplinary Expert Working Group (EWG) using methodology consistent with National Health and Medical Research Council (NHMRC) standards.

This summary is designed to provide a quick overview of the key messages presented in the guidelines. However important information pertaining to the evidence supporting each recommendation as well as information about caveats to the recommendations is included in a preamble to each section. Because of this, the recommendations should be read in conjunction with information in the body of the main document.

Key messages are summarised according to the NHMRC levels of evidence[1]. Key references for each point are also included. The level of evidence highlights the methodology of the studies contributing to the evidence that underpins the guidelines. However this does not always translate into an equivalent strength of the recommendation for two reasons: studies vary in quality and different studies may produce conflicting results. The EWG has therefore used 'may' or 'should' to indicate the strength of the recommendation. 'May' is used when the evidence is not clear cut or when there is a wide range of opinions relating to a specific intervention; 'should' is used when there is a clear outcomes of all relevant research or a narrow range of opinion. Where no level I, II, III or IV evidence was available but there was sufficient consensus of the EWG, clinical practice points have been provided.

Designation of Levels of Evidence – National Health and Medical Research Council	
I	Evidence obtained from a systematic review of all relevant randomised controlled trials.
II	Evidence obtained from at least one properly designed randomised controlled trial.
III – 1	Evidence obtained from well-designed pseudo-randomised controlled trials (alternate allocation or some other method).
III – 2	Evidence obtained from comparative studies with concurrent controls and allocation randomised (cohort studies), case-control studies, or interrupted time-series with group.
III – 3	Evidence obtained from comparative studies with historical control, two or more studies, or interrupted time series without a parallel control group.
IV	Evidence obtained from case series, either post-test or pre-test and post-test.

Clinical practice points	
☑	Recommended best practice based on clinical experience and expert opinion.

1. ORGANISATION OF CARE

1.1.1 Stroke unit care

a) All people admitted to hospital with stroke and who require rehabilitation should be treated in a comprehensive or rehabilitation stroke unit with an interdisciplinary team. **(Level I, Ref 14)**

b) If no stroke unit is available, consideration should be given to transferring the person with stroke (when medically stable) to the nearest stroke unit, or a hospital that most closely meets the criteria for stroke unit care. ☑

1.1.2 Inpatient integrated care pathways

There is insufficient evidence to support recommendations about routine use of care pathways. If used, care pathways should be flexible enough to meet the heterogeneous needs of people with stroke. ☑

1.1.3 Inpatient stroke care coordinator

A stroke coordinator may be used to foster coordination of services and assist in discharge planning. ☑

1.2.1 Early supported discharge

Where comprehensive interdisciplinary community rehabilitation services and carer support services are available, early supported discharge services may be provided for people with mild to moderate disability. **(Level I, Ref 22-25)**

1.2.2 Community rehabilitation

Rehabilitation for people with stroke in the community is equally effective if delivered in the hospital via outpatients or day hospital, or in the community. **(Level I, Ref 26, 27, 30)**

1.3.1 Discharge destination

Decisions about discharge destination (home vs residential care) should be made in the context of availability of supportive services and the wishes of the stroke survivor and carer. ☑

1.3.2 Respite care

People with stroke and their carers should have access to respite care. This may be provided in their own home or an institution. ☑

1.3.3 Ongoing review

People with stroke should have regular and ongoing review by a member of a stroke team, including at least one specialist medical review following discharge. ☑

2. DISCHARGE PLANNING, TRANSFER OF CARE AND INTEGRATED COMMUNITY CARE

2.1 Family and team meetings

The stroke team should meet regularly with the person with stroke and the family to involve them in management, goal setting and planning for discharge. ☑

2.2 Pre-discharge needs assessment

a) Before discharge, people with stroke and their carers should have the opportunity to identify and discuss their post-discharge needs (eg. physical, emotional, social and financial) with the interdisciplinary team. ☑

b) Before discharge (or home trial) from inpatient care and, where appropriate, a home assessment should be carried out to ensure safety and community access. Optimal independence will be facilitated through home modification and adaptive equipment, as required. ☑

2.3 Care plans

People with stroke, their carers, the general practitioner and community care providers should be involved with the interdisciplinary team in the development of a care plan that outlines care in the community after discharge, including the development of self-management strategies, provision of equipment and support services, and outpatient appointments. ☑

2.4 Carer training

Relevant members of the interdisciplinary team should provide specific training for carers before the person's discharge home. This should include training, as necessary, in:

- personal care techniques, communication strategies, physical handling techniques, ongoing prevention and other specific stroke-related problems; **(Level II, Ref 43)**

- safe swallowing and modified diet. ☑

2.5 Liaison with community providers

The stroke survivor's general practitioner, other primary health professionals and community service providers should be involved in, and informed about, the discharge plans and agreed post-discharge management, as early as possible prior to discharge. ☑

2.6 Post-discharge follow-up

a) Contact with a family support / liaison worker may be considered for carers and stroke survivors in the community to assist with their knowlege and/or satisfaction. **(Level II, Ref 48, 51, 52)**

b) Stroke survivors and their families should be followed up by a relevant member of the team after their discharge from a formal rehabilitation program. ☑

c) People with stroke and carers should be provided with a contact person (in the hospital or community) for any post-discharge queries. ☑

2.7 General information and education

All stroke survivors and their families should be provided with timely, up-to-date information <u>in conjunction</u> with opportunities to learn via education from members of the interdisciplinary team and other appropriate community service providers. Simple information provision alone is not effective. **(Level I, Ref 53, 54; Level II, Ref 43, 56)**

3. MANAGEMENT OF THE CONSEQUENCES OF STROKE

3.1 SENSORIMOTOR IMPAIRMENTS

3.1.1 Strength

One or more of the following interventions should be used for people who have reduced strength:
- progressive resistance exercises; **(Level II, Ref 57)**
- electromyographic biofeedback in conjunction with conventional therapy; **(Level II, Ref 61,62)**
- electrical stimulation; **(Level I, Ref 63; Level II, Ref 64)**
- task-specific training. **(Level II, Ref 58, 59)**

3.1.2 Sensation

One or more of the following interventions for increasing tactile and kinaesthetic sensation may be provided for people who have sensory impairments:
- sensory-specific training; **(Level III-2, Ref 74; Level III-3, Ref 73, 75)**
- sensory-related training; **(Level III-2, Ref 76)**
- cutaneous electrical stimulation in conjuction with conventional therapy. **(Level IV, Ref 77)**

3.1.3 Spasticity

a) One or more of the following interventions may be provided for people who have moderate to severe spasticity (ie, spasticity that interferes with a stroke survivor's activity or personal care):

- Botulinum Toxin A; **(Level I, Ref 79)**
- intrathecal baclofen; **(Level I, Ref 86; Level II, Ref 87)**
- dynamic splinting; **(Level III-2, Ref 90)**
- vibration; **(Level II, Ref 89)**
- stretch; **(Level II, Ref 91; Level III-2, Ref 92)**
- electromyographic biofeedback. **(Level III-2, Ref 93)**

b) Interventions to decrease spasticity should not be routinely provided for people who have mild to moderate spasticity (ie, spasticity that does not interfere with a stroke survivor's activity or personal care). ☑

3.1.4 Contracture

a) For people at risk of developing contractures, management may include prolonged positioning of muscles in a lengthened position to maintain range of motion. **(Level II, Ref 97)**

b) Overhead pulley exercise should <u>not</u> be used to maintain range of motion of the shoulder. **(Level III-1, Ref 101)**

c) For people who have contractures, management may include the following interventions to increase range of motion:

- electrical stimulation; **(Level III-3, Ref 102)**
- casting. **(Level I, Ref 103)**

3.1.5 Subluxation of the shoulder

a) For people with severe weakness who are at risk of developing a subluxed shoulder, management should include either or both of the following interventions to minimise subluxation:

- electrical stimulation; **(Level I, Ref 104)**
- firm support devices. ☑

b) For people who have developed a subluxed shoulder, management may include firm support devices to prevent further subluxation. **(Level III-2, Ref 106-109)**

3.1.6 Shoulder pain

For people with severe weakness who are at risk of developing shoulder pain, management should include interventions to educate staff, carers and people with stroke to prevent trauma. ☑

3.1.7 Swelling of the extremities

a) For people who are immobile, management may include the following interventions to prevent swelling in the hand and foot:

- electrical stimulation; **(Level III-1, Ref 116)**
- continuous passive motion in elevation; **(Level III-2, Ref 117)**
- pressure garments. **(Level III-2, Ref 90)**

b) For people who have swollen extremities, management may include the following interventions to reduce swelling of the hand and foot:

- electrical stimulation; **(Level III-1, Ref 116)**
- continuous passive motion in elevation. **(Level III-2, Ref 117)**

3.1.8 Cardiovascular fitness

Rehabilitation should include interventions to increase cardiovascular fitness once people have sufficient strength in the large lower limb muscle groups. **(Level I, Ref 120; Level II, Ref 58, 121)**

3.1.9 Falling

Multifactorial interventions provided in the community, including an individually prescribed exercise program, may be provided for people who are at risk of falling, in order to prevent or reduce the number and severity of falls. **(Level I, Ref 136)**

3.2 PHYSICAL ACTIVITY

3.2.1 Sitting

Supervised task-specific sitting practice should be provided for people who have difficulty sitting. **(Level II, Ref 138)**

3.2.2 Standing up from a chair

Task-specific practice of standing up should be provided for people who have difficulty in standing up from a chair. **(Level I, Ref 120)**

3.2.3 Standing

Task-specific standing practice with feedback may be provided for people who have difficulty standing. **(Level I, Ref 120,142)**

3.2.4 Walking

a) One or more of the following interventions should be provided for people who can walk but with difficulty:

- joint position biofeedback with or without conventional therapy; **(Level II, Ref 145; Level III-2, Ref 146)**

- cueing of cadence; **(Level I, Ref 120)**

- treadmill with or without body weight support; **(Level I, Ref 120, 147)**

- multichannel electrical stimulation in conjunction with conventional therapy; **(Level II, Ref 151; Level III-2, Ref 152)**

- task-specific training. **(Level II, Ref 58, 154, 155)**

b) Ankle-foot orthoses may be considered for people with persistent foot drop. If used it should be individually fitted. **(Level III-2, Ref 157)**

3.2.5 Upper limb activity

One or more of the following interventions should be provided for people with difficulty using their upper limb:

- task-specific training; **(Level II, Ref 59, 158)**

- joint position biofeedback in conjunction with conventional therapy; **(Level III-2, Ref 169)**

- robot-assisted reaching; **(Level II, Ref 67, 170)**

- constraint-induced movement therapy. **(Level I, Ref 120)**

3.2.6 Amount of practice

a) Rehabilitation should be structured to provide as much practice as possible within the first six months after stroke. **(Level I, Ref 174)**

b) Group therapy involving task-specific training or video self-modelling may be used to increase the amount of practice in rehabilitation. **(Level II, Ref 154, 179; Level III-3, Ref 178)**

3.3 ACTIVITIES OF DAILY LIVING

a) People who have difficulty in ADL should receive occupational therapy or multidisciplinary interventions targeting ADL. **(Level I, Ref 26, 180, 181)**

b) Until clinical safety is proven, administration of amphetamines to improve ADL is not recommended. **(Level I, Ref 182)**

3.4 COGNITIVE CAPACITIES

3.4.1 Attention and concentration

Cognitive therapy may be used in rehabilitation of attention and concentration deficits. **(Level I, Ref 183)**

3.4.2 Memory

External cues may be used to help prompt memory in people with memory difficulties. **(Level II, Ref 187)**

3.4.3 Executive functions

External cues, such as a pager, may be used to initiate everyday activities in people with impaired executive functioning. **(Level II, Ref 187)**

3.5 VISUOSPATIAL/ PERCEPTUAL CAPACITIES

3.5.1 Visual function

a) Prism glasses may be used to improve visual function in people with homonymous hemianopia but there is no evidence of benefit in ADL function. **(Level II, Ref 190)**

b) Computer-based visual restitution training may be used to improve visual function in people with visual field deficits. **(Level II, Ref 191)**

3.5.2 Agnosia

There is insufficient evidence to guide recommendations regarding interventions for agnosia.

3.5.3 Neglect

People with unilateral spatial neglect may benefit from cognitive rehabilitation (for example, scanning training). **(Level I, Ref 194)**

3.5.4 Apraxia

Strategy training in conjunction with conventional therapy to improve ADL may help people with apraxia in the short term (<5 months) to improve planning and task execution. **(Level II, Ref 198)**

3.6 COMMUNICATION

3.6.1 Aphasia

a) Interventions for people with aphasia may include:

- treatment of phonological and semantic deficits following models derived from cognitive neuropsychology; **(Level II, Ref 204)**
- constraint-induced therapy; **(Level II, Ref 203)**
- the use of gesture. ☑

b) The following techniques may be used to enhance therapy for people with aphasia:

- use of volunteers (including family or staff) trained in supported conversation techniques; **(Level II, Ref 207)**

- computer-based therapy programs. **(Level II, Ref 208)**

c) People with aphasia may be considered for group therapy. **(Level II, Ref 206)**

d) Until clinical safety is proven and benefits clearly outweigh any harms, the routine use of the following interventions for aphasia are <u>not</u> recommended:
- Piracetam; **(Level I, Ref 211)**
- other pharmacological interventions. ☑

e) Aphasia therapy should be commenced as early as possible following a stroke. ☑

f) People with aphasia may benefit from intensive intervention by a speech pathologist. ☑

g) People with severe aphasia may benefit from augmentative and alternative communication devices used in functional activities. ☑

3.6.2 Dyspraxia of speech

a) Interventions for the treatment of dyspraxia of speech may include modelling, visual cueing, integral stimulation and articulatory placement cueing. **(Level III-3, Ref 217)**

b) People with severe apraxia of speech may benefit from augmentative and alternative communication devices used in functional activities. ☑

3.6.3 Dysarthria

a) Interventions for the treatment of dysarthria may include:

- Biofeedback or a voice amplifier to change intensity and increase loudness; **(Level IV, Ref 221)**

- A palatal lift to compensate for velopharyngeal incompetency; **(Level IV, Ref 223-225)**

- The use of strategies such as decreased rate, overarticulation or gesture; ☑

- Oral musculature exercises. ☑

b) People with severe dysarthria may benefit from augmentative and alternative communication devices used in functional activities. ☑

3.7 DYSPHAGIA

a) Compensatory strategies such as positioning, therapeutic manoeuvres or modification of food and fluids to facilitate safe swallowing may be provided for people with dysphagia. **(Level IV, Ref 228)**

b) One or more of the following methods may be provided to facilitate resolution of dysphagia:

- "Shaker" therapy targeting specific muscle groups; **(Level II, Ref 229)**

- Thermo-tactile stimulation; **(Level II, Ref 232)**

- Electrical stimulation. **(Level III-3, Ref 230)**

3.8 HYDRATION AND NUTRITION

a) Fluid supplementation by appropriate methods should used to treat or prevent dehydration. **(Level I, Ref 226, 240, 241)**

b) Nutritional supplementation should be offered to people whose nutritional status is poor or deteriorating. **(Level I, Ref 242)**

c) Early enteral tube feeding via a nasogastric tube may be used for people who require alternative feeding methods as a consequence of dysphagia. **(Level II, Ref 244)**

d) NG rather than PEG feeding should be used routinely during the first month post-stroke for people who do not recover a functional swallow. **(Level II, Ref 244)**

e) Decisions regarding long-term enteral feeding for people who do not recover a functional swallow should be made in consultation with the person with stroke and the family. ☑

f) If a decision is taken for long-term enteral feeding, a PEG or similar permanent feeding tube should be used. ☑

g) People with stroke should be monitored to prevent dehydration. ☑

h) People who are at risk of malnutrition, including those with dysphagia, should be referred to a dietitian for assessment and management. ☑

3.9 MOOD

a) Routine use of pharmacological therapy to prevent post-stroke depression is not currently recommended. **(Level I, Ref 245)**

b) Psychological interventions may be provided to improve mood for people without depression however it is unclear if such interventions prevent depression. **(Level II, Ref 245)**

c) Antidepressants and/or psychological interventions may be provided for people with depression or emotional lability. **(Level I, Ref 246, 247)**

d) Cognitive behaviour therapy and/or antidepressants may be used for people with anxiety disorders. ☑

e) ECT may be considered in major, drug-resistant depression following stroke. ☑

3.10 CONTINENCE

3.10.1 Bladder function

a) All people with urinary dysfunction should be managed using an organised, functional approach to rehabilitation. **(Level II, Ref 252)**

b) For people with urinary retention:

- The routine use of indwelling catheters is not recommended. However if urinary retention is severe, then intermittent catheterisation should be used to assist bladder emptying. ☑

- If using intermittent catheterisation, then a closed catheterisation technique should be used. ☑ **(Level II, Ref 260)**

c) For people with urge incontinence:

- A prompted or scheduled voiding regime program, bladder retraining and anticholinergic drugs should be considered. ☑

- If continence is unachievable, containment aids may assist with social continence. ☑

d) For people with functional incontinence, a whole-team approach is recommended. ☑

e) If incontinence persists then further tests should be undertaken. ☑

3.10.2 Bowel function

a) For those with bowel dysfunction, an appropriate assessment (including a rectal examination) and targeted education should be provided. **(Level II, Ref 262)**

b) Bowel training may be used for people who have bowel dysfunction. **(Level III-3, Ref 263, 264)**

c) If continence is unachievable, containment aids may assist with social continence. ☑

3.11 MEDICAL

3.11.1 Pain

Amitriptyline should be preferred over carbamazepine, however either may be considered when treating people with central post-stroke pain (CPSP). **(Level II, Ref 266)**

3.11.2 Deep vein thrombosis (DVT) and pulmonary embolism (PE)

a) Antiplatelet therapy should be used for people with ischaemic stroke to prevent DVT/PE. **(Level I, Ref 279)**

b) The following interventions may be used with caution (taking into account the risks and benefits) for selected people at high risk of DVT/PE (ie, history of DVT/PE, morbid obesity or known prothrombotic tendency):

- heparin or low molecular weight heparin in prophylactic doses; **(Level I, Ref 282, 283; Level II, Ref 280)**

- thigh-length antithrombotic stockings. **(Level I, Ref 285, 286)**

3.11.3 Pyrexia

a) People with fever should be investigated to identify the source (eg, infection of urinary tract, respiratory tract, skin, intravenous site). ☑

b) Antipyretic therapy, comprising regular paracetamol and/or physical cooling measures, should be used routinely where fever occurs. ☑

3.11.4 Seizures

Anti-convulsant medication may be used for people with recurrent seizures. **(Level I, Ref 291-293)**

3.11.5 Sleep apnoea

For people with sleep apnoea after stroke:

- CPAP should be considered as the first line treatment. **(Level I, Ref 297; Level II, Ref 298, 299)**

- If the person is unable or unwilling to use CPAP, then oral appliances or postural therapy may be considered. ☑

3.12 SECONDARY PREVENTION

3.12.1 Antiplatelet therapy

Antiplatelet therapy in the form of aspirin, or clopidogrel, or a combination of low dose aspirin and modified release dipyridamole, should be prescribed to all people with ischaemic stroke who are not prescribed anticoagulation therapy. **(Level I, Ref 306)**

3.12.2 Anticoagulation

a) Anticoagulation therapy for long-term secondary prevention should be used in all people with ischaemic stroke or TIA who have documented atrial fibrillation, cardioembolic stroke from valvular heart disease, or recent myocardial infarction, unless a contraindication exists. **(Level I, Ref 310, 311)**

b) Anticoagulation should not be started for 7-14 days after a disabling ischaemic stroke, to minimise the risk of cerebral haemorrhage. ☑

3.12.3 Blood pressure lowering therapy

a) All people after stroke or TIA, whether normotensive or hypertensive, should receive blood pressure lowering advice or drug therapy, unless contraindicated by symptomatic hypotension. **(Level I, Ref 315)**

b) Commencement of new blood pressure lowering therapy should generally be delayed until the person with stroke is clinically stable. ☑

3.12.4 Cholesterol

a) Therapy with a statin should be considered for people with a total cholesterol level >3.5 mmol/L following ischaemic stroke. **(Level II, Ref 320)**

b) People with high cholesterol levels should be considered for dietetic referral for nutritional review and counselling. ☑

3.12.5 Behaviour change

a) Every person with stroke should be assessed and informed of their risk factors for a further stroke and possible strategies to modify identified risk factors. The risk factors and interventions include:

- smoking cessation: nicotine replacement therapy and behavioural therapy should be used; **(Level I, Ref 326-329)**

- improved diet: a diet that is low in fat (especially saturated fat) and sodium, but high in fruit and vegetables should be consumed. Potassium supplements may be used; **(Level I, Ref 321, 336, 337, 343, 347; Level II, Ref 322, 323, 339-342)**

- increase regular exercise; ☑

- avoidance of excessive alcohol. ☑

b) Interventions should be individualised and may be delivered using behavioural techniques (eg, counselling) via a group or on a one-to-one basis. **(Level I, Ref 326, 328, 330)**

3.12.6 Concordance with medication

Interventions to promote adherence to medication regimes are often complex and may include one or more of the following:

- information, reminders, self-monitoring, reinforcement, counselling, family therapy; **(Level I, Ref 349, 351)**

- reduction in the number of daily doses; **(Level I, Ref 349, 350)**

- multi-compartment medication compliance device; ☑

- specific aids to counter stroke-related deficits (physical or cognitive). ☑

3.13   COMPLEMENTARY MEDICINE AND ALTERNATIVE THERAPIES

a) Until clinical safety is proven and any benefits clearly outweigh harms, the routine use of the following complementary and alternative therapies are not recommended in stroke rehabilitation:
- Acupuncture; **(Level I, Ref 353, 354)**

- Reiki therapy; **(Level II, Ref 355)**

- Other alternative therapies. ☑

b) Health professionals should be aware of different forms of complementary and alternative therapies and be available to discuss these with stroke survivors and their families. ☑

3.14 PALLIATION AND DEATH

a) Health professionals who are trained in communication associated with palliative care should be involved in the care of people with stroke who are dying and with their families. ☑

b) People with stroke who are dying, and their families, should have care that is consistent with the principles and philosophies of palliative care. ☑

4. LIVING WITH STROKE

4.1 ACTIVITY AND PARTICIPATION IN THE COMMUNITY

4.1.1 Self-management

a) People with stroke who do not have cognitive impairment should be made aware of the availability of generic self-management programs before discharge from hospital and be supported to access such programs once they have returned to the community. **(Level II, Ref 361-363)**

b) Stroke-specific programs for self-management may be provided to people who require more specialised programs. ☑

c) A collaboratively developed self-management care plan may be used to harness and optimise self-management skills. ☑

4.1.2 ADL and exercise

a) People living in the community who have difficulties with ADL should have access, as appropriate, to therapy services to improve, or prevent deterioration in, ADL. **(Level I, Ref 26)**

b) People who are living in the community more than 6 months after their stroke should have access to interventions to improve fitness and mobility. **(Level II, Ref 60, 121, 369)**

c) People living in the community should be provided with information (eg, alternative transport options, resuming driving, ADL and exercise opportunities/services) to facilitate increased outdoor journeys and therefore greater participation within the community. The information provided should also be supplemented by other simple strategies (eg, encouragement, use of appropriate aids/appliances, approaches to overcoming fear) by an appropriate health professional. **(Level II, Ref 370)**

d) General practitioners should refer to allied health professionals where necessary when undertaking routine medical review of people with stroke. ☑

4.1.3 Driving

a) People with stroke who wish to return to driving may be offered a visual attention retraining program or traditional perceptual training. **(Level II, Ref 184)**

b) The National Guidelines for Driving (Austroads) and relevant state guidelines should be followed for all issues relating to driving following a stroke. ☑

c) People with stroke who wish to return to driving should be offered an opportunity to undertake an occupational therapy driving assessment, unless there are medical contraindications. ☑

4.1.4 Leisure

Targeted occupational therapy may be used to increase participation in leisure activities. **(Level I, Ref 181)**

4.1.5 Return to work

People with stroke who wish to work should be offered assessment and assistance to resume or take up work. ☑

4.1.6 Sexuality

a) People with stroke and their carers should be offered:

- the opportunity to discuss issues relating to sexuality with an appropriate health professional; ☑
- written information addressing issues relating to sexuality post-stroke. ☑

b) Any interventions should address psychosocial aspects as well as physical function. ☑

4.2 SUPPORT

4.2.1 Peer support

Stroke survivors should be provided with information about the availability and potential benefits of a local stroke support group and/or other sources of peer support prior to discharge from the hospital. ☑

4.2.2 Counselling

Counselling services should be made available to all stroke survivors and their families and may take the form of:

- an active educational counselling approach; **(Level I, Ref 53)**
- information supplemented by family counselling; **(Level II, Ref 56)**
- a problem-solving counselling approach. **(Level II, Ref 392)**

4.2.3 Carer support

a) Carers of stroke survivors should be provided with:

- information about the availability and potential benefits of local stroke support groups, at or before the person's return to the community; **(Level II, Ref 394; Level III-2, Ref 393)**
- support by health professionals starting early after the person's stroke. ☑

b) Carers of stroke survivors should be offered services to support them after the person's return to the community. Such services should use a problem-solving or educational-counselling approach.
(Level II, Ref 394-396; Level III-2, Ref 393)

INTRODUCTION

In Australia, stroke affects approximately 48,000 people per year.[2] Around half of these people are over the age of 75 and as the population ages, the number of strokes occurring each year is expected to increase. The burden of stroke goes beyond the measured cost in Australia of $1.3 billion per annum.[3] The impact on individuals, families and the workforce is substantial. Of those who have a stroke, approximately a third will die within the first 12 months, a third will make a complete recovery and a third will be left with a disability that causes some reliance on others for assistance with activities of daily living. Many stroke survivors require rehabilitation and ongoing support in the community.

In discussing the impact of stroke, these guidelines use the World Health Organisation's International Classification of Functioning, Disability and Health,[4] in which a person's functioning or disability is conceived as a dynamic interaction between health conditions and environmental and personal factors. Disability is the umbrella term for any or all of:

- an impairment of body structure or function;
- a limitation in activities; or
- a restriction in participation.

This framework enables the description of human functioning on a continuum, not just at the extremes.[4]

Within this document different sections relate to each aspect of this classification. For example, sections that focus on the impairment level include strength, spasticity, contracture, attention, neglect, dysphagia and seizures. Sections describing activity limitation include activities of daily living (ADL), standing up from a chair and walking. Examples of sections describing restriction in participation include leisure, return to work and peer support.

Setting the scene: a consumer perspective

The process of developing the *Clinical Guidelines for Stroke Rehabilitation and Recovery* has importantly included input and advice from stroke survivors. Their first-hand experience of stroke and stroke care can contribute much to our understanding of what we can do that will make a difference to the experience of people as they are recovering from a stroke.

In particular, the stroke survivors who were consultants to these guidelines highlighted the shock, anxiety and confusion that can be experienced by those with stroke and their family, and the subsequent feelings of despair. In view of this they offer the following advice to health professionals:

- Avoid technical language - clear communication using everyday language is vital.
- Provide support and encouragement to those with stroke and their family throughout the recovery process, including access to peer support.
- Provide information and care in a manner that allows those with stroke to foster hope for the future.

Rehabilitation

Rehabilitation is a proactive, person-centred and goal-oriented process that begins the first day after stroke. Its aim is to improve function and/or prevent deterioration of function, and to bring about the highest possible level of independence - physically, psychologically, socially and financially. Rehabilitation is concerned not only with physical recovery but also with reintegration of the person into the community. Furthermore, rehabilitation is a process that aims to maximise self-determination and optimise choices for those with stroke.

The central aspect of rehabilitation is the provision of a coordinated program by a specialised, interdisciplinary team of health professionals. This rehabilitation team involves combined and coordinated

use of medical, nursing and allied health skills, along with social, educational and vocational services, to provide individual assessment, treatment, regular review, discharge planning and follow-up.

While the interdisciplinary team recognises the specialist contribution of each discipline, generally no mention has been made of their specific roles throughout the document. It is the intention of the working group that this document highlights the team approach to rehabilitation and to focus on the interventions themselves rather than which member of the team should be involved. However, the following is provided as a summary of the main aspects of members of the team:

- **Doctors** coordinate comprehensive medical care (including consulting other medical specialists as needed), assist stroke survivors and their families in making informed choices and re-adjustments, and prevent complications and recurrent stroke. The doctor is often responsible for making sure the best available resources and services are offered to those affected by stroke. An inpatient medical team (commonly a specialist [eg. in neurology, rehabilitation or geriatrics], registrar and junior medical officers) often work in conjunction with a general practitioner to provide care in hospital and in the community.

- **Nurses** perform comprehensive nursing assessments and help manage aspects of patient care including observations, swallowing, mobility, continence, skin integrity, pain control and prevention of complications. Nurses also provide patient centred care and assist coordination of care, discharge planning, support and education. Nurses can provide specialist stroke care in the acute, rehabilitation and community context as well as deliver palliative and terminal nursing care.

- **Physiotherapists** address recovery of sensorimotor function in the upper and lower limb, and functional mobility ranging from bed transfers to community ambulation. They also assist in the treatment of musculoskeletal problems or complications (eg, shoulder pain) and respiratory problems.

- **Occupational therapists** work with clients to optimise participation and independence for all daily occupations (including self-care, leisure and productivity). This is achieved by either working directly to address recovery of function (including motor, cognitive or perceptual function), or by adapting the task or the environment.

- **Speech pathologists** work with people who have difficulties with communication, cognition, and swallowing, and also train carers to facilitate activity and participation.

- **Dietitians** work with those who need modified diets or alternative feeding as well as those at risk of, or suffering from malnutrition. They also provide education and counselling for risk factor modification and management of co-morbidities.

- **Social workers** provide support, counselling and information to those with stroke and their families regarding options to optimise physical, emotional, social and spiritual well-being. They also assist in organising community resources.

The team may be expanded to include **psychologists and/or neuropsychologists, psychiatrists, pharmacists, ophthalmologists, orthoptists, podiatrists, orthotists, and therapy assistants as well as general ward staff.** The person with stroke and their carer or other family members should also be acknowledged as an important team member.

Australian Clinical Guidelines for Stroke Management

Scope of the Guidelines

The Australian Clinical Guidelines for Stroke Management have been developed as two documents.

The first document, *Clinical Guidelines for Acute Stroke Management*, relates to acute care (considered to be the first seven days) and was released in September 2003. It is available at www.strokefoundation.com.au or from the National Stroke Foundation, and addresses assessment of

impairment and early management decisions.

This second document, *Clinical Guidelines for Stroke Rehabilitation and Recovery,* encompasses all care after the acute phase and presents evidence-based recommendations for rehabilitation interventions and care in the community for stroke survivors and their families. These Guidelines are intended for use by health professionals and policy makers who plan, organise and deliver care for people with stroke during rehabilitation and long term recovery.

The *Clinical Guidelines for Stroke Rehabilitation and Recovery* should be used in conjunction with the *Clinical Guidelines for Acute Stroke Management*, to underpin high quality, integrated stroke care across the continuum of care.

Focus of the Guidelines

The *Clinical Guidelines for Stroke Rehabilitation and Recovery* are based on the assumption that timely assessment by an appropriate member of the team has been conducted previously, in the acute phase. Assessment is specifically noted only where it occurs primarily after the acute phase, or where it requires particular emphasis. Hence the focus of this document is on the **interventions** used for stroke rehabilitation and recovery.

While stroke is discussed broadly in this document, it is recognised that there are different types of stroke. It is noted that haemorrhagic stroke (particularly subarachnoid haemorrhage) is often excluded from some studies. Furthermore the prevalence of ischaemic stroke has meant that the evidence is predominantly derived from, and focussed on, this type of stroke.

Development of the Guidelines

The *Clinical Guidelines for Stroke Rehabilitation and Recovery* have been developed according to processes prescribed by the National Health and Medical Research Council (NHMRC) under the direction of an interdisciplinary Expert Working Group (EWG) (see Appendix 1). Consultation from other individuals and organisations was also included in the development process in line with NHMRC standards. Details about the development methodology, consultation process, and priorities for further research are outlined in Appendix 2.

Consumer versions of the Guidelines

Consumer versions of the *Clinical Guidelines for Acute Stroke Management* and *Clinical Guidelines for Stroke Rehabilitation and Recovery* documents have been developed through partnerships between the National Stroke Foundation and State Stroke Associations throughout Australia. Given the different needs of stroke survivors and their families at different stages of recovery, the two Clinical Guideline documents are presented as three books for consumers. These books are available through the National Stroke Foundation and State Stroke Associations.

Revision of the Guidelines

The National Stroke Foundation aims to review and update the *Clinical Guidelines for Stroke Rehabilitation and Recovery* by 2010 and will work with relevant bodies (including the Stroke Society of Australasia, Australasian Stroke Unit Network, State Stroke Associations and members of the EWG) to achieve this. It is planned that the two volumes - the *Clinical Guidelines for Acute Stroke Management* and the *Clinical Guidelines for Stroke Rehabilitation and Recovery* - will be brought together in one volume as part of the review process.

Using the Guidelines

The primary goal in developing guidelines is to help health care workers improve the quality and effectiveness of the care they provide. The guidelines should not be seen as an inflexible recipe for stroke

care; rather, they provide a framework that is based on the best available evidence that can be adapted to local needs, resources and individual circumstances.

Strategies planned to encourage the transfer of evidence into clinical practice may include:

- endorsement by professional and lay organisations (including the NHMRC);
- distribution via existing networks, key professional and lay organisations, publications in professional journals, and electronic access via the internet;
- educational meetings / conferences;
- use of local opinion leaders;
- audit and feedback.

In considering implementation of these Guidelines at a local level, health professionals are encouraged to identify the barriers and facilitators to evidence-based care within their environment to determine the best strategy for local needs. Further information regarding implementation is discussed in Appendix 2.

Implications for service equity

In addition to providing an avenue to improve the health outcomes for people with stroke, these guidelines provide an opportunity to discuss and address the difficulty of equity in health. The impact of stroke is dependant on a number of socioeconomic characteristics including gender, culture/ethnicity, education, occupation, income, location of residence, and lifestyle. It is known, for example, that the incidence of stroke varies depending on different socioeconomic characteristics.[5-12] One of these studies found access to some services during hospital care (eg, physiotherapy, occupational therapy and speech pathology) differed depending on socioeconomic factors, even though there was universal access to health care.[11] However, few studies were identified during the development process regarding the impact of interventions for stroke rehabilitation and recovery on socioeconomic factors.

Access is one of the major barriers to equitable services and is influenced by geography, culture and spiritual beliefs. Particular challenges are therefore noted for rural and remote services where resources, particularly human resources, may be limited. Whilst it is recognised that residents in rural and remote areas may have difficulty accessing health care as readily as their urban counterparts, there are no specific studies investigating differences in stroke interventions in rural and remote areas. Therefore, the aim in all cases must be to develop local solutions that ensure optimal practice and quality outcomes that are based on the best available evidence using the available resources.

Careful consideration is also required for the differing needs of people with stroke. Appropriate resources may be required in a variety of languages and formats for people with stroke and their carers. The particular needs of people from Aboriginal and Torres Strait Islander and those from Culturally and Linguistically Diverse backgrounds may also require special attention and resources. Other groups of people (eg, younger people with stroke) may also have specific needs that require particular resources or application of these guidelines.

The following principles, relating to the *Clinical Guidelines for Stroke Rehabilitation and Recovery*, are essential to the planning and delivery of rehabilitation and recovery services and should be considered when implementing the evidence in a local setting:

- focus on and respect for the individual needs of each person with stroke, with care tailored specifically to those needs;
- inclusion of the person with stroke and, where relevant, the family in the interdisciplinary team and, in particular, in setting realistic and achievable rehabilitation goals in order to facilitate informed decision-making, empowerment, autonomy and person-centred care;

- recognition that the person with stroke is part of a family and a community, with all the demands, needs and strengths that this entails;

- respect for cultural and other differences and the different service delivery needs that these may entail. Care, and particularly information, should be provided using an appropriate language and format;

- equity of access, across geographic, cultural, linguistic and socioeconomic groups, to the full range of rehabilitation services;

- continuity of care across acute, rehabilitation and community services, to enable each person with stroke to move smoothly from one to another.

Specific discussion has also been included within the document where relevant (see sections 1.1.1, 1.2.1,1.2.2, 2.7, 4.2.3).

Format

These guidelines are organised in five sections to address issues identified as important in stroke rehabilitation and recovery:

- **Organisation of care:** This section addresses the organisation of services for those who have had a stroke and emphasises the importance of a coordinated interdisciplinary team. The section aims to be useful in guiding clinical decisions about the structure of services and may be used by those who plan or organise care.

- **Discharge planning, transfer of care and coordinated community care:** This addresses the planning of discharge from hospital to the community and emphasises the importance of seamless care across all settings and the need to involve the stroke survivor and carers in a collaborative care planning process. The aim is to assist in clinical decisions regarding discharge planning and again, the section may be useful for those who plan or organise care.

- **Management of the consequences of stroke:** This section addresses the management of common impairments or complications of stroke, to guide clinical decisions for an individual person with stroke.

- **Living with stroke:** This section addresses activity and participation in the community and the need for support throughout recovery. It is useful for guiding decisions about services and interventions that support long-term recovery after stroke.

- **Resource implications:** This section outlines the economic evidence for aspects of stroke recovery and rehabilitation. The section aims to be useful in guiding decisions about the structure of services and may be used by those who plan or organise care.

The introduction to each topic provides a summary of the current evidence. The guidelines are then presented in a box and are summarised according to the National Health and Medical Research Council (NHMRC) levels of evidence.[1]

Designation of Levels of Evidence – National Health and Medical Research Council	
I	Evidence obtained from a systematic review of all relevant randomised controlled trials.
II	Evidence obtained from at least one properly designed randomised controlled trial.
III – 1	Evidence obtained from well-designed pseudo-randomised controlled trials (alternate allocation or some other method).
III – 2	Evidence obtained from comparative studies with concurrent controls and allocation randomised (cohort studies), case-control studies, or interrupted time-series with group.
III – 3	Evidence obtained from comparative studies with historical control, two or more studies, or interrupted time series without a parallel control group.
IV	Evidence obtained from case series, either post-test or pre-test and post-test.

Clinical practice points	
☑	Recommended best practise based on clinical experience and expert opinion.

The level of the evidence highlights the methodology of the studies contributing to the evidence that underpins the recommendations. However this does not always translate into an equivalent strength of the recommendation for two reasons: studies vary in quality and different studies may produce conflicting results. The EWG has therefore used 'may' or 'should' to indicate the strength of the recommendation. 'May' is used when the evidence is not clear cut or when there is a wide range of opinions relating to a specific intervention; 'should' is used when there is clear outcomes of all relevant research or a narrow range of opinion. Key references for each guideline are also included. Where no level I, II, III or IV evidence was available but there was sufficient consensus of the EWG, clinical practice points have been provided.

CHAPTER 1: ORGANISATION OF CARE

The way in which stroke rehabilitation is organised and delivered depends on the services available and the needs of the stroke survivor and his/her family. Some people will receive rehabilitation as an inpatient in hospital. Others, living at home, will participate in a centre-based rehabilitation program and attend therapy sessions in an outpatient setting or at a day hospital. Some will receive community-based or domiciliary rehabilitation provided in the home or residential facility.

1.1 Hospital care

1.1.1 Stroke unit care

The majority of people with stroke will be admitted to hospital for assessment and treatment. One systematic review identified 24 trials and found stroke unit care significantly reduced death and disability after stroke compared with conventional care in general wards.[14] Care provided on stroke units is also more likely to include regular delivery of key processes of care such as those outlined in these guidelines.[15]

Models of stroke care described in the literature include:

- *acute stroke ward*: acute unit in a discrete ward;

- *comprehensive stroke unit care*: combined acute and rehabilitation unit in a discrete ward;

- *stroke rehabilitation unit*: a discrete rehabilitation unit for people with stroke, who are transferred from acute care 1-2 weeks post stroke;

- *mixed rehabilitation ward*: rehabilitation provided on a ward managing a general caseload.

In Australia, most stroke units established to date have a primary focus on early (acute) rehabilitation, with varying degrees of intensity and follow-up. However the evidence for stroke unit care is clearest for units that can provide several weeks of rehabilitation (on a comprehensive stroke unit or stroke rehabilitation unit).[14,16]

The stroke units that have been shown to deliver highly effective stroke care share a number of characteristics, including:

- a coordinated interdisciplinary team;

- staff who have a special interest 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 (eg, family conferences);

- active encouragement of people with stroke and their carers and/or family members to be involved in the rehabilitation process.[16]

In some areas, the number of people with stroke requiring care is not high enough to support a dedicated stroke unit and maintain staff expertise. Other models of care may be considered in these circumstances, with service delivery based, as much as possible, on evidence-based care.[17] The potential risks and benefits of a transfer to the nearest stroke unit need to be balanced against the risks and benefits of less specialised care closer to home. The needs and wishes of those with stroke and their families should also be considered.

Many aspects of good stroke unit care, such as an interdisciplinary team, starting rehabilitation from day one, and regular team meetings, can be introduced to hospitals too small to support a stroke unit. Small hospitals can also identify ways to ensure delivery of evidence based care in the absence of a stroke unit.

1.1.1 Stroke unit care	
a) All people admitted to hospital with stroke and who require rehabilitation should be treated in a comprehensive or rehabilitation stroke unit with an interdisciplinary team.	Level I Ref[14]
b) If no stroke unit is available, consideration should be given to transferring the person with stroke (when medically stable) to the nearest stroke unit, or a hospital that most closely meets the criteria for stroke unit care.	☑

1.1.2 Inpatient integrated care pathways

Clinical pathways (also known as care pathways, or critical pathways) are clinical resources that aim to support the delivery of timely, coordinated, evidence-based care. The definition, structure and detail contained within the pathway may vary from setting to setting.

A robust systematic review on the use of care pathways found positive and negative effects.[18] Care pathways have been found to reduce some complications (eg, urinary infections and readmission rates), and increase the use of neuroimaging.[18] However, people have been found to be more dependant on discharge when care pathways are used, and reported quality of life and satisfaction with hospital care was lower.[18] These results were obtained from a systematic review of RCTs, quasi RCTs and non randomised studies. The review concluded that there is currently insufficient evidence to support the routine use of care pathways.[18]

Limitations identified with the use of clinical pathways in stroke care are thought to arise from the heterogeneity of stroke as well as the fact that coordination of care (a key aim in the implementation of a clinical pathway) is implicit in stroke unit care. Thus examining the effectiveness of a care pathway within a stroke unit does not allow for an evaluation of potential benefits that might be more apparent in a setting without organised care or where staff are frequently changing. Until further research is available it would seem reasonable to conclude that if care pathways are used they should be flexible enough to meet the various needs of stroke.

1.1.2 Inpatient integrated care pathways	
There is currently insufficient evidence to support recommendations about routine use of care pathways. If used, care pathways should be flexible enough to meet the heterogeneous needs of people with stroke.	☑

1.1.3 Inpatient stroke care coordinator

An inpatient stroke care coordinator is one of a number of strategies used to facilitate a coordinated approach to care. The coordinator is generally a member of the team and the role is often performed in addition to other clinical or management responsibilities. Exponents of this model suggest that a stroke coordinator is particularly useful for coordinating services and facilitating the involvement of the person with stroke and the carer in care planning, including planning for discharge or transfer of care.[19,20] Currently, there are no studies on the use of a stroke care coordinator.

1.1.3 Inpatient stroke care coordinator	
A stroke coordinator may be used to foster coordination of services and assist in discharge planning.	☑

1.2 Rehabilitation in the community

Often people with stroke require further rehabilitation once they return to the community, in addition to the rehabilitation that they received while in hospital. This section outlines the evidence for models of care for people who are living in the community. It excludes the model of "hospital at home" as this is a model of providing care while avoiding inpatient hospital admission.

1.2.1 Early supported discharge

Early supported discharge (ESD) is a model that links inpatient care with community services. Rehabilitation services are provided in the community at a time when the stroke survivor would normally still be an inpatient. ESD enables a stroke survivor to go home earlier than otherwise possible, with the support of rehabilitation and nursing services in the home. A key argument for ESD is that the home provides an optimum rehabilitation environment, since the goal of rehabilitation is to establish skills that are appropriate to the home setting. Stroke survivors have reported greater satisfaction following ESD than conventional care.[21,22]

Meta-analysis have found that ESD services reduce the inpatient length of stay and adverse events (eg, readmission rates), while increasing the likelihood of being independent and living at home.[22-25] Risks relating to carer strain might be expected with ESD, but there is too little evidence to demonstrate whether or not this is the case.[22,25] Reviews have noted that ESD predominantly involves people with mild to moderate disability and thus this service should target this group of stroke survivors.[22,23]

To work effectively, ESD services must have similar elements to those of organised stroke teams (see characteristics of stroke units, section 1.1.1). Thus ESD should only be considered where there are adequate community services for rehabilitation and carer support.

1.2.1 Early supported discharge	
Where comprehensive interdisciplinary community rehabilitation services and carer support services are available, early supported discharge services may be provided for people with mild to moderate disability.	Level 1 Ref[22-25]

1.2.2 Community rehabilitation

Generally there are two models for rehabilitation in the community:

- centre-based therapy, provided in the hospital or in a community facility such as community centre, and including rehabilitation for those attending on a full-day basis or as an outpatient;
- community-based or domiciliary rehabilitation provided within the home or residential facility.

One systematic review identified a number of robust studies and found that community rehabilitation has a small but worthwhile effect.[26] However the evidence suggests that no one model of comprehensive services is more effective than other models.[27-31] Factors to consider include practical considerations (eg, frail elderly people who may be unable to access transport), and local needs and resources (eg, staff expertise, local transport) and the availability or wishes of the carer.

1.2.2 Community rehabilitation	
Rehabilitation for people with stroke in the community is equally effective if delivered in the hospital via outpatients or day hospital, or in the community.	Level 1 Ref[26,27,30]

1.3 Long-term care

1.3.1 Discharge destination

Many stroke survivors require long-term residential care. One systematic review comparing institutional care versus at-home care (foster care provided in the community) for functionally dependent people found only one relevant trial, and that was not specific to stroke. No conclusion could be reached regarding the effect of living situation/residential setting on function, mental status, and attitudes to perceived health, life satisfaction and mortality.[32]

Information regarding residential care options and alternative support available for care at home should be provided to those with stroke and their family. Any decision regarding institutional care should then take into consideration the wishes of the person with stroke and the family.

1.3.1 Discharge destination	
Decisions about discharge destination (home vs residential care) should be made in the context of availability of supportive services and the wishes of the stroke survivor and carer.	☑

1.3.2 Respite care

Respite care can be defined as any service or group of services designed to provide temporary relief and/or rest for caregivers. Providing care for someone with stroke is often a challenge both physically and emotionally and often the main burden lies with the carer. Evidence on respite care is lacking. There are no good stroke-specific studies. A good systematic review of respite care for people with dementia and their carers found no quality studies to draw conclusions on the benefits of respite care for caregivers.[33] Consumers indicate, however, that access to respite care is vital for the health of both carers and people with stroke. (See section 4.2.2: Carer support)

1.3.2 Respite care	
People with stroke and their carers should have access to respite care. This may be provided in their own home or an institution.	☑

1.3.3 Ongoing review

Usually all those with stroke will have a specialist medical review (to assess progress and need for additional support or therapy services) in the first few months following discharge from hospital. However, many issues or difficulties may not become evident for a considerable time following a stroke. Access to rehabilitation later in recovery may be needed to prevent deterioration or to realise potential for improvement, especially for those in residential facilities who made little progress earlier due to co-existing illness.[34] There is evidence from a number of robust RCTs to show that gains can be made in the months and years after stroke (see section 4.1.2: ADL and exercise), and some consumers place great emphasis on continued rehabilitation. However there are no studies assessing the process of review and access to "top-up therapy".

Review may consider maintenance of function and/or the person's ability to participate in a rehabilitation program. A checklist, including physical, psychological and social factors, may be useful for primary health workers in the community and in residential care settings, and may be incorporated into ongoing monitoring and secondary prevention.[34]

1.3.3 Ongoing review	
People with stroke should have regular and ongoing review by a member of a stroke team, including at least one specialist medical review following discharge.	☑

CHAPTER 2: DISCHARGE PLANNING, TRANSFER OF CARE AND INTEGRATED COMMUNITY CARE

Good discharge planning is crucial for effective and efficient hospital use and successful reintegration into the community.[35] It is an integral part of rehabilitation assessment and goal setting, and is critical in maximising independence and participation, minimising social isolation and its negative effects, and ensuring that carer needs are addressed. While it is known that the transfer of responsibility for management from inpatient to the community can be difficult, insufficient attention and resources are often provided for this process.[36-38]

Discharge planning relies on effective communication between team members, the person with stroke, family members, and community service providers including general practitioners. Often discharge is staggered through the use of transitional or independent living units and day or weekend leave. This process can allow adjustments to take place as well as identifying potential issues that need to be addressed.

2.1 Family and team meetings

Ongoing communication between the stroke team and family members, with early family involvement, is a key element of an organised stroke service.[16] However, this evidence relates to the total stroke unit "package" rather than the individual elements of that package, so while there is no direct evidence on good communication *per se*, it is supported indirectly by strong evidence.

Communication is established through regular meetings to discuss management and plan discharge, and through encouraging carers and other family members to become involved in the rehabilitation process, including goal setting.

2.1 Family and team meetings	
The stroke team should meet regularly with the person with stroke and the family to involve them in management, goal setting and planning for discharge.	☑

2.2 Pre-discharge needs assessment

A pre and/or post-discharge needs assessment examines, for example, the social, emotional, physical and financial needs of the person with stroke and his/her family. Assessment of discharge needs should start as soon as possible after admission. The assessment should take into account pre-existing strengths and weaknesses (cognitive and physical) in order to build on strengths and minimise any potential functional decline (see section 2.3: Care plans). Any cognitive or behavioural issues identified should be discussed and management incorporated into any discharge plan. The circumstances and capacity of the carer and family should also be explored to identify any community care supports needed. The needs assessment often includes a home visit that enables collaborative assessment of the home environment and the person's ability to perform meaningful activities within that environment. At this time, the need for home modifications or assistive equipment may be determined, and appropriate modifications and/or assistive equipment recommended.

There is no stroke-specific evidence regarding the effectiveness of this approach, and very little evidence in other populations.

2.2 Pre-discharge needs assessment	
a) Before discharge, people with stroke and their carers should have the opportunity to identify and discuss their post-discharge needs (eg. physical, emotional, social and financial) with the interdisciplinary team.	☑
b) Before discharge (or home trial) from inpatient care and, where appropriate, a home assessment should be carried out to ensure safety and community access. Optimal independence will be facilitated through home modification and adaptive equipment, as required.	☑

2.3 Care plans

A care plan is normally completed prior to discharge and identifies appropriate management strategies to guide care after the stroke survivor returns to the community. Care plans are based on the needs identified in the pre-discharge assessment, and are useful in building self-management strategies for those with stroke. All team members, including the person with stroke, the family, the general practitioner, and community-based service providers are involved in developing and documenting an agreed plan that takes into account the complex adjustments needed, especially when changing settings or care. This ensures the active involvement of the person with stroke and the family in the ongoing recovery process.

Evidence for discharge plans (one component of a total care plan) suggested no additional benefit.[39-41] However, care plans are often one component of a complex service delivery (eg, early supported discharge or inpatient integrated pathway). In many of the trials, it is difficult to determine the evidence for this specific component.

2.3 Care plans	
People with stroke, their carers, the general practitioner and community care providers should be involved with the interdisciplinary team in the development of a care plan that outlines care in the community after discharge, including the development of self-management strategies, provision of equipment and support services, and outpatient appointments.	☑

2.4 Carer training

Carers report feeling inadequately trained, poorly informed, and dissatisfied with the extent of support available after discharge.[42] Evidence from a recent, high quality trial suggests that informal carers benefit from undertaking training in a range of activities related to care, including personal care techniques, communication, physical handling and transfers, ongoing prevention and other specific stroke-related problems.[43] Carer education programs are available through Commonwealth Carer Resource Centres in some states and cover such topics as the impact of caring, loss and grief, and self care.

2.4 Carer training	
Relevant members of the interdisciplinary team should provide specific training for carers before the person's discharge home. This should include training, as necessary, in:	
• personal care techniques, communication strategies, physical handling techniques, ongoing prevention and other specific stroke-related problems;	Level II Ref[43]
• safe swallowing and modified diet.	☑

2.5 Liaison with community providers

Poor communication and liaison has been described between staff across different stroke care settings as well as between staff and people with stroke and their families.[37] There is also dissatisfaction regarding communication between community service providers and carers.[37,42] Effective communication regarding previous management and future management plans remains an important part of good stroke care. The family should be provided with appropriate information regarding the details of any community services, possible waiting times, costs and contact details prior to discharge. Good pre-discharge care planning (see section 2.3: Care plans) addresses these communication issues and supports effective transfer of care.

2.5 Liaison with community providers	
The stroke survivor's general practitioner, other primary health professionals and community service providers should be involved in, and informed about, the discharge plans and agreed post-discharge management, as early as possible prior to discharge.	☑

2.6 Post-discharge follow-up

The level of services following discharge from hospital can be poor, and people with stroke and their families often report being dissatisfied with the services provided. [37] A number of follow-up services have been evaluated including:

- social work;[44, 45]
- specialist nurse support;[46]
- the Stroke Transition After Inpatient Care (STAIR) program;[47]
- stroke family care worker;[48]
- mental health worker;[49]
- home visits by physician or physiotherapist;[50] and
- stroke family support organisers.[51,52]

Such services are usually multidimensional and can include emotional and social support, assistance with referral to other services, and the provision of information to people with stroke and their families. The evidence is difficult to interpret and no one service has been shown to be clearly beneficial. A follow up service provided by a physician or physiotherapist resulted in higher function (although not statistically significant) compared to standard aftercare.[50] However methodological limitations of this RCT are noted (ie. different baseline data between groups and small sample size) raising questions about the findings of this particular study. The use of a family support worker/organiser appears to provide small benefits including improved knowledge and/or satisfaction with care for those with stroke and their carer.[48, 51, 52] However no changes in stroke survivor or caregivers general health or function was found.[48, 51, 52] Since the early post-discharge period is consistently noted to be a difficult time, the development of services to cover this time would seem to be important. Post-discharge studies suggest modest advantage in some areas although no clear functional benefits have been found and further studies are needed. However since the early post-discharge period is consistently reported by stroke survivors and their family to be a difficult time, the development of simple and relevant services seem to be important.

2.6 Post-discharge follow-up	
a) Contact with a family support / liaison worker may be considered for carers and stroke survivors in the community to assist with their knowledge and/or satisfaction.	Level II Ref [48,51,52]
b) Stroke survivors and their families should be followed up by a relevant member of the team after their discharge from a formal rehabilitation program.	☑
c) People with stroke and carers should be provided with a contact person (in the hospital or community) for any post-discharge queries.	☑

2.7 General information and education

As noted previously in this chapter, the provision of information and education is particularly important for those with stroke and their families during discharge or transfer of care. However, information and education is critical at all stages of rehabilitation and recovery. Effective communication, education and information sharing should be provided in an appropriate and timely manner and may include general advice about stroke (eg, causes or results of stroke), stages of recovery, therapy-based activities to do once discharged and community support. Such information has been traditionally provided via leaflets, booklets, videos and, more recently, web-based material. More interactive aspects of education may also be used, for example weekly education sessions including group and individual discussions and family meetings.

The evidence for interventions to improve information and education provision, however, is conflicting.[53]

Two systematic reviews concluded that information provided in an educational context (especially an active educational-counselling approach) improves knowledge better than information provided in a booklet or leaflet.[53,54] However it is unclear if increased knowledge about stroke translates into improved recovery and adjustment for people with stroke and their carers.[54] One subsequent trial found an education intervention did not increase knowledge but did reduce anxiety of stroke survivors.[55]

Numerous other trials have assessed interventions to educate people with stroke and their carers or families. In some, the intervention was multifactorial and it is difficult to gauge the effect of education or information provision alone. Trials discussed under other sections, including post-discharge follow-up, counselling, self-management and carer support, are also relevant here. Subsequent high level trials have reported positive benefits for education plus counselling[56] and specific carer training prior to discharge.[43]

The importance of team members being available to talk to people with stroke and their families at different stages of recovery should not be underestimated. Any education needs to be flexible and tailored to meet the individual needs of those involved, especially for those from different cultures and languages. State Stroke Associations and the National Stroke Foundation are able to provide written information including consumer versions of these guidelines and fact sheets.

2.7 General information and education	
All stroke survivors and their families should be provided with timely, up-to-date information in conjunction with opportunities to learn via education from members of the interdisciplinary team and other appropriate community service providers. Simple information provision alone is not effective.	Level I Ref [53,54] & Level II Ref [43,56]

CHAPTER 3: MANAGEMENT OF CONSEQUENCES OF STROKE

This chapter presents the more common consequences and potential complications of stroke. It is concerned with improving outcomes and managing secondary impairments in the sensorimotor and physical domains, as well as supporting activities of daily living, maximising skills in the areas of cognition, visuospatial and perceptual skills, communication and swallowing, and minimising mood disturbances. Good outcomes after stroke also depend on effective management of hydration and nutrition, bowel and bladder function, medical management, and prevention of further stroke. The chapter concludes with consideration of complementary and alternative therapies, and palliation and death.

3.1 Sensorimotor impairments

Improving outcomes

3.1.1 Strength

Weakness is one of the major impairments after stroke.[52] A number of studies have found positive effects of increasing strength after stroke. These include:

- progressive resistance exercises;[57-60]
- electromyographic (EMG) biofeedback when applied in conjunction with conventional therapy; [61,62]
- electrical stimulation;[63-65]
- task-specific training.[58,59]

Increasing strength using these interventions can also have a beneficial effect on activity.[58,59,62,64,66-71] Furthermore, spasticity does not increase as a result of increasing strength.[66,72]

3.1.1 Strength	
One or more of the following interventions should be used for people who have reduced strength:	
• progressive resistance exercises;	Level II Ref[57]
• electromyographic biofeedback in conjunction with conventional therapy;	Level II Ref[61,62]
• electrical stimulation;	Level I Ref[63] Level II Ref[64]
• task-specific training.	Level II Ref[58,59]

3.1.2 Sensation

Studies have found that tactile and kinaesthetic sensation was improved by sensory-specific training[73-75] and sensory-related training designed to facilitate transfer.[76] There is conflicting evidence for the effect of non-specific cutaneous stimulation when used in conjunction with conventional therapy.[77,78] Improvement in sensation may also improve activity.[77]

3.1.2 Sensation	
One or more of the following interventions for increasing tactile and kinaesthetic sensation may be provided for people who have sensory impairments:	
•sensory-specific training;	Level III-2 Ref[74] Level III-3 Ref[73,75]
•sensory-related training;	Level III-2 Ref[76]
•cutaneous electrical stimulation in conjunction with conventional therapy.	Level IV Ref[77]

3.1.3 Spasticity

It is now known that spasticity (ie, hyperactive stretch reflexes) is not a major determinant of activity limitations. Interventions to reduce spasticity may be considered if the level of spasticity interferes with activity or the ability to provide care to the stroke survivor.[79] Studies have found the following:

- Botulinum Toxin A decreased spasticity,[79, 83] and in one study led to concurrent negative loss of muscle strength.[85] However, Botulinum Toxin A did not improve activity.

- Botulinum Toxin A reduced contractures and made caring for the person with stroke easier.[79]

- Botulinum Toxin B had no effect on spasticity.[85]

- Intrathecal baclofen decreased severe spasticity,[86,87] but significant harms such as infection have been reported.[88]

- Vibration brought about immediate decreases in spasticity.[89]

- Dynamic splinting,[90] stretch[91,92] and EMG biofeedback[93] decreased spasticity without harm being reported.

- Electrical stimulation did not decrease spasticity[72] except to enhance the effect of Botulinum Toxin A[94,95] or EMG biofeedback.[93]

- The efficacy of oral anti-spastic medication was marginal at best, and accompanied by high levels of adverse reactions.[96] As such, it is not recommended.

3.1.3 Spasticity	
a) One or more of the following interventions may be provided for people who have moderate to severe spasticity (ie, spasticity that interferes with a stroke survivor's activity or personal care):	
•Botulinum Toxin A;	Level I Ref[79]
•Intrathecal baclofen;	Level I Ref[86] Level II Ref[87]
•Dynamic splinting;	Level III-2 Ref[90]
•Vibration;	Level II Ref[89]
•Stretch;	Level II Ref[91] Level III-2 Ref[92]
•Electromyographic biofeedback;	Level III-2 Ref[93]
b) Interventions to decrease spasticity should not be routinely provided for people who have mild to moderate spasticity (ie, spasticity that does not interfere with a stroke survivor's activity or personal care).	☑

Managing secondary impairments

Management of secondary impairments involves initial efforts at **prevention**. Where this is not successful, management involves strategies to **reduce** impairments. The following sections therefore, present evidence for both prevention and reduction strategies.

3.1.4 Contracture

Contracture results in reduced joint range of motion due to the presence of impairments (eg, weakness or spasticity). Particularly common is loss of shoulder external rotation, forearm supination, wrist and finger extension, ankle dorsiflexion and hip internal rotation. Studies have found the following:

- Prolonged positioning of the shoulder in maximum comfortable external rotation maintained range of motion of this muscle group in one trial (ie, prevented contracture), however no difference was noted for other shoulder muscles.[97] No difference was found for any shoulder muscle groups in another trial with low subject numbers.[98]

- There was too few quality studies in one systematic review to draw conclusions on the effect of hand splinting alone.[99] However the only higher level trial (out of 19) included in this review found no effect on range of motion of the wrist after additional nightly splinting compared with prolonged upper limb positioning alone.[100]

- Use of overhead pulleys to maintain range of motion increased shoulder pain.[101]

- Electrical stimulation of the forearm muscles increased range of motion at the wrist, however the effects were only short term - ie. benefits occurred while treatment was applied but quickly reduced when treatment ceased.[102]

- A systematic review of casting (ie, casting at the ankle, knee, wrist or elbow which may have been one cast or a series of casts) in people with traumatic brain injury or stroke found casting improved range of motion.[103] However there is little or no effect on the level of spasticity or activity.

3.1.4 Contracture	
a) For people at risk of developing contractures, management may include prolonged positioning of muscles in a lengthened position to maintain range of motion.	Level II Ref [97]
b) Overhead pulley exercise should not be used to maintain range of motion of the shoulder.	Level III-1 Ref [101]
c) For people who have contractures, management may include the following interventions to increase range of motion:	
• electrical stimulation;	Level III-3 Ref [102]
• casting.	Level I Ref [103]

3.1.5 Subluxation of the shoulder

There is no evidence that subluxation can be reduced after it occurs; prevention is therefore paramount. Management of subluxation once it occurs consists of strategies to prevent it worsening.

Research has found the following:

- Electrical stimulation prevented some of the subluxation resulting from immobility as a result of weakness, but did not reduce it once it had occurred.[104]

- One systematic review found there is insufficient evidence to draw conclusions on the effect of supportive devices (such as slings, wheelchair attachments) in preventing subluxation.[105]

- Low level trials suggest that firm support (from devices such as laptrays, arm troughs, and triangular slings) temporarily reduces an already subluxed shoulder, but support from extension slings (such as the Bobath sling, Hook Harness slings and hemislings) does not.[106-109]

3.1.5 Subluxation of the shoulder	
a) For people with severe weakness who are at risk of developing a subluxed shoulder, management should include either or both of the following interventions to minimise subluxation: • electrical stimulation; • firm support devices.	Level I, Ref[104] ☑
b) For people who have developed a subluxed shoulder, management may include firm support devices to prevent further subluxation.	Level III-2 Ref[106-109]

3.1.6 Shoulder Pain

The cause of shoulder pain remains unclear.

Research has found the following:

• Electrical stimulation improved pain-free shoulder range of motion but there was not enough evidence to demonstrate that it prevented or reduced severity of shoulder pain.[110]

• There was insufficient evidence to draw conclusions on the effect of supportive devices (such as slings, wheelchair attachments) in preventing pain.[105]

• Strapping delayed the onset of pain but did not decrease the severity of pain.[97,105]

• Intra-articular corticosteroid injections did not significantly improve shoulder pain.[111] A high percentage of people also reported adverse effects.

• Cryotherapy and Bobath therapy were not effective in reducing the frequency of pain in people with chronic shoulder pain but may reduce the reported severity of pain.[112]

• Ultrasound was not effective in reducing shoulder pain.[113]

Preventing contracture and subluxation should help to prevent pain, but interventions aimed at reducing trauma to the shoulder, such as educating all staff, carers and stroke survivors, should also help to prevent shoulder pain. Such education may include strategies to care for the shoulder during manual handling and transfers and advice regarding positioning. As there is no clear evidence for effective interventions once shoulder pain is already present in people with stroke, management should be based on evidence-based guidelines for acute musculoskeletal pain.[114]

3.1.6 Shoulder pain	
For people with severe weakness who are at risk of developing shoulder pain, management should include interventions to educate staff, carers and people with stroke to prevent trauma.	☑

3.1.7 Swelling of the extremities

People who are upright (standing or sitting) with their arm or leg hanging and immobile as a result of weakness are at risk of developing swelling of the hand and foot. Research has found that:

• Intermittent pneumatic compression was not effective in reducing swelling when provided in addition to routine therapy;[115]

• Electrical stimulation to mimic the action of the muscle pump was more effective than elevation alone to reduce swelling;[116]

• Pressure garments were beneficial in reducing swelling;[90]

- Continuous passive motion with elevation was more effective than elevation alone in reducing swelling.[117]

3.1.7 Swelling of the extremities	
a) For people who are immobile, management may include the following interventions to prevent swelling in the hand and foot:	
• electrical stimulation;	Level III-1 Ref[116]
• continuous passive motion in elevation;	Level III-2 Ref[117]
• pressure garments.	Level III-2 Ref[90]
b) For people who have swollen extremities, management may include the following interventions to reduce swelling of the hand and foot:	
• electrical stimulation;	Level III-1 Ref[116]
• continuous passive motion in elevation.	Level III-2 Ref[117]

3.1.8 Cardiovascular fitness

Severe cardiovascular deconditioning occurs as a result of the immobility imposed early after stroke.[118] Studies have shown the following:

- One meta-analysis of fitness training after stroke noted benefits of fitness training that were associated with specific or "task-specific" training. The review found that fitness training after stroke could improve walking ability, particularly if treadmill walking was used; however there was insufficient data for clear conclusions to be drawn.[119]

- Another meta-analysis found strong evidence for fitness training after stroke to improve maximal workload, gait speed and walking distance.[120] The analysis found only small evidence for fitness training to improve aerobic capacity.[120]

- Two subsequent trials have found benefits of fitness training via water-based exercises[121] and home based interventions.[58]

- Community walking did not provide sufficient stimulus to improve cardiovascular fitness.[122-124]

- When the American College of Sports Medicine guidelines for undertaking fitness training were followed, no increase in heart attacks or falls was reported.[122,123,125]

3.1.8 Cardiovascular fitness	
Rehabilitation should include interventions to increase cardiovascular fitness once people have sufficient strength in the large lower limb muscle groups.	Level I Ref[120] Level II Ref[58, 121]

3.1.9 Falling

Increased falling has been found after stroke in both hospital and community settings.[126-130]

To date, evidence for falls intervention is primarily based on research in older people with a range of diagnoses (including healthy people) and from different settings. The extent to which these findings can be generalised to people with stroke remains unclear. Assessment of falls needs to consider the specific

underlying cause. Where problems are stroke-specific (eg, difficulty standing) then interventions should target these difficulties.

Stroke-specific studies have produced conflicting results:

- Symmetrical standing training and repetitive sit-to-stand (STS) training reduced falls compared to neuromuscular facilitation techniques in one trial.[131] Another similar study using visual feedback to train STS ability found a non-significant trend in falls reduction.[132] However one subsequent study found extra STS practice did not result in fewer falls.[133]

- Individualised physiotherapy did not reduce falls in people more than one year after a stroke.[134] However, falls were a secondary outcome in this study and the intervention was of low intensity.

- The use of identification bracelets failed to reduce the number of falls during inpatient rehabilitation.[135]

Systematic reviews have shown the following:

- Interventions likely to prevent or reduce falls in older people include: an individually prescribed home exercise program (targeting balance and strength), individual home hazard assessment and modification (for those with a history of falls), Tai Chi exercise group, reduction of psychotropic medication and other multifactorial programs (eg, health and environmental risk factor screening and interventions).[136]

- There is insufficient evidence regarding the efficacy of other interventions including individual lower limb strength training, brisk walking, group exercise programs, hip protectors, nutritional and vitamin supplements, visual deficiency correction, and pharmacological interventions.[136,137] Possible harms have been reported for strength training and brisk walking interventions.

3.1.9 Falling	
Multifactorial interventions provided in the community, including an individually prescribed exercise program, may be provided for people who are at risk of falling, in order to prevent or reduce the number and severity of falls.	Level I Ref[136]

3.2 Physical activity

Improving outcomes

3.2.1 Sitting

Studies have found that:

- Supervised task-specific practice improved sitting ability, as measured by distance reached in sitting.[138]

- Sitting ability, as measured by sitting symmetry, was not improved by independent practice aimed at improving aspects of balance,[139] or by "Balance Performance Monitor" feedback, reaching, or Bobath therapy.[140]

3.2.1 Sitting	
Supervised task-specific sitting practice should be provided for people who have difficulty sitting.	Level II Ref[138]

3.2.2 Standing up from a chair

Task-specific practice of standing up improves ability to stand up as indicated by reduced postural sway and reduces the time needed to stand up.[120]

3.2.2 Standing up from a chair	
Task-specific practice of standing up should be provided for people who have difficulty in standing up from a chair.	Level I Ref[120]

3.2.3 Standing

One systematic review found no evidence that any one physiotherapy approach (orthopaedic, neurophysiologic, motor learning) was clearly better than another at improving leg strength, balance or the ability to perform everyday tasks.[141] Additional systematic reviews have found that task-specific standing practice with feedback (visual alone or with auditory) resulted in people standing more evenly.[120,142] However no improvement in balance during functional activities or in overall independence was found.[142]

3.2.3 Standing	
Task-specific standing practice with feedback may be provided for people who have difficulty standing.	Level I Ref[120,142]

3.2.4 Walking

No treatment approach (orthopaedic, neurophysiologic, motor learning) has been found to be superior to any other in improving walking.[141] Studies have found the following:

- EMG biofeedback was no better than conventional therapy in improving walking as measured by gait velocity.[143,144]

- Joint position biofeedback was effective in reducing hyperextension of the knee during walking when used in conjunction with conventional therapy or when used alone.[145,146]

- Cueing of cadence is effective in improving walking speed, and stride length.[120]

- One systematic review found treadmill training with body weight support improved walking endurance, but not balance, walking ability or speed.[120] Another systematic review found training to improve walking speed in people who were independent walkers but not in people who were dependent. There was no evidence of harm.[147]

- One systematic review found treadmill training without body weight support improved walking ability, but not speed.[120] Another systematic review found unsupported treadmill training, in conjunction with other therapy, improved walking speed in people who were independent walkers.[147]

- Functional electrical stimulation during walking has produced conflicting findings. Peroneal nerve stimulation during walking improved community ambulation[148] but not walking speed.[149,150]

- Multichannel electrical stimulation, in conjunction with conventional therapy, during walking improved walking speed,[151,152] except in one trial, which had low subject numbers.[153]

- Therapy consisting of practice of a number of activities relating to walking improved walking speed [58,154-156] and walking.[58,154,155]

- One systematic review concluded there is a lack of good quality studies regarding an ankle-foot

orthoses (AFO).[157] However non-randomised and single-case studies suggest there may be some benefits in gait for people with foot drop.[157] One RCT[426] was identified, but excluded from this review, which found no beneficial effects of AFO compared to a hinged AFO. The studies of AFO involve people several weeks or months after stroke onset and thus AFO may be considered later in rehabilitation.

3.2.4 Walking	
a) One or more of the following interventions should be provided for people who can walk but with difficulty:	
• joint position biofeedback with or without conventional therapy;	Level II Ref[145] Level III-2 Ref[146]
• cueing of cadence;	Level I Ref[120]
• treadmill with or without body weight support;	Level I Ref[120,147]
• multichannel electrical stimulation in conjunction with conventional therapy;	Level II Ref[151] Level III-2 Ref[152]
• task-specific training.	Level II Ref[58,154,155]
b) Ankle-foot orthoses may be considered for people with persistent foot drop. If used it should be individually fitted.	Level III-2 Ref[157]

3.2.5 Upper limb activity

Studies on upper limb activity have found the following:

• Task-specific training in conjunction with strength training was superior to neuro-developmental therapy (NDT).[59] Task-specific training was also superior to repetition alone[158] in improving upper limb activity.

• Repetitive protraction of the arm was superior to placebo in the severely disabled.[159]

• There is conflicting evidence for bilateral retraining.[160-165] No improvement in activity has been reported by higher level trials.[160,161]

• Neither NDT,[166] nor sensorimotor integration[167] was more effective than the orthopaedic approach in improving upper limb activity.

• Electrical stimulation reduced impairment but it did not improve activity or participation.[63,64]

• EMG biofeedback was no more effective than conventional therapy in improving upper limb activity,[168] but there was insufficient statistical power to be conclusive.

• Joint position feedback in conjunction with conventional therapy improved the quality of reaching.[169]

• Robot-assisted shoulder-elbow movement improved reaching.[67,170-172]

• Constraint-induced movement therapy improved upper limb activity.[120,173]

3.2.5 Upper limb activity	
One or more of the following interventions should be provided for people with difficulty using their upper limb:	
• task-specific training;	Level II Ref[59,158]
• joint position biofeedback in conjunction with conventional therapy;	Level III-2 Ref[169]
• robot-assisted reaching;	Level II Ref[67,170]
• constraint-induced movement therapy.	Level I Ref[120]

3.2.6 Amount of practice

A meta-analysis found a small but significant benefit of more exercise therapy on ADL if there is at least 16 hours of therapy, in addition to the regular therapy, within the first 6 months after stroke.[174] Increasing practice was also found to be beneficial for instrumental ADL and gait speed but not dexterity.[174] Furthermore, most people are able to tolerate an increase in session time.[175]

Group therapy offers a way of increasing the amount of practice because it is an efficient use of therapist time,[176] and observational analysis shows that it does increase the amount of practice.[177] Mobility has been shown to increase through group therapy task-specific practice run by therapists, both community-based[178] and hospital-based.[154]

Video self-modelling (ie, exercise performance videoed with subsequent feedback from a therapist using the video footage) is also an effective and efficient way of increasing the amount of practice.[179]

3.2.6 Amount of practice	
a) Rehabilitation should be structured to provide as much practice as possible within the first six months after stroke.	Level I Ref[174]
b) Group therapy involving task-specific training or video self-modelling may be used to increase the amount of practice in rehabilitation.	Level II Ref[154,179] Level III-3 Ref[178]

3.3 Activities of daily living (ADL)

ADL fall into two types:

- Personal ADL includes basic self-maintenance tasks such as showering, toileting, dressing, and eating.
- Instrumental ADL includes domestic and community tasks such as home maintenance tasks and community access, including driving.

Occupational therapy interventions work to maximise the person's abilities, building on improvements that have been achieved at impairment level, including those achieved by other team members, and encouraging the transfer of these improvements into a functional situation. Occupational therapy overall has been shown to be beneficial for ADL.[180] An additional meta-analysis found community-based occupational therapy to be beneficial when a targeted approach was used.[181]

Multidisciplinary teams (of which an Occupational Therapist is usually one part) providing therapy-based rehabilitation in the community has also been shown to improve ADL and prevent deterioration in ADL.[26]

The use of amphetamines has been suggested to improve ADL, but the evidence does not support their use and shows a non-significant trend towards harm.[182]

3.3 Activities of Daily Living (ADL)	
a) People who have difficulty in ADL should receive occupational therapy or multidisciplinary interventions targeting ADL.	Level I Ref[26,180,181]
b) Until clinical safety is proven administration of amphetamines to improve ADL is <u>not</u> recommended.	Level I Ref[182]

3.4 Cognitive Capacities

Cognitive impairment has important implications for participation and outcomes in rehabilitation and in the community. Cognitive impairment commonly involves attention, memory, orientation, language, and/or executive functions.

Assessment is critical to understanding how to manage people with cognitive impairment. Early screening for cognitive impairment conducted by a trained team member is essential. A more detailed assessment will clarify the type of impairments and guide the team in providing the most appropriate rehabilitation interventions.

3.4.1 Attention and concentration

A systematic review has found that cognitive rehabilitation improved measures of alertness and sustained attention.[183] The review defined cognitive rehabilitation as any form of practice based on attention tasks with the aim of improving attention abilities. Only one trial in this review included a measure of functional independence and this showed no significant change. Two subsequent trials also failed to show a significant change in function with a range of interventions.[184,185]

3.4.1 Attention and concentration	
Cognitive therapy may be used in rehabilitation of attention and concentration deficits.	Level I Ref[183]

3.4.2 Memory

A systematic review of cognitive rehabilitation for memory deficits included only one small trial and was inconclusive.[186] The review defined cognitive rehabilitation as any attempt to change memory function by practice, special internal methods or techniques, or compensatory strategies. The included study found that memory training had a positive result for those tasks actually involved in training, but found carry-over to general memory was no better than with repetition training.

A subsequent trial found the use of an external cuing device (a pager) was effective in assisting with memory deficits.[187]

Another small preliminary trial comparing the benefits of active or passive conditions using virtual, computer-based environments found that, for those with spatial memory deficits, active involvement had a beneficial result.[188]

3.4.2 Memory	
External cues may be used to help prompt memory in people with memory difficulties	Level II Ref[187]

3.4.3 Executive functions

Executive functions have an organising role in the initiation and inhibition of behaviour. Impaired executive functions may affect a person's ability to plan, solve problems, and self-monitor.[36] Evidence for interventions is sparse. One trial demonstrated a positive effect on executive function when using a pager to prompt function.[187]

3.4.3 Executive functions	
External cues, such as a pager, may be used to initiate everyday activities in people with impaired executive functioning.	Level II Ref[187]

3.5 Visuospatial/Perceptual capacities

Perceptual problems often compromise the safety of those with stroke. It is therefore seen as good practice to include, where appropriate, compensatory strategies to minimise such issues.

3.5.1 Visual function

Visual field loss occurs in approximately a third of stroke survivors, and usually affects one half of the field of vision in both eyes (homonymous hemianopia). Visual impairments can cause significant functional difficulties, and can include diplopia (double vision), difficulties with ocular convergence (both eyes looking at the same point), impaired saccadic movement (both eyes looking from one point to another), oversensitivity to light, nystagmus (rapid involuntary rhythmic movement of eyes from midline to one side) and dry eyes. Often, visual deficits resolve naturally over the first few months post stroke.

Evidence for interventions aimed at visual dysfunction is limited. Restorative (visual field training) and compensatory approaches (hemianopic reading training and visual exploration training) have been described in a large narrative review of mostly low level trials.[189] Benefits of both approaches have been found at an impairment level, with little or no effect on activity or participation.[189] Only three Level II studies have been identified. These found:

- Treatment with 15-diopter Fresnel prisms improved visual perception test scores but not ADL function in stroke patients with homonymous hemianopia.[190]
- Computer-based training of stimulus detection provided benefits in the ability to detect visual stimuli in people with brain injury (including stroke). [191]
- A visual attention retraining program was no more beneficial than traditional perceptual training in improving on-road driving performance amongst stroke survivors.[184] (see section 4.1.3: Driving)

Single eye patching for diplopia (often alternating on a daily basis) is common practice. Eye patching provides practical compensation for diplopia however, this intervention also has disadvantages (eg, reduced stimulation to the affected eye, decreased depth perception, spatial bias[192]). If function is affected, then an eye patch may be beneficial to maximise the effects of active therapy, but may be removed during other parts of the day.

3.5.1 Visual function	
a) Prism glasses may be used to improve visual function in people with homonymous hemianopia but there is no evidence of benefit in ADL function.	Level II Ref[190]
b) Computer-based visual restitution training may be used to improve visual function in people with visual field deficits.	Level II Ref[191]

3.5.2 Agnosia

Agnosia is the inability to recognise sounds, smells, objects or body parts (other people's or one's own) despite having no primary sensory deficits. It is a disabling and potentially dangerous condition in that people may fail to recognise dangerous objects; for example, using the stove or turning on the hot tap. By definition, agnosia affects a single sensory modality, and the person with stroke is often unaware of the problem.

It has been suggested that people with agnosia are most likely to benefit from brief compensatory interventions such as increasing a person's awareness of their deficit, followed by training to recognise stimuli using senses or perceptual abilities that remain intact.[193] Such interventions may include, for example, using cues such as labels or pieces of velcro stuck to objects, recognising faces by their distinctive features, verbal reasoning, or "caller ID" for people with phonagnosia (inability to recognise people by their voice).[193]

3.5.2 Agnosia	
There is insufficient evidence to guide recommendations regarding interventions for agnosia.	

3.5.3 Neglect

Unilateral spatial neglect, or hemi-inattention, is the failure to attend to sensory or visual stimuli or to make movements towards one side of the environment, typically the left side due to lesions in the right parietal lobe. The presence of a unilateral spatial neglect has deleterious effects on all aspects of a person's ADL.

Evidence for interventions in this area is wide ranging. A recent systematic review examined 15 controlled trials of cognitive rehabilitation for neglect and found that, overall, there was some evidence that cognitive rehabilitation for neglect improves performance on neuropsychological tests, but evidence of little or no effect of intervention on increased activity.[194] Cognitive rehabilitation was defined as therapeutic activities designed to reduce directly the level of cognitive deficits or the resulting disability, and could include structured therapy sessions, computerised therapy, prescription of aids and modification of the patient's environment.[194]

In addition to the studies examined in this review, three further controlled trials have been identified and the findings are mixed.[195-197] Of the various types of intervention studies, visual-scanning training appeared to reduce symptoms of spatial neglect and associated disability.[195] There was insufficient quality studies for the use of Fresnel prisms, half visual field eye patches, mirror therapy, activation treatments, caloric stimulation, TENS, and computer-based rehabilitation.

3.5.3 Neglect	
People with unilateral spatial neglect may benefit from cognitive rehabilitation (for example, scanning training).	Level I Ref[194]

3.5.4 Apraxia

Apraxia is impaired planning and sequencing of movement that is not due to weakness, incoordination, or sensory loss.

There are a few studies for interventions for apraxia, which may include strategy training in ADL (eg, verbalisation of actions), sensory stimulation (touching the limbs), proprioceptive stimulation (eg, applying weight to the limbs), cueing, chaining (ie, breaking tasks into individual steps), and normal movement approaches (in which a clinician guides the body through normal patterns of movement).

Strategy training (which included self-verbalisation, writing action sequence, and viewing pictures of action sequences) combined with occupational therapy, was found to lead to greater gains in ADL than occupational therapy alone; but no difference between the two was found in motor function or severity of apraxia at 5-month follow-up.[198]

Gesture-production exercises were found to improve measures of ideational and ideomotor apraxia[199] in people with aphasia and limb dyspraxia, although there are some methodological concerns with this study.[37] Evidence for speech dyspraxia is discussed in section 3.6.2.

3.5.4 Apraxia	
Strategy training in conjunction with conventional therapy to improve ADL may help people with apraxia in the short term (<5 months) to improve planning and task execution.	Level II Ref[198]

3.6 Communication

3.6.1 Aphasia

Evidence for the efficacy of aphasia therapy is limited. Most trials have methodological shortcomings and involve small numbers.[200] However aphasia is a heterogeneous entity and invites a range of different approaches and interventions. Studies of aphasia therapy have found the following:

- Pooled results from non randomised trials examining frequency and timing of aphasia therapy found it was more effective when commenced early.[201]

- A review of RCT's and non-RCT's examining the intensity of therapy indentified ten trials, eight of which were used in a pooled analysis.[202] Four positive trials provided more intense therapy over a shorter duration. The average amount of therapy provided in the positive trials was 8.8 hours of therapy per week for an average of 11.2 weeks. The minimum intensity of any positive trial included in the analysis was 5 hours per week. Another positive study identified in this review, provided 3 hours of therapy per week but was but excluded from the analysis as none of the targeted outcome measures were used. The four negative trials provided an average of 2.0 hours per week for an average of 22.9 weeks.[202] However benefits were noted in only two of the three outcome measures considered. As the review included non RCT studies and six out of the ten included studies were of lower methodological quality, it is difficult to draw conclusions about the efficacy of intense therapy. Further studies are recommended.[202] Overall the definitive benefits of therapy remain uncertain at present, but intense therapy seems more effective than less intense therapy.

- Therapies targeting specific underlying deficits or optimising preserved abilities, for example, constraint-induced therapy,[203] phonological therapy and semantic therapy,[204] or the use of gesture (iconic and cued articulation),[205] improved language function. Constraint-induced therapy involves forcing patients to use language specifically affected by stroke by active restraint in the use of some language over others as well as a massed practice technique.

- Studies of group versus individual therapy have produced conflicting results. A systematic review,[200] which included only one trial, found no difference between individual treatment and group treatment, although the authors of the trial did report a difference. A subsequent trial reported a beneficial effect of group training.[206]

- Use of volunteers, including communication partners, with training in either basic communication techniques or in the particular communication needs of the person with stroke has been shown to be an effective adjunct to aphasia therapy in improving functional communication.[200,207]

- Computer-based therapy delivered some benefits in assisting therapy.[208-210]

- Evidence for pharmacological interventions suggests that only piracetam and dextroamphetamine may be useful.[211,212] However there is conflicting evidence regarding potential serious side effects of such interventions.[211,213]

- A non-systematic review of single case studies[214] reported positive effects of augmentative and alternative communication (AAC) devices for people with severe aphasia. However there was no transfer of benefits into everyday activities.

People with stroke may experience a range of communication problems that either occur with, or exist independently of, aphasia. These difficulties may occur in pragmatic skills such as effective use of body language, facial expression, prosody (intonation), referencing and turn taking, as well as discourse skills such as organisation and cohesion of narrative, and fitting a conversation within its social context. While these problems have been identified, there is no evidence available on the efficacy of intervention strategies for people with stroke experiencing such difficulties.

3.6.1 Aphasia	
a) Interventions for people with aphasia may include:	
• treatment of phonological and semantic deficits following models derived from cognitive neuropsychology;	Level II, Ref[204]
• constraint-induced therapy;	Level II Ref[203]
• the use of gesture.	☑
b) The following techniques may be used to enhance therapy for people with aphasia:	
• use of volunteers (including family or staff) trained in supported conversation techniques;	Level II, Ref[207]
• computer-based therapy programs.	Level II Ref[208]
c) People with aphasia may be considered for group therapy.	Level II Ref[206]
d) Until clinical safety is proven and any benefits clearly outweigh any harms, the routine use of the following interventions for aphasia are <u>not</u> recommended in stroke rehabilitation:	
• piracetam;	Level I Ref[211]
• other pharmacological interventions.	☑
e) Aphasia therapy should be commenced as early as possible following a stroke.	☑
f) People with aphasia may benefit from intensive intervention by a speech pathologist.	☑
g) People with severe aphasia may benefit from augmentative and alternative communication devices used in functional activities.	☑

3.6.2 Dyspraxia of speech

Because of its rarity in isolation, studies examining treatment for verbal dyspraxia (impaired planning and sequencing of muscles used for speech) often include participants with a co-existing aphasia. Many interventions have been described for dyspraxia of speech but few have been tested empirically. Clinical strategies described in the literature address either the accuracy of articulatory placement and transitioning (including modelling, feedback on the accuracy of articulatory positions, shaping of speech and non-speech sounds using oral exercises and the use of words of increasing length and phonetic complexity) or therapy targeting the prosody of speech with timing or melody.[215] In severe cases, augmentative communication devices may be used.

Single case studies examining interventions for verbal dyspraxia have encountered methodological problems and few are controlled studies.[216]

Single subject studies have demonstrated:

• The effectiveness of sound training techniques including modelling, visual cueing, integral stimulation and articulatory placement cueing.[217]

• The effectiveness of the PROMPT system (using tactile cues on the face and neck to cue the articulatory position of the target sound).[218,219]

3.6.2 Dyspraxia of speech	
a) Interventions for the treatment of dyspraxia of speech may include modelling, visual cueing, integral stimulation and articulatory placement cueing.	Level IV Ref[217]
b) People with severe apraxia of speech may benefit from augmentative and alternative communication devices used in functional activities.	☑

3.6.3 Dysarthria

One systematic review found no quality studies with which to guide clinical decisions for treatment of dysarthria in non-progressive brain damage[220] although there is evidence for the management of dysarthria in other neurological populations (eg, Parkinson's Disease). Interventions described in the literature address the phonatory, respiratory, prosodic, articulatory and resonatory aspects of speech production and include stimulation of muscle function (with oral musculature exercises, biofeedback or thermal stimulation), augmentative communication devices, prosthetic devices (eg, palatal lifts), compensatory strategies (such as decreased rate), or interventions to assist the listener in interpreting dysarthric speech.[220]

Single case studies and case reports examining the effectiveness of some of these interventions suggest that:

- Biofeedback is effective in changing intensity and increasing loudness;[221]
- A voice amplifier is effective in increasing loudness;[221,222]
- A palatal lift can be effective in cases of velopharyngeal incompetence to correct hypernasality and improve speech production.[223-225]

3.6.3 Dysarthria	
a) Interventions for the treatment of dysarthria may include:	
• Biofeedback or a voice amplifier to change intensity and increase loudness;	Level IV Ref[221]
• A palatal lift to compensate for velopharyngeal incompetency;	Level IV Ref[223-225]
• The use of strategies such as decreased rate, overarticulation or gesture;	☑
• Oral musculature exercises.	☑
b) People with severe dysarthria may benefit from augmentative and alternative communication devices used in functional activities.	☑

3.7 Dysphagia

Strategies to prevent complications and restore the normal swallow have been described as:

- direct methods such as fluid and diet modification,[226] safe swallowing strategies and optimising the position of the stroke survivor while eating;[227] and
- indirect interventions such as oral musculature exercises and stimulation of the oral and pharyngeal structures.[227]

Studies of dysphagia therapy have found the following:

- Based on two trials, a systematic review found there was inconclusive evidence for the effectiveness of direct methods.[227] A subsequent study found the use of swallowing therapy (including direct and indirect methods) resulted in improved swallowing functions and improved nutritional conditions.[228]
- "Shaker" therapy (resisted exercises) which collectively recruited the supra-hyoid, infra-hyoid and sternocleidomastoid muscles had a positive effect for people with specific dysphagia.[229]
- Electrical stimulation and thermal tactile stimulation[230-232] reduced the severity of swallow impairment. Electrical stimulation for dysphagia is a developing area. Possible contraindications to this therapy must be assessed (eg. pregnant, presence of pacemaker). Electrical stimulation should only be considered by clinicians experienced with this intervention and applied according to published parameters.
- There are no quality studies evaluating the intensity and frequency of dysphagia therapy.[227]

Dysphagia commonly improves within a few weeks following stroke, however it can persist, requiring long-term intervention and/or alternative feeding strategies (see section 3.8: Hydration and nutrition).

3.7 Dysphagia	
a) Compensatory strategies such as positioning, therapeutic manoeuvres or modification of food and fluids to facilitate safe swallowing may be provided for people with dysphagia.	Level IV Ref[228]
b) One or more of the following methods may be provided to facilitate resolution of dysphagia:	
• "Shaker" therapy targeting specific muscle groups;	Level II Ref[229]
• thermo-tactile stimulation;	Level II Ref[232]
• electrical stimulation.	Level III-3 Ref[230]

3.8 Hydration and nutrition

Dehydration is common after stroke due to consequences of stroke such as swallowing impairment, immobility and communication difficulties. Dehydration has been associated with poor outcomes post stroke.[233, 234] Malnutrition is associated with a worse outcome and can lead to further weakness, infections, pressure sores, increased length of hospital stay, and increased mortality.[235-237]

Studies relating to hydration and nutrition post-stroke have found the following:

• Sub-optimal fluid intake is particularly problematic in people with dysphagia,[226,238] and it may be necessary to increase fluid intake via the intravenous, subcutaneous or enteral route (using a nasogastric tube or percutaneous endoscopic gastrostomy [PEG]). There is no clear evidence to suggest one route is more beneficial than the other.[239]

• Simple strategies such as making fluid accessible, providing preferred fluids and supervision have been found to increase fluid intake in elderly people who are able to take fluids orally.[240,241]

• There is evidence from a systematic review to support the provision of nutritional supplements in general elderly populations at risk of malnutrition.[242] However there is no evidence for the routine provision of supplements for those with stroke.[237]

• Supplements have been shown to be beneficial for people with stroke who have poor nutrition on admission or whose nutritional status deteriorates.[237, 243]

• Evidence for alternative methods of hydration and nutrition for people with dysphagia is unclear. One large robust study found no significant difference in death and disability between those provided with early enteral feeding and those provided with intravenous or subcutaneous fluids (without nutrition).[244]

• Nasogastric tube feeding in the first month after stroke was associated with increased functional recovery and was more likely to be associated with normal feeding 6 months after stroke than if a PEG was inserted in this time frame.[244]

It is generally accepted that PEG feeding is the most practical long-term intervention for people who do not regain a functional swallow, but this can raise complex ethical and quality of life issues.

3.8 Hydration and nutrition	
a) Fluid supplementation by appropriate methods should used to treat or prevent dehydration.	Level I Ref[226,240,241]
b) Nutritional supplementation should be offered to people whose nutritional status is poor or deteriorating.	Level I Ref[242]
c) Early enteral tube feeding via a nasogastric tube may be used for people who require alternative feeding methods as a consequence of dysphagia.	Level II Ref[244]
d) NG rather than PEG feeding should be used routinely during the first month post-stroke for people who do not recover a functional swallow.	Level II Ref[244]

e) Decisions regarding long-term enteral feeding for people who do not recover a functional swallow should be made in consultation with the person with stroke and the family.	☑
f) If a decision is taken for long-term enteral feeding, a PEG or similar permanent feeding tube should be used.	☑
g) People with stroke should be monitored to prevent dehydration.	☑
h) People who are at risk of malnutrition, including those with dysphagia, should be referred to a dietitian for assessment and management.	☑

3.9 Mood

Mood is frequently affected following a stroke, but assessment and treatment can be difficult. Depression is the most common mood disturbance, and anxiety and emotionalism may also occur, either separately or in combination. The greatest risk is within the first few months after a stroke, but symptoms may develop at any time and ongoing monitoring is important, particularly in the first six months of returning home.

Treatment options include pharmacological therapy, or psychological therapy, which includes counselling and problem-solving interventions. The heterogeneity and methodological shortcomings of trials make it difficult to reach conclusions on interventions to prevent or to manage depression after stroke.[245,246] Studies of interventions treating mood disorders have found the following:

• Pharmacotherapy improved mood scores on mood scales, but clear benefit in remission of post-stroke depression and improvement of functional outcomes has not been shown.[247]

• Pharmacotherapy was of benefit to people with emotionalism.[246]

• Routine prophylactic use of pharmacotherapy was not effective in preventing depression however individual psychotherapy improved mood scores on mood scales, but it is unclear if it prevents post-stroke depression.[245] One subsequent pilot study involving small numbers, reported benefits of psychotherapy on depression and life satisfaction.[248] Methodological shortcomings are noted however and further larger studies are needed to confirm these findings.[248]

• No randomised controlled trials (RCTS) have been undertaken to evaluate electroconvulsive therapy (ECT) for stroke, and a good systematic review of ECT in an elderly population with depression was unable to draw any conclusions due to the lack of good quality evidence.[249]

3.9 Mood	
a) Routine use of pharmacological therapy to prevent post-stroke depression is <u>not</u> currently recommended.	Level I Ref [245]
b) Psychological interventions may be provided to improve mood for people without depression however it is unclear if such interventions prevent depression.	Level II Ref [245]
c) Antidepressants and/or psychological interventions may be provided for people with depression or emotional lability.	Level I Ref [246, 247]
d) Cognitive behaviour therapy and/or antidepressants may be used for people with anxiety disorders.	☑
e) ECT may be considered in major, drug-resistant depression following stroke.	☑

3.10 Bladder and bowel function

Dysfunction of the bladder and/or bowel is common soon after stroke and may be caused by a combination of stroke-related impairments (eg, weakness, cognitive or perceptual impairments).

3.10.1 Bladder function

Urge incontinence, functional incontinence and urinary retention with or without overflow incontinence are the most common forms of incontinence experienced post stroke.[250] Each type of dysfunction has a distinct aetiology and hence requires targeted management. Therefore all people with stroke should have a thorough medical and nursing assessment of their continence status, including an assessment of current medications, and a clear diagnosis needs to be made. Post-void bladder scanning may also be useful to guide assessment and management.[250, 251]

Studies and reviews have shown:

- For general management of incontinence, an organised, functional approach to rehabilitation was of more benefit than a conventional (Bobath) approach.[252]

- Bladder training and/or anticholinergic drugs provided small benefits for people with urge incontinence in a general population.[253, 254] Other approaches described in the literature without clear evidence include eliminating bladder irritants, prompted voiding, pelvic floor exercises, biofeedback, electrical stimulation and urge suppression techniques.[255] Containment aids (eg, pads) may be used to prevent social inconvenience and embarrassment.

- There is little or no effect of the use of different voiding positions (eg, bedpan or urinal versus commode)[256] for the treatment of mild urinary retention, although consensus suggests that the use of a bedpan should be discouraged. Approaches described in the literature for urinary retention include a double voiding program and relaxation exercises.

- There is consensus that intermittent catheterisation is preferred over indwelling catheters for people requiring intervention in hospital.[257-259] Evidence suggests a closed (sterile) catheterisation technique should be used for such interventions conducted by health professionals, to reduce the risk of infection.[260] If intermittent catheterisation is still required in the community, then a clean, self-catheterisation technique may be used.[258, 259]

- There are no studies regarding the treatment of functional incontinence specific to stroke. One systematic review found short-term benefits of prompted voiding interventions.[261] Other interventions described in the literature without clear evidence of effectiveness include eliminating or minimising environmental barriers to access toileting (eg, appropriate equipment and/or clearly marked door), habit training, and appropriate clothing that accommodates the person's dexterity.

3.10.1 Bladder function	
a) All people with urinary dysfunction should be managed using an organised, functional approach to rehabilitation.	Level II Ref[252]
b) For people with urinary retention:	
• The routine use of indwelling catheters is not recommended. However if urinary retention is severe, then intermittent catheterisation should be used to assist bladder emptying.	☑
• If using intermittent catheterisation, then a closed catheterisation technique should be used.	Level II Ref[260]
c) For people with urge incontinence:	
• A prompted or scheduled voiding regime program, bladder retraining and anticholinergic drugs should be considered.	☑
• If continence is unachievable, containment aids may assist with social continence.	☑
d) For people with functional incontinence, a whole-team approach is recommended.	☑
e) If incontinence persists then further tests should be undertaken.	☑

3.10.2 Bowel function

Symptoms of bowel dysfunction include constipation and diarrhoea.

Evidence for interventions is limited. One RCT found a nurse-led assessment and education intervention was effective in improving "normal" bowel movements and changing bowel-modifying lifestyle behaviours (diet and fluid intake), and the intervention also influenced patient-GP interaction and physician prescribing patterns (for laxatives).[262] There was a non-significant trend of reduced faecal incontinence by this multi-factorial intervention.

This suggests that practical issues such as adequate fluid intake, use of stimulatory laxative, dietary manipulation and modifying the environment are considerations in the management of bowel problems.

One fifth of all the patients involved in the above study (including half of all those who had faecal incontinence) were found to have faecal loading/impaction, emphasising the importance of a rectal examination in the evaluation of bowel problems (or faecal incontinence).[262]

Two additional low-level trials were identified. One low-level trial found a bowel regime (time of day plus suppository) that replicates pre-stroke function to be effective.[263] Another form of bowel training, digital stimulation of the anus, may also provide some benefit.[264] There is consensus that compensatory, non-medical strategies (eg, containment pads) may be useful to prevent social inconvenience and embarrassment.

3.10.2 Bowel function	
a) For those with bowel dysfunction, an appropriate assessment (including a rectal examination) and targeted education should be provided.	Level II Ref [262]
b) Bowel training may be used for people who have bowel dysfunction.	Level III-3 Ref [263, 264]
c) If continence is unachievable, containment aids may assist with social continence.	☑

3.11 Medical

3.11.1 Pain

Pain from any cause can affect people with stroke as it does any other person. Management of acute pain should be based on appropriate evidence-based guidelines.[114] People with stroke, however, are more likely to develop a form of central pain, often referred to as central post stroke pain (CPSP). CPSP occurs in approximately 2-8% of those with stroke[265] and is a superficial and unpleasant burning, lancinating, or pricking sensation, often made worse by touch, water or movement.

The evidence for interventions for CPSP is inconclusive.

- One trial demonstrated that amitriptyline significantly reduced CPSP compared to placebo (in a dose escalation of 12.5mg twice a day for one day, 25mg twice a day for a day, and then 25mg in the morning and 50mg at night).[266] However an additional study failed to find an effect of amitriptyline when used prophylactically after acute thalamic stroke.[267] The known cardiotoxic risks of tricyclic antidepressants (especially in overdose) need to be balanced by these analgesic benefits for the more elderly patients with stroke.

- Evidence from a systematic review found that anticonvulsants might be useful for neuropathic pain.[268-271] The only stroke related trial included in this review found carbamazepine only has a small effect on reducing CPSP.[266]

- A systematic review identified five small trials that suggested tramadol might be an effective agent for neuropathic pain.[272] None of these studies focused on people with stroke and hence it is unclear to what extent these findings can be generalised to people with CPSP.

- Other pharmacotherapy has been advocated, without clear evidence of benefit.[273-276]

- Surgical and chemical sympathectomy interventions require further evidence.[277]

- Other forms of pain relief including TENS, acupuncture or psychological interventions have also been suggested, but evidence for these is also limited.[34,278]

If the reason for the pain remains unclear, then referral to a pain specialist/unit may be considered.

3.11.1 Pain	
Amitriptyline should be preferred over carbamazepine, however either may be considered when treating people with central post-stroke pain (CPSP).	Level II Ref[266]

3.11.2 Deep vein thrombosis (DVT) and pulmonary embolism (PE)

DVT and the associated complication of PE, are significant risks in the first few weeks post stroke. Potential preventive strategies described in the literature include the following:

- Early mobilisation is not supported by direct evidence; however, as a characteristic of an organised stroke service, it has been suggested that early mobilisation may be important in preventing DVT.[16]

- Hydration, similarly, has not been evaluated in trials, but studies have found dehydration to be strongly associated with DVT[233] and early hydration, a component of stroke unit care, could be expected to provide some protection against DVT.

- Routine antiplatelet therapy is beneficial for acute ischaemic stroke and has also been shown to prevent DVT and PE in a variety of different medical conditions.[279-281] Unlike heparins, there doesn't appear to be an early risk of haemorrhagic transformation of cerebral infarction with aspirin.[279-281]

- Heparin and low molecular weight heparin have both been shown to prevent DVT and PE after ischaemic stroke in both RCTs[280] and systematic reviews of RCTs.[282, 283] Evidence from these studies also demonstrated that early use of such treatment is consistently associated with increased risk of cerebral haemorrhage when used in the first few days or weeks after the onset of ischaemic stroke.[280, 282, 283]

- Low molecular weight heparin is more effective than unfractionated heparin in preventing DVT, but there is insufficient evidence to determine whether low molecular weight heparin has any advantage (or disadvantage) compared to standard heparin for other important end-points such as PE, intracranial haemorrhage or death.[282, 283, 284]

- The routine use of low molecular weight heparin or standard heparin is not recommended as the risks outweigh the benefits and other therapy is available (ie. aspirin).[282] However the benefits of low molecular weight heparin may outweigh the risks for certain subgroups e.g. those with a prior history of DVT or PE, those with an inherited thrombophilic tendency or those who are morbidly obese.[282] As both types of heparin are effective in preventing DVT and PE there is uncertainty whether the choice of treatment makes a major difference for those in these subgroups. Low molecular weight heparin is more effective at preventing DVT and can be more convenient to administer (often once a day dosing) however problems of low molecular weight heparin in older people and those with renal failure suggest that standard heparin may also have some advantages in certain circumstances.

The evidence for physical methods of preventing DVT is less clear:

- Graduated compression (antithrombotic) stockings do reduce the incidence of post-surgical DVT,[285] but the evidence for people with stroke is inconclusive.[286] Potential benefits need to be weighed up against risks, which include acute limb ischaemia (especially in stroke survivors with diabetes), peripheral neuropathy, and peripheral vascular disease.

- There is insufficient evidence of effectiveness to support the use of pneumatic compression devices and electrical stimulation of leg muscles.[286]

3.11.2 Deep vein thrombosis (DVT) and pulmonary embolism (PE)	
a) Antiplatelet therapy should be used for people with ischaemic stroke to prevent DVT/PE.	Level I Ref[279]
b) The following interventions may be used with caution (taking into account the risks and benefits) for selected people at high risk of DVT/PE (ie, history of DVT/PE, morbid obesity or known prothrombotic tendency):	
• heparin or low molecular weight heparin in prophylactic doses;	Level I Ref[282, 283] Level II Ref[280]
• thigh-length antithrombotic stockings.	Level I Ref[285,286]

3.11.3 Pyrexia

The most common causes of pyrexia (fever) are chest or urinary infections within the first two months post stroke.[287] A systematic review found that fever has a negative effect on outcome.[288]

Regular paracetamol or physical cooling is effective in reducing fever.[289]

3.11.3 Pyrexia	
a) People with fever should be investigated to identify the source (eg, infection of urinary tract, respiratory tract, skin,	☑
b) Antipyretic therapy, comprising regular paracetamol and/or physical cooling measures, should be used routinely where fever occurs.	☑

3.11.4 Seizures

About 10% of people experience seizures after having a stroke,[290] more commonly within the first 7-14 days than later. People with severe stroke, haemorrhagic stroke, and/or a stroke involving the cerebral cortex are at increased risk of developing seizures, but there is still debate about risk factors. Anticonvulsant medication is effective for people with seizures;[291-294] however, there are no studies that demonstrate one anticonvulsant should be preferred over another for people with stroke.[295]

3.11.4 Seizures	
Anticonvulsant medication may be used for people with recurrent seizures.	Level I Ref[291-293]

3.11.5 Sleep apnoea

Observational studies have reported incidences of obstructive sleep apnoea (OSA) between 32 and 80% following stroke.[296] There is debate as to whether OSA is a risk factor for stroke, a consequence of stroke, or both.[296]

Studies have shown the following:

• Continuous positive airway pressure (CPAP) was a more effective treatment than postural therapy or oral devices but may not be tolerated by all people with OSA.[297-299]

• Postural therapy demonstrated mild benefits in people with positional OSA.[300]

• Oral devices were less effective than CPAP and are suggested for those who are unwilling or unable to comply with continuous positive airways pressure therapy (eg, due to delirium).[299,301]

- Most drug treatments used for OSA have not been shown to reduce apnoea episodes or improve wellbeing in the long term.[302]

3.11.5 Sleep apnoea	
For people with sleep apnoea after stroke: • CPAP should be considered as the first line treatment. • If the person is unable or unwilling to use CPAP, then oral appliances or postural therapy may be considered.	Level I Ref[297] Level II Ref[298, 299] ☑

3.12 Secondary prevention

The risk of first recurrent stroke is 6 times greater than the risk of first-ever stroke in the general population.[303] Secondary prevention begins very early after stroke and should continue indefinitely. It is therefore important that interventions commenced while undertaking rehabilitation are regularly reviewed and modified. Primary care professionals, particularly general practitioners, play a vital role in managing those with stroke in the community. Carotid endarterectomy is an early secondary prevention strategy and is therefore discussed in the *Clinical Guidelines for Acute Stroke Management.*

3.12.1 Antiplatelet therapy

There is evidence from a number of robust RCTs that antiplatelet therapy produces modest but worthwhile benefits and should be the antithrombotic agent of first choice.[304] Antiplatelet therapy does have adverse effects, particularly a small risk of haemorrhage,[305] however the significant benefits far outweigh the risks. The evidence shows that aspirin is just as effective at lower doses (eg, 75-300mg) for secondary prevention and it is recommended at these levels for long-term use.[306] Aspirin remains the most readily available and widespread agent, however other agents may be used, for example, clopidogrel (75mg daily) or a combination therapy – dipyridamole plus aspirin (200mg bd).[306-308] A further study found the combination of clopidogrel plus aspirin produced no significant benefit over clopidogrel alone, but was associated with a higher incidence of adverse effects.[309]

3.12.1 Antiplatelet therapy	
Antiplatelet therapy in the form of aspirin, or clopidogrel, or a combination of low dose aspirin and modified release dipyridamole, should be prescribed to all people with ischaemic stroke who are not prescribed anticoagulation therapy.	Level I Ref[306]

3.12.2 Anticoagulation

There is evidence from a number of systematic reviews involving a number of RCTs against the routine use of anticoagulant therapy in people with non-cardioembolic ischaemic stroke or TIA.[304,310,311] However in people with non-rheumatic atrial fibrillation and a recent TIA or minor ischaemic stroke, the benefits of anticoagulants outweigh the risks and they are more effective than antiplatelet therapy for long-term secondary prevention.[312,313] They should therefore be prescribed unless there is a major contraindication (eg, poor compliance, major bleeding risk).

There remains uncertainty about the ideal time to commence therapy, however data from the International Stroke Trial suggest that treatment should not be started within the first two weeks due to the increased risk of haemorrhage.[280] Hence aspirin or other antiplatelet therapy should be used during this time, with anticoagulation commenced later.

3.12.2: Anticoagulation	
a) Anticoagulation therapy for long-term secondary prevention should be used in all people with ischaemic stroke or TIA who have documented atrial fibrillation, cardioembolic stroke from valvular heart disease, or recent myocardial infarction, unless a contraindication exists.	Level I Ref [310,311]
b) Anticoagulation should not be started for 7-14 days after a disabling ischaemic stroke, to minimise the risk of cerebral haemorrhage.	☑

3.12.3 Blood pressure lowering therapy

High blood pressure is the major risk factor for both first and subsequent stroke. Generally, effective blood pressure management requires that blood pressure is maintained below acceptable limits (ie, lower than 140/90 mm Hg).[314] However reduction in blood pressure, irrespective of initial blood pressure, has been shown to reduce the recurrence of stroke.[315,316] There is consensus that therapy should be commenced only when those with stroke are clinically stable (commonly at least one to two weeks post stroke) and that therapy can continue for several years.[315] Currently the most direct evidence available in secondary stroke prevention is for the use of an ACE inhibitor or for combination therapy with an ACE inhibitor and a diuretic.[317,318]

Lifestyle change strategies by themselves or in conjunction with pharmacotherapy can also be used to reduce blood pressure (see section 3.12.5: Behaviour change).

3.12.3 Blood pressure lowering therapy	
a) All people after stroke or TIA, whether normotensive or hypertensive, should receive blood pressure lowering advice or drug therapy, unless contraindicated by symptomatic hypotension.	Level I Ref [315]
b) Commencement of new blood pressure lowering therapy should generally be delayed until the person with stroke is clinically stable.	☑

3.12.4 Cholesterol

There is conflicting evidence regarding the link between elevated cholesterol and stroke subtypes, as epidemiology studies suggested that a higher cholesterol was associated with a higher risk of ischaemic stroke but a lower risk of haemorrhagic stroke.[319] However trials of cholesterol lowering interventions have not confirmed such a risk.[320] Dietary modification has been shown to lower cholesterol levels in those with cardiovascular risks and should be used as an alternative, or in addition, to pharmacotherapy.[321-323] There is good evidence of the benefits (ie, reduction of major vascular events) of lipid-lowering therapy (statin) for those with stroke who have a total cholesterol level > 3.5 mmol/L and who may or may not have concurrent coronary heart disease.[320]

3.12.4 Cholesterol	
a) Therapy with a statin should be considered for people with a total cholesterol level >3.5 mmol/L following ischaemic stroke.	Level II Ref [320]
b) People with high cholesterol levels should be considered for dietetic referral for nutritional review and counselling.	☑

3.12.5 Behaviour change

Evidence on behaviour change strategies targeting lifestyle factors to prevent recurrence of stroke is limited and often derived from cohort studies of primary prevention. Studies have shown the following:

- Smoking increases the risk of both ischaemic and haemorrhagic stroke.[324,325] Nicotine replacement therapy and behavioural therapy have been shown to be effective in smoking cessation in general populations.[326-329] Behavioural therapy has been shown to be effective via an individualised approach, which may be delivered via a group or on a one-to-one basis.[326,328,330]

- Excessive alcohol consumption increases the risk of stroke[331,332] so reducing alcohol levels could be expected to modify the risk of further strokes. However, light alcohol intake may assist in preventing further strokes.[331]

- There is evidence from a number of systematic reviews that exercise has a protective effect on stroke.[331-334] However, for secondary stroke prevention, there is currently a lack of direct evidence on interventions to increase fitness.[119] Exercise has clear benefits for reducing hypertension in at-risk people[335] and thus increasing exercise could be expected to reduce the risk of further stroke.

- Diet has an impact on a number of risk factors and can provide additional benefits to pharmacological interventions in people with vascular disease. Reducing dietary salt in people with cardiovascular disease reduces blood pressure and is therefore beneficial to prevent stroke.[336-338] A diet that is low in fat but high in fruit and vegetables has been shown to be effective in risk reduction for those with cardiovascular disease.[339-342] An appropriate diet is also beneficial for those with dyslipidemia[321-323] and obesity (to assist in controlling hypertension).[343] Supplementary antioxidants and vitamins, however, have not been found to reduce stroke.[344-346] A systematic review not specific to stroke populations has found that supplementary potassium may provide benefit in lowering blood pressure.[347]

- A multifactorial behavioural intervention strategy may be required which targets several risk factors. Such an approach has been shown to reduce stroke risk.[348]

3.12.5 Behaviour change	
a) Every person with stroke should be assessed and informed of their risk factors for a further stroke and possible strategies to modify identified risk factors. The risk factors and interventions include:	
• smoking cessation: nicotine replacement therapy and behavioural therapy should be used;	Level I Ref [326-329]
• improved diet: a diet that is low in fat (especially saturated fat) and sodium, but high in fruit and vegetables should be consumed. Potassium supplements may be used;	Level I Ref [321,336,337,343,347] Level II Ref [322,323,339-342]
• increase regular exercise;	☑
• avoidance of excessive alcohol.	☑
b) Interventions should be individualised and may be delivered using behavioural techniques (eg, counselling) via a group or on a one-to-one basis.	Level I Ref [326,328,330]

3.12.6 Concordance with medication

Failure to take prescribed medication is a major barrier to optimal outcomes in post stroke management.

Three robust reviews have found only modest effects for interventions to improve adherence with medications in people with chronic illness, although the interventions were not tested specifically in the stroke population. Studies have found the following:

- Simplification of drug dose regimens, information/education, motivation, counselling, family therapy, support and reminders, and complex or combined interventions were useful in promoting adherence to prescription regimes.[349-351]

- Education alone or informing people about adverse drug effects did not change adherence.[349]

- The use of multi-compartment medication compliance devices is useful in promoting adherence among non-adherent adults living at home with diabetes, however no benefits were noted for those with hypertension.[352]

Specific interventions may be required for particular problems after stroke; for example, difficulties in opening containers due to loss of hand function or difficulties with cognition and perception (eg, neglect). A self-management care plan may also be useful for optimising concordance with medications.

3.12.6 Concordance with medication	
Interventions to promote adherence to medication regimes are often complex and may include one or more of the following:	
• information, reminders, self-monitoring, reinforcement, counselling, family therapy	Level I Ref[349,351]
• reduction in the number of daily doses;	Level I Ref[349,350]
• multi-compartment medication compliance device;	☑
• specific aids to counter stroke-related deficits (physical or cognitive).	☑

3.13 Complementary and alternative therapies

Complementary and alternative therapies cover a range of practices including acupuncture, homoeopathy, traditional Chinese medicine, aromatherapy, music therapy, Reiki therapy, conductive education, naturopathy, reflexology and osteopathy. Although there have been a number of trials, primarily for acupuncture, there remains no evidence for the overall efficacy of complementary and alternative therapies.[353-355] However acupuncture may be useful in some specific circumstances. For example, acupuncture for sensory stimulation has been shown to improve standing ability, as measured using clinical scales.[356] Homoeopathic interventions, however, may develop harmful interactions with certain medications and should be discussed with relevant health professionals.

Since complementary medicine may relate to particular cultural backgrounds or other belief systems, health professionals should be aware of and sensitive to the needs and desires of the stroke survivor and the family. Health professionals should be willing to discuss the effectiveness of therapy and different options of care within the context of the current health care system.

3.13 Complementary and alternative therapies	
a) Until clinical safety is proven and any benefits clearly outweigh any harms, the routine use of the following complementary and alternative therapies are <u>not</u> recommended in stroke rehabilitation: • Acupuncture; • Reiki therapy; • Other alternative therapies. b) Health professionals should be aware of different forms of complementary and alternative therapies and be available to discuss these with stroke survivors and their families.	Level I Ref [353-354] Level II Ref [355] ☑ ☑

3.14 Palliation and death

Palliation can be a complex phase of care. Issues to consider include feeding, hydration and pain management to maximise comfort. Carer support, counselling and multidisciplinary care are basic principles of palliative care. Practical end-of-life issues, such as the use of medical power of attorney and advance care directives, should be discussed. Organ donation may be sensitively raised if appropriate. Issues of bereavement may become part of the responsibility of the stroke team.

While there are a number of systematic reviews in this area (primarily for cancer), there is insufficient evidence to support specific interventions.[357] There is evidence from recent systematic reviews to suggest communication skills training can have a small beneficial effect on behaviour change in health professionals working with people with cancer.[358,359] Any intervention during the palliative phase needs to incorporate a holistic approach. This includes an integration of the physical, psychological, spiritual, cultural and social needs of the person and family.[360]

3.14 Palliation and death	
a) Health professionals who are trained in communication associated with palliative care should be involved in the care of people with stroke who are dying and with their families.	☑
b) People with stroke who are dying, and their families, should have care that is consistent with the principles and philosophies of palliative care.	☑

CHAPTER 4: LIVING WITH STROKE

This chapter is concerned with the needs of people with stroke and their carers when the person has returned to the community, either to their own home or to a residential aged care facility. The aim at this stage is to enable stroke survivors to return, as far as possible, to their pre-stroke levels of activity and engagement with the community and to ensure that their quality of life is optimal.

4.1 ACTIVITY AND PARTICIPATION IN THE COMMUNITY

The mix of physical, psychosocial and financial consequences of stroke complicates the ability to resume pre-stroke activity and participation levels in the community. A primary aim of rehabilitation is to enable people with stroke to return to an active lifestyle with full participation in the community, and successful community reintegration should remain a focus for both health professionals and people with stroke and their families. Furthermore, long-term needs of stroke survivors and their families may change over time. Rehabilitation therefore needs to focus on long-term planning, incorporating subsequent reviews and access to interventions based on a collaborative goal-setting process over a period of time (see sections 1.3.3: Ongoing review and 2.6: Post-discharge follow up).

4.1.1 Self-management

People with stroke may have a decreased ability to manage aspects of their day-to-day life independently. At the same time, they need to adapt to their illness and any resulting disability, and to be active in managing their daily lives in spite of any long-term consequences of stroke. Self-management is a process by which this may be done. As self-managers, people with stroke work actively with health professionals, family members and other people to lead and optimise recovery from the very start of the recovery process. Self-management addresses any lifestyle interventions necessary to reduce the risk of recurrence of stroke as well as strategies to assist in adapting to changes in relationships, place of residence or participation restrictions.

Collaborative care planning and the development of a self-management care plan are a way of formalising and optimising self-management. This can occur at any stage in recovery, including prior to discharge (see section 2.3: Care plans) and once the person is in the community.

There are many models by which stroke survivors may be encouraged to manage their own recovery, but few have been comprehensively developed and tested. The most thoroughly tested model is a generic six-week self-management program where stroke survivors (without cognitive impairment) were provided with education about communicating with health professionals, managing change and setting and achieving goals.[361-363] A systematic review found small to moderate positive changes in health outcomes for people participating in such generic self-management programs.[364] Other models of self-management may be based on written material only, or on individual contact with health professionals and peers.

A stroke-specific self-management program has only recently been studied.[365] Potential benefits were noted, but more research is needed.

4.1.1 Self-management	
a) People with stroke who do not have cognitive impairment should be made aware of the availability of generic self-management programs before discharge from hospital and be supported to access such programs once they have returned to the community.	Level II Ref [361-363]
b) Stroke-specific programs for self-management may be provided to people who require more specialised programs.	☑
c) A collaboratively developed self-management care plan may be used to harness and optimise self-management skills.	☑

4.1.2 ADL and exercise

It is generally recognised that the major part of physical recovery following stroke occurs within the first six months. There is, however, strong evidence that further improvements in ADL and fitness can occur after this time, and that further rehabilitation input reverses the decline that frequently occurs after stroke.[26,60,121,366-369] ADL and exercise are equally important in the recovery process while in hospital as well as later in the community.

Community-based allied health practitioners later in the recovery process can play a crucial role in monitoring the need for, and encouraging actual participation in, community and exercise activities. One trial involving people living in the community found that providing information (eg, resuming driving or alternative transport), aids and appliances, encouragement, and approaches to overcoming fear increased participation and activity, including both the likelihood of people getting out of the house as often as they wanted as well as the number of actual outdoor journeys.[370] The general practitioner also plays an important role in appropriately referring people in the months and years after formal rehabilitation has ended.

A range of factors can substantially limit community participation in appropriate programs, including access to appropriate transport, associated costs, fears related to limited communication ability and awareness of appropriate services and their location. Consideration is therefore needed in planning or referring to such programs. Information should also be provided for the carer or family of those with stroke.

4.1.2 ADL and exercise	
a) People living in the community who have difficulties with ADL should have access, as appropriate, to therapy services to improve, or prevent deterioration in ADL.	Level I Ref [26]
b) People who are living in the community more than 6 months after their stroke should have access to interventions to improve fitness and mobility.	Level II Ref [60,121,369]
c) People living in the community should be provided with information (eg, alternative transport options, resuming driving, ADL and exercise opportunities/services) to facilitate increased outdoor journeys and therefore greater participation within the community. The information provided should also be supplemented by other simple strategies (eg, encouragement, use of appropriate aids/appliances, approaches to overcoming fear) by an appropriate health professional.	Level II Ref [370]
d) General practitioners should refer to allied health professionals where necessary when undertaking routine medical review of people with stroke.	☑

4.1.3 Driving

It is important that people with stroke and their families are made aware of the need for assessment and potential difficulties and dangers of resuming driving after stroke. For example, people with hemianopia are unable to retain their licence by law. Readers are referred to the national guidelines for the full legal requirements regarding returning to driving.[371]

Motor, sensory, visual or cognitive impairments can have a major impact on a person's ability to drive after stroke. Studies have found that the impairments most likely to predict poor on-road driving ability are visuospatial and attention deficits, reduced motor processing, homonymous hemianopia, and a right cerebral hemisphere lesion.[372-375]

There is little agreement regarding the most appropriate method of assessing ability to drive, however a three-step approach has been suggested:[34]

1. Assessment of motor, sensory, visual and cognitive deficits: eg, the Motor-Free Visual Test, which measures perception, and the Stroke Drivers Screening Assessment, which measures attention and executive abilities;[372,375]

2. An off-road driving test: eg, the Dynavision Performance Assessment Battery or the Cognitive Behavioural Driver's Inventory;[376]

3. An on-road test.[377]

Evidence for interventions to improve driving ability is limited. Only one RCT was identified, and this found a visual attention retraining program was no more beneficial than traditional perceptual training in improving on-road driving performance amongst stroke survivors.[184]

4.1.3 Driving	
a) People with stroke who wish to return to driving may be offered a visual attention retraining program or traditional perceptual training.	Level II Ref[184]
b) The National Guidelines for Driving (Austroads) and relevant state guidelines should be followed for all issues relating to driving following a stroke.	☑
c) People with stroke who wish to return to driving should be offered an opportunity to undertake an occupational therapy driving assessment, unless there are medical contraindications.	☑

4.1.4 Leisure

The majority of stroke survivors are over retirement age, and leisure and social activities are a significant part of their life. Changes in physical, cognitive and psychological factors post stroke can affect leisure activities. Many people with stroke are unable to continue with their usual leisure activities and/or do not take up new ones, which may lead to social isolation, depressed mood and negative effects on their relationships with their carer.[378]

A recent meta-analysis found community occupational therapy improved leisure activities if targeted interventions were used, although there was no improvement in personal or extended ADL.[181] Another RCT evaluated a day service for younger stroke survivors and found only small gains, with no effect on depression, anxiety or quality of life.[379]

4.1.4 Leisure	
Targeted occupational therapy may be used to increase participation in leisure activities.	Level I Ref[181]

4.1.5 Return to work

Observational studies have reported wide-ranging estimates of return to work of people with stroke, with a direct correlation between returning to work and age and disability.[380] There are a number of reasons why people may have difficulty returning to work following a stroke. These include age, physical and cognitive impairments, attitudes and policies of the employer, and the person's own wishes or desire to return to work.[380] If the person with stroke wants to work but is unable to return to his/her previous occupation, then other vocational options within the workplace (or other areas/ workplaces) should be explored (eg, volunteer work or training in other vocational areas).

One trial assessed a day service specifically for younger stroke survivors and found a positive effect on occupational performance.[379] The service offered opportunities to identify and pursue meaningful and realistic activities in the community, not specifically work-related. There is no evidence for interventions

specifically to assist in returning to work. There are a number of agencies and services within the community that can provide assistance in helping return to work, supported by the skills of an occupational therapist and other relevant members of the team.

4.1.5 Return to work	
People with stroke who wish to work should be offered assessment and assistance to resume or take up work.	☑

4.1.6 Sexuality

Observational studies have found that sexual dissatisfaction is common post stroke (45-83%) and is more common in people with communication disorders despite no reported drop in libido.[381-383] However, there are no studies that address the impact of interventions on sexual activity after stroke.

The causes of decreased sexual activity remain undefined empirically, but are thought to be in part organic and in part psychosocial.[383] It may be attributed to an inability to discuss relationships and sexuality, fear, anguish, sensory and physical changes, or changes in body image and self esteem.[378,384,385] A fear of further stroke during sex is also common[385] despite the lack of evidence to support this.

Possible interventions need to consider the psychosocial aspects such as body image, anxiety and fear and include strategies such as counselling, information provision, and effective communication. Such interventions should be provided by health professionals with appropriate experience / expertise in sexuality counselling. Interventions may also need to consider physical aspects such as positioning and timing, or the use of non-invasive treatments for erectile dysfunction.[386,387]

4.1.6 Sexuality	
a) People with stroke and their carers should be offered:	
• the opportunity to discuss issues relating to sexuality with an appropriate health professional;	☑
• written information addressing issues relating to sexuality post-stroke.	☑
b) Any interventions should address psychosocial aspects as well as physical function.	☑

4.2 Support

Social support has been shown to correlate directly with outcomes post stroke. It is common for people with stroke to comment on a "black hole" period when returning home, as they confront the difficulty adjusting to life after stroke, especially when formal interventions have been completed. Support during this phase would seem to be particularly important.

Three important aspects of support have been reported in descriptive studies: emotional, instrumental (practical support such as home help), and informational.[388] High emotional support along with moderate levels of instrumental support was found to be most the beneficial; however, a trial of a social support intervention based on these assumptions failed to produce significant effects, highlighting the complex nature of social support after stroke.[389] Services that provide support in the community include support groups, community services (eg, meals on wheels, home help), primary care workers, community rehabilitation team members, and voluntary services (eg, providing social support and transport).

4.2.1 Peer support

Peer support is a process by which stroke survivors may share experiences with others who have undergone a similar experience. Peer support groups provide support from other stroke survivors, carers and health workers, as well as the opportunity to learn self-management skills from others. Consumers report that many stroke survivors are active in establishing and maintaining peer support groups in the community. Furthermore they report that peer support is beneficial for sharing experience, education and socialisation (leading to improved self-esteem and self-confidence) and thus is a critical component for recovery of good quality of life after stroke. Individual peer support may also be of value, either to supplement groups or for people who do not want involvement in a group.

There are currently no quality studies regarding the effectiveness of peer support for stroke survivors. Peer support networks are present throughout Australia and coordinated by State Stroke Associations. Peer support is also available through these organisations on an individual basis, often via the phone.

4.2.1 Peer support	
Stroke survivors should be provided with information about the availability and potential benefits of a local stroke support group and/or other sources of peer support prior to discharge from the hospital.	☑

4.2.2 Counselling

Many aspects of life are affected by stroke and complex adjustments are required not only for the stroke survivor but also for the family and carer. Observational studies have found that family dynamics have an impact on rehabilitation; for example, a well-functioning family has been shown to result in improved function for stroke survivors.[390,391]

Studies examining the effectiveness of family counselling interventions after stroke have found the following:

• Problem-solving counselling plus education was more effective than routine care or education alone.[392]

• An information package and three visits from a social worker trained in family counselling provided functional and social benefits, but had no impact on depression, anxiety, understanding or skill levels or health status.[56]

• A systematic review of all interventions, including counselling, targeted family education and adjustment concluded that there was strong evidence for an active educational counselling approach. The review found that information packages alone did not have an effect.[53]

   Some of the included trials are noted elsewhere in this document (ie, sections 2.6: Post-discharge follow-up; 2.7: General information and education; and 4.2.3: Carer support). Evidence for counselling in those with depression is discussed in the section 3.9: Mood.

4.2.2 Counselling	
Counselling services should be available to all stroke survivors and their families and may take the form of:	
• an active educational counselling approach;	Level I Ref[53]
• information supplemented by family counselling;	Level II Ref[56]
• a problem-solving counselling approach.	Level II Ref[392]

4.2.3 Carer support

The physical and emotional aspects of caring for someone with stroke can result in significantly higher anxiety and depression, and lower perceived quality of life. Therefore carers, along with stroke survivors, need long-term practical, emotional, social and financial support.

Interventions and guidelines for counselling (section 4.2.1), post-discharge follow-up (section 2.6), respite care (section 1.3.2), and information and education (section 2.7) apply equally here. Studies involving carers have found the following:

- An education and problem-solving intervention provided via a carer support group or individual basis improved confidence in knowledge and increased use of active problem-solving skills, compared with a control group.[393,394]

- Social problem-solving or educational-counselling interventions are effective in improving carer competence, problem-solving ability and preparedness while minimising changes in burden.[395,396]

- Different modes of delivering support to carers, for example using the telephone[395,397] or the internet[398] have been used, and have potential benefits in reducing stress. Such interventions may be particularly useful for carers in more rural and remote parts of Australia.

4.2.3 Carer support	
a) Carers of stroke survivors should be provided with:	
• information about the availability and potential benefits of local stroke support groups, at or before the person's return to the community;	Level II Ref[394] Level III-2 Ref[393]
• support by health professionals starting early after the person's stroke.	☑
b) Carers of stroke survivors should be offered services to support them after the person's return to the community. Such services should use a problem-solving or educational-counselling approach.	Level II Ref[394-396] Level III-2 Ref[393]

CHAPTER 5: RESOURCE IMPLICATIONS

Evidence-based care is critical to improve the outcomes of people with stroke. Provision of health care services must include the consideration of costs together with the effectiveness of different interventions to optimise health outcomes given inevitable health care budget constraints.

Literature regarding the economic impact of stroke rehabilitation and recovery has been identified during the systematic development process of these guidelines. It is noted that the vast majority of the studies identified were conducted overseas and related to cost descriptions of individual factors or interventions, rather than economic evaluations comparing both the costs and effects of interventions.

Difficulties arise in extrapolating international results into the Australian context given the differences in health services provision, target populations, and interventions, such as drug dosages or time horizons. For example, cost-effectiveness studies vary in their time horizons with those undertaken as part of clinical trials often having short 3-6 month durations making extrapolations over the longer term difficult. In addition, the different methods employed make it not possible to reliably compare study results across interventions. In Australia, there has been limited work to do this. The Assessing Cost-Effectiveness in Heart Disease (ACE-HD) study will provide systematic evidence for different prevention interventions exploring the impact on heart and stroke outcomes in terms of disability adjusted life years saved (DALYs). Work has also been done to trial a method for assessing the cost-effectiveness of stroke interventions employing the National Stroke Foundation's Model of Resource Utilisation, Costs and Outcomes for Stroke (MORUCOS).[399] However, these studies focus on the acute phase of recovery and there are few interventions relevant to these Guidelines. Clearly there is an urgent need in Australia to undertake further work in this area.

The discussion relating to cost-effectiveness evidence is organised to reflect the structure of the document. Firstly, evidence for organisation of care issues is discussed, followed by evidence for specific interventions. It is noted that while the literature regarding economic factors is discussed in this chapter no additional recommendations have been made since these factors have been considered when formulating the recommendations in the previous chapters. Where there is no discussion on the economic implications of a particular intervention, no evidence was identified during the review process.

5.1 Organisation of care

5.1.1 Stroke Unit Care

One systematic review identified three studies comparing the costs and outcomes of stroke units to that on a general ward.[400] All three studies were based in Europe (UK, Sweden and Germany) and included costs of community and outpatient care. All three studies found modest cost savings (3-11%) using stroke unit care, however the figures failed to reach significance. The authors concluded that there was "some" evidence for the costs to be at least equivalent to conventional care.

Two subsequent published studies were also identified. One modelling study used the Markov model to predict the medium-term (5 year) impact of setting up stroke units in France.[401] The study estimated a 12% increase in costs involved in setting up and running stroke units compared with conventional care. Furthermore the study predicted an incremental cost-effectiveness ratio (ICER) for stroke units of £1359 per year of life gained without disability. The authors suggested this was well within the threshold (£53,400) recognised by the international scientific community. However, only running costs were involved in the evaluation and further costs, such medical imaging, have not been considered.

The other subsequent trial-based study assessed three different models of providing coordinated stroke care compared to routine care in the Netherlands.[402] Organised care was found be offered at similar costs while achieving improved health outcomes. Caution is required to apply the results of this study, as the health system model is significantly different to the Australian health care system.

In Australia, the work by Moodie has demonstrated that when modelled over the lifetime of a cohort of first-ever stroke patients, stroke units when compared to conventional care produced considerable gains in terms of health benefits with these additional benefits entailing additional costs. There was an additional lifetime cost of AUD$1,288 per DALY recovered, or alternatively AUD$20,172 per stroke averted or AUD$13,487 per premature death averted. It was determined that the stroke unit intervention was cost-effective given the small additional costs per extra unit of benefit gained.[399]

Currently only 19% of public hospitals report providing stroke unit care.[403] Stroke units improve outcomes for people with stroke (see section 1.1.1). Furthermore, the cost of providing stroke unit care once set up is only slightly higher, or at least equivalent, to general ward care. Although this literature does not specifically indicate the real costs of setting up a stroke unit, there is evidence that health services should be organised to provide stroke unit care and that considerable gains in terms of health benefits could be achieved.

5.1.2 Early Supported Discharge

One systematic review identified eight trials evaluating the economic implications of ESD compared with conventional care.[400] Two studies were conducted in Australia with the remainder from Hong Kong (one), Canada (one), Sweden (two) and the UK (two). All but one of the studies compared ESD using home-based services compared to conventional services (noted to be either hospital rehabilitation or mix of hospital and community rehabilitation). Of the eight studies included, six studies were noted as having medium or high methodological quality. These studies reported a trend for reduced costs of between 4-30% with ESD, however this cost saving was found to be statistically significant in only one of the six studies. The authors concluded that there was "moderate" evidence that ESD services provided care at modestly lower total costs than conventional care. However the heterogeneity of the ESD care provided was noted along with the uncertain impact of ESD care on hospital readmission and informal carers. The review also concurred with the previous summary (section 1.2.1) that ESD favours stroke survivors with mild or moderate disability.

One subsequent UK trial-based study assessed the outcomes and costs of early domiciliary care compared to hospital based care.[404] A societal perspective for costs was used based on 1997/8 prices. Mean costs for health care and social care costs over 12 months were £6840 for domiciliary care compared to £11 450 for stroke units. In terms of Quality Adjusted Life Years (QALYs) these were less for domiciliary care when compared to stroke unit care (0.221 v 0.297). Cost effectiveness was calculated using ICERs for avoiding an additional 1% of deaths or institutionalisation that ranged from £496 (without informal costs) to £1033 (with highest estimate of informal costs) for stroke unit care compared with domiciliary care. Based on each additional QALY gained the costs ranged from £64,097 to £136,609. Hence in this study, health outcomes were lower using this ESD model but ESD was found to be cheaper.

Data specific to the Australian context was included in the previous review and warrants further discussion. The data from a meta analysis of ESD (12 trials, N=1277, search date March 2001) was used to apply costs from the Australian health system.[24] Hospital costs were taken from the Australian National Hospital Cost Data for 1998/1999, domiciliary rehabilitation costs were taken from a single study of domiciliary rehabilitation care (Adelaide stroke study) and costs related to other community services were taken from the Australian Department of Health and family Services Report, 1996/1997.[24] Using a cost minimisation analysis (ie. health outcomes were found to be equivalent) ESD was found to be 15% lower regarding overall mean costs ($A16016 v $18350). Cost estimates were based over a 12-month period and did not include any indication of set up costs. It was highlighted that the included studies were all based in urban centres confirming the view that ESD should only be considered where appropriate resources are available to provide effective domiciliary care. A small shift of costs from the secondary sector to primary section was noted (more GP visits with ESD care) however no difference was found in the cost of routine community and outpatient services. Overall

ESD was found to provide a cost saving alternative to conventional care and the authors concluded that it therefore should be considered for certain subgroups of people with stroke.

The above studies provide limited evidence regarding the cost-effectiveness of ESD in Australia. It can be concluded from these studies that ESD may produce equivalent outcomes at potentially a reduced cost for urban settings.

5.1.3 Community Rehabilitation

Economic evaluations of community rehabilitation are limited to cost-description studies. One systematic review identified four trials comparing different models of community care and found conflicting results.[400] Three studies were undertaken in the UK and one in Sweden. Two studies comparing home-based rehabilitation to day hospital or outpatient rehabilitation models reported consistent increases in costs for home-based care between 26-27% however this increase was not found to be significant. Another study found physiotherapy services were 38% lower (statistically significant) for home-based care compared to a day hospital. The fourth study found community rehabilitation (home-based) was of similar costs in the first twelve months when compared to hospital rehabilitation. Two included studies noted that the cost burden was shifted from hospital services to home help or social services. The authors of the review however stated that no conclusions could be drawn.

From this literature it is not possible to make conclusions regarding the cost effectiveness of any one model of community rehabilitation and whether or not any additional costs that may be incurred result in more health gains than current practice.

5.2 Specific interventions for the management of stroke

5.2.1 Carer training

One study was identified that assessed the economic outcome of training carers.[405] Evidence was based on one RCT conducted in the UK. The study has been discussed previously (see section 2.4). Costs were based at 2001-2 prices and included health and other formal care costs as well as informal costs. Providing carer training during inpatient rehabilitation reduced total costs (mean saving of £4043), primarily reflecting savings due to earlier discharge from inpatient care, while also improving health outcomes. No difference in QALYs in carers were found however the authors suggested that this was likely to be influenced by the insensitivity of the outcome measure used (EuroQol five-dimensional questionnaire).

Since the burden of providing both formal and informal care after stroke in Australia is significant[406, 407] inpatient rehabilitation services in Australia should be encouraged to introduce formal carer training as part of their care. Further cost-effectiveness studies in this area are needed which include appropriate assessment of the impact on carers.

5.2.2 Secondary prevention

There are few economic evaluation studies available for secondary prevention based on Australian data in stroke. The majority of the literature related to the cost-effectiveness of prevention interventions relate to drug therapies and/or generic outcomes that may include stroke, but are not stroke specific.

Moodie (2003) has investigated the cost-effectiveness of antithrombotic (warfarin) treatment for people with atrial fibrillation as a primary and secondary prevention measure. This investigator determined that 1851 dalys could be recovered with a cost/DALY saved of A$480. This finding was based on the 1997 Australian population modeled using MORUCOS, an economic model with resource utilization data derived from the North East Melbourne Stroke Incidence Study.[399]

One published systematic review has identified three studies assessing the cost-effectiveness of anticoagulation for primary prevention in people with atrial fibrillation (AF).[408] Warfarin was more cost-effective than aspirin for people with two or more stroke risk factors, in addition to those with chronic non-vavular AF in one study. Warfarin was also found to be cost-effective for people with only one other stroke risk factor costing US$8000 per QALY. However, warfarin use for people with no other stroke risk factors, apart from AF, was not cost effective with costs of US$370,000 per QALY. A second study confirmed these findings. The third study found anticoagulation for AF caused by mitral stenosis to be cost effective with costs of only US$3700 per QALY.

Economic benefits of a specific blood pressure medication (Ramipril) for people at high risk of heart disease and stroke has been studied.[409] This Australian study reported a potential reduction of 9188 strokes over 5 years. The incremental cost-effectiveness result, estimated as a cost per life-year saved, was A$17,214 based on a combined cardiovascular death endpoint. Six international studies were identified that assessed the cost-effectiveness of antiplatelet therapy in secondary stroke prevention. Two studies compared a combination of dipyridamole plus aspirin to aspirin alone.[410,411] One study compared clopidogrel to aspirin.[412] The other three studies compared all three therapy options.[413-415] The studies predicted costs in the UK, USA and France over a period of 2 years, 5 years or over a lifetime. The combination therapy of diryridamole plus aspirin was found to be cost effective compared with aspirin alone in all five studies. However, there was conflicting evidence for the cost effectiveness of clopidogrel. Two studies reporting no cost effectiveness using clopidogrel.[413,414] Two other studies found clopidogrel was cost effective and reported ICERs of US$31,200 and US$26,580 per QALY saved.[412,415]

Cost-effectiveness studies undertaken for lifestyle changes are limited in that they have not been undertaken for stroke specifically. This is also influenced by the fact that many lifestyle interventions have not been systematically evaluated to provide adequate cost and effects data. For example, a systematic review reported that there were only five economic evaluations for lifestyle interventions aimed at reducing obesity.[416] One study in the UK suggested the costs saved far outweigh the costs spent on exercise in those over 45 years old.[417] Smoking cessation has been reported to cost between £270-1500 per QALY saved depending on the intervention (eg, advice from GP or nicotine replacement strategies).[418] Clearly, stroke specific studies are needed to assess the potential cost-effectiveness of lifestyle change interventions as well as other prevention interventions.

APPENDIX 1: MEMBERSHIP AND TERMS OF REFERENCE OF THE ADVISORY AND WORKING GROUPS

Expert Working Group

Members of the working group responsible for the development of these guidelines includes:

Dr Michael Pollack (co-chair)	Director, Hunter Stroke Service; Rehabilitation Physician, John Hunter Hospital
Dr Erin Lalor (co-chair)	Chief Executive Officer, National Stroke Foundation
Dr Louise Ada	Physiotherapist, University of Sydney
Prof Justin Beilby	Professor of General Practice, University of Adelaide
Dr Janice Collier	Physiotherapist, National Stroke Research Institute
Ms Cindy Dilworth	Speech Pathologist, Royal Brisbane and Women's Hospital
Ms Louise Gustafsson	Occupational Therapist, University of Queensland
Mr Kelvin Hill	Project Manager, National Stroke Foundation
Ms Louise Jordan	Manager of Clinical Service Delivery, Hunter Stroke Service
Dr Sharon Kilbreath	Physiotherapist, University of Sydney
Prof Richard Lindley	Professor of Geriatric Medicine, University of Sydney; Geriatrician, Westmead Hospital
Mr Ian Murdoch	Consumer Representative, Queensland Stroke Association
Mr John Norton	Consumer Representative, Bendigo
Ms Debra O'Conner	Director of Health Promotion, Dianella Community Health
Ms Jane Phelan	Consumer Representative, Melbourne
Ms Jenny Pilgram	Nurse Educator, Royal District Nursing Service, Melbourne
Dr Rene Pols	Deputy Director of Human Behaviour and Health Research Unit, Flinders University
Dr Jonathan Sturm	Neurologist, Gosford Hospital

The members of the expert working group assisted in:

1. Reviewing the framework of existing guidelines;

2. Identifying, reviewing and classifying relevant literature;

3. Developing the draft clinical stroke guidelines for use in Australia;

4. Providing feedback gained through the consultation process;

5. Developing a plan for communication, dissemination and implementation; and

6. Developing recommendations for periodically updating the guidelines

Additional contributing people of the Guidelines development team included:

Ms Lynn Legg	Coordinator, Stroke Therapy Evaluation Program Team, Scotland
Ms Jessica Dyson	Research Assistant, National Stroke Foundation
Ms Chris Scott	Manager of Health Policy and Programs, National Stroke Foundation
Dr Angela Kirsner	Medical Writer/Editor, Kirsner Consulting Pty Ltd

Corresponding Working Group

A Corresponding Working Group was also established during the development process and consisted of people who supplemented the expertise of the working group.

Dr Annie McCluskey	School of Exercise & Health Sciences, University of Western Sydney
Dr Brian Zeman	Rehabilitation Physician, Royal Rehabilitation Centre
Dr Debbie Kesper	Rehabilitation Physician, Bendigo Health Care
Ms Dina Watterson	Occupational Therapist, Royal Melbourne Hospital
Ms Dominique Cadilhac	Manager, Public Health Division, National Stroke Research Institute
Ms Elissa Didus	Neuropsychologist, Repatriation General Hospital
Ms Fiona Simpson	Dietitian, Royal North Shore Hospital
Ms Gracey Tomolo	Speech Pathologist, Royal Melbourne Hospital
Ms Karen Creighton	Occupational Therapist, Bendigo Health Care
Dr Maria Crotty	Rehabilitation Physician, Repatriation General Hospital
Ms Ursula Winzeler	School of Occupational Therapy, La Trobe University
Dr Jacinta Douglas	School of Communication Sciences, La Trobe University

Advisory Committee

An independent Advisory Committee (or Governance Committee) oversaw the **process** of guideline development on behalf of the National Heart, Stroke and Vascular Health Strategies Group. Members of this committee included:

Dr Judith Frayne (Chair)	President, Stroke Society of Australasia
Professor Mark Harris	Professor of General Practice, University of New South Wales
Dr Helen Dewey	Neurologist and Senior Research Fellow, National Stroke Research Institute
Ms Suzanne Kuys	Physiotherapist, Princess Alexandra Hospital
A/Professor Karen Duggan	Chair, National Blood Pressure Advisory Committee
Ms Amanda Croker	Principal Policy Advisor, Health Outcomes Unit, Queensland Health
Ms Karen Carey-Hazel	Consumer Representative, National Heart, Stroke and Vascular, Health Strategies Group
Ms Sharon Leigh	Department of Health and Ageing, Australian Government
Ms Cathy Moore	Department of Health and Ageing, Australian Government

APPENDIX 2: PROCESS REPORT

Development of Clinical Guidelines for Stroke Rehabilitation and Recovery

The *Clinical Guidelines for Stroke Rehabilitation and Recovery* have been developed by the National Stroke Foundation according to processes prescribed by the National Health and Medical Research Council (NHMRC) toolkit series[419-423] under the direction of an interdisciplinary Expert Working Group (EWG) and Advisory Committee (see Appendix 1). The EWG has worked through a collaborative process, and networked with a number of formal and informal groups and individuals from around Australia and overseas.

Systematic searches and literature review

The systematic identification of relevant literature was conducted according to NHMRC standards between May and October 2004.

Question formulation

Clinical questions were developed by the EWG to address interventions relevant to stroke rehabilitation and recovery. The questions generally queried the effects of a specific intervention and were developed in three parts: the intervention, the population and the outcomes. An example is "What is the effect of anticonvulsant therapy on reducing seizures in people with post-stroke seizures?" In this example, anticonvulsant therapy is the intervention, reduction of post-stroke seizures is the outcome, and the population is people with post-stroke seizures.

Finding relevant studies

To avoid duplication, the systematic literature search was undertaken in conjunction with the Stroke Therapy Evaluation Program (STEP) team from Scotland, who have been instrumental in identifying, appraising and collating the evidence for stroke care. The STEP team have developed and maintain 'effectivestrokecare.org', a fully indexed, searchable, web-enabled database of evidence for stroke management. STEP works in conjunction with the Cochrane Stroke Group.

Key words based on the components of the formulated question were used to guide searching. The search strategies were developed in partnership with the STEP team to ensure comparability of the outcomes of the searches. Relevant systematic reviews were initially identified. Where no systematic review was found, primary studies were searched. STEP was initially used for each question although additional searches were required. In these cases standardised methodological filters were used for MEDLINE, CINAHL or psycINFO electronic databases. Updated searches were conducted prior to the end of the consultation period (early February, 2005), with significant literature included in order to provide the most up-to-date evidence.

Appraising and selecting studies

The STEP team and the EWG critically appraised the literature using a standardised checklist consistent with NHMRC standards. The strength (study design and issues of quality), size of effect, relevance, applicability (benefits/harms) and generalisability were all considered. Examples of completed checklists can be found on the STEP website *(www.effectivestrokecare.org)*. Where Level I or II evidence was unavailable the search was broadened to include lower levels of evidence.

Summarising and synthesising the evidence

The key messages in each section are presented as boxed text and preceded by a summary of the relevant evidence. The evidence is described according to the National Health and Medical Research Council (NHMRC) classification system.[1]

Designation of Levels of Evidence – National Health and Medical Research Council	
I	Evidence obtained from a systematic review of all relevant randomised controlled trials.
II	Evidence obtained from at least one properly designed randomised controlled trial.
III – 1	Evidence obtained from well-designed pseudo-randomised controlled trials (alternate allocation or some other method).
III – 2	Evidence obtained from comparative studies with concurrent controls and allocation randomised (cohort studies), case-control studies, or interrupted time-series with group.
III – 3	Evidence obtained from comparative studies with historical control, two or more studies, or interrupted time series without a parallel control group.
IV	Evidence obtained from case series, either post-test or pre-test and post-test.

It is noted that the level of the evidence highlights the study design used in the trials that underpins the recommendations but does not always indicate the strength of the study or the strength of the recommendation. Although no specific grading scales have been used to indicate the strength of each recommendation the EWG has attempted to consistently use 'may' or 'should' to provide some indication of the strength of the recommendation based primarily on the literature but also considering the range of opinion received during consultation period. Hence 'may' is used when there is a wide range of evidence and/or opinion and 'should' is used where there is a narrow range of evidence and/or opinion. Furthermore, the organisation of the document as a whole or the order of various interventions within each section does not imply any particular priority or emphasis on the part of the expert working group.

Where no level I, II, III or IV evidence was available but there was sufficient consensus of the EWG, a clinical practice point based on expert opinion is provided. The results of consultation were also considered by the EWG regarding these consensus statements.

Consultation

Public consultation was undertaken, with the draft document circulated to relevant professional bodies, interested individuals, consumers and consumer organisations. A public notice was also published in *The Australian* newspaper. Feedback received during consultation was considered by the EWG and the draft document amended. A formal letter of reply was sent to all individuals and organisations that provided feedback during this period outlining the response taken by the EWG.

The outcomes of the consultation period suggested:

• Greater focus on person-centred care;

• Greater focus on rural and remote issues;

• Minor clarification on relevant literature;

• Revision of the roles of stroke team members.

Many points made during consultation related to grammatical or semantic interpretations and the EWG was able to make changes to correct or clarify certain points. In one instance, an additional study was identified. Overall the consultation process provided valuable assistance by increasing the accuracy and comprehensiveness of the document.

The following professional organisations and individuals were involved during the consultation process:

Mr Barry Arnott	Primary Care Manager, Rural Northwest Health
Mr Richard Abbott	Chronic Care Manager, NSW
Dr Craig Anderson	President, Stroke Society of Australasia
Ms Rosalie Andrew	Physiotherapist, Ballarat Health Service
Ms Catherine Baker	Occupational Therapist, Peninsula Health Care
Ms Sarah Barras	Deputy Chief Occupational Therapist, Donvale Rehabilitation Hospital
Dr Julie Bernhardt	Physiotherapist, National Stroke Research Institute
Ms Laura Boyd	Occupational Therapist, Boandik Lodge, SA
Ms Vanessa Brenninger	Dietitian, Royal North Shore Hospital, Sydney
Dr Leeanne Carey	Occupational Therapist, National Stroke Research Institute
A/Prof Ian Cameron	Chair, Rehabilitation Medicine, University of Sydney
Dr Colleen Canning	School of Physiotherapy, University of Sydney
Ms Leone Carroll	On behalf of Speech Pathology Australia
Dr Julie Cichero	Speech Pathologist, Private Practitioner
Mrs Kathryn Cistulli	Pharmacist, Royal North Shore Hospital, Sydney
Dr Catherine Dean	School of Physiotherapy, University of Sydney
Ms Nadege Demoiseau	Occupational Therapist, Mount Wilga Private Hospital
Ms Sonia Denisenko	On behalf of Australian Physiotherapy Association
Mr Dimitri Diacogiorgias	Podiatrist, Ballarat Health Service
Mr David Duncan	CEO, Occupational Therapy Australia
Ms Carol Gore	Associate Nurse Manager, Peninsula Health Care
Prof Gary Jennings	Director, Baker Medical Research Institute
Dr Chris Katsogiannis	Rehabilitation Physician, Orange Base Hospital
Ms Lynnette Kay	Occupational Therapist, University of Sydney
Ms Nicky Kay	Occupational Therapist, Royal Hobart Hospital
Ms Fiona Kent	Physiotherapist, Peninsula Health Care
Ms Susannah Kerr	Speech Pathologist, Gosford Hospital
Ms Kerry King	Speech Pathologist, Manly Hospital
Ms Michele Kosky	Health Consumer Council of WA
Ms Joan Leung	Physiotherapist, Royal Rehabilitation Centre, Sydney
Ms Sandra Lever	President, Australasian Rehabilitation Nurses Association
Ms Judy Martineau	Dietitian, The Wesley Hospital, Brisbane
Dr Kath McCarthy	On behalf of Australasian Faculty of Rehabilitation Medicine
Dr Annie McCluskey	School of Exercise & Health Sciences, University of Western Sydney
Ms Cathy Moore	Department of Health and Ageing, Australian Government
Ms Belinda Morey	Dietitian, Royal Brisbane Women's Hospital
National Blood Pressure and Vascular Disease Advisory Committee	National Heart Foundation

Mr John Norton	Consumer, Bendigo
Prof Daniel O'Connor	On behalf of Royal Australian and New Zealand College of Psychiatry
Ms Kimberley O'Donnell	Speech Pathologist, Royal Rehabilitation Centre, Sydney
A/Prof Dennis Pashen	On behalf of Australian College of Rural and Remote Medicine
Ms Gill Pierce	Carers Victoria
Ms Kerry Plumber	Assistant Director, Community Health and Allied Health, Bankstown Health Service
Dr Michael Rasmussen	Medical Advisor, Boehringer-Ingelheim Pty Ltd
Prof Perminder Sachdev	On behalf of Royal Australian and New Zealand College of Psychiatry
Ms Faye Simpson	Neuropsychologist, Peninsula Health Care
Ms Fiona Simpson	Dietitian, Royal North Shore Hospital, Sydney
Ms Marie Skinner	Principal Policy Officer, Queensland Health
Ms Robyn Speerin	On behalf of clinicians involved in chronic care, NSW Health
Dr Don Swinbourne	CEO, The Royal Australian and New Zealand College of Radiologists
Dr Srikanth Velandai	Geriatrician, Royal Hobart Hospital
Ms Dina Watterson	Occupational Therapist, Royal Melbourne Hospital
Ms Denita Wild	Occupational Therapist, Caufield General Medical Centre
A/Prof Linda Worrall, Dr Bronwyn Davidson, Robyn O'Hollaran, Tami Howe & Tanya Rose	Communication Disability in Ageing Research Centre, University of Queensland
Ms Clementia Yuen	Physiotherapy Service Manager, Braeside hospital
Dr Brian Zeman	Rehabilitation Physician, Royal Rehabilitation Centre, Sydney

Consumer Involvement

Consumer input has been a key component in the development process. Three consumers were included in the EWG and have been involved in every phase of the development process, including the development of the clinical questions to guide the literature searching. In addition a number of consumer organisations participated in the consultation process including the State Stroke Associations, the Health Consumer Council of WA and the Carers Australia.

Implementation

Reviewing the evidence and developing evidence-based recommendations for care involves only the first steps to ensuring that evidence-based care is available. Following publication of the *Clinical Guidelines for Stroke Rehabilitation and Recovery*, the guidelines must be disseminated to all those who provide care of relevance to stroke rehabilitation and recovery, who may then identify ways in which the guidelines may be taken up at a local level.

Strategies by which guidelines may be disseminated and implemented include:

- distribution of education materials - for example: mailing of guidelines to members of the target audience;

- educational meetings - for example: interdisciplinary conferences;

- educational outreach visits - for example: one on one visits by trained educators for short periods of time or visits by trained educators for longer periods of time;

- local opinion leaders (with brief training, they may provide covering letters for guidelines mailed to colleagues or host meetings; with training for longer periods of time, they may head task forces, etc);

- audit and feedback - for example: regular, frequent e-mails to clinicians with computer generated reports on compliance with guidelines;

- reminders - for example: computer generated alerts and flags.

A systematic review of dissemination and implementation strategies found that there was insufficient evidence of the effectiveness of these interventions. Methodological weaknesses, poor reporting of the study setting and uncertainty about the generalisability of the results were the prime reasons that made interpretation difficult. The review also indicated that single interventions may or may not be as effective as multifaceted interventions and there is no relationship between the number of interventions and the effect of the interventions.[424]

All of the above strategies may therefore be considered and used where appropriate for implementation of the *Clinical Guidelines for Stroke Rehabilitation and Recovery.* Health professionals are encouraged to identify the barriers and facilitators to evidence-based care within their environment when determining the best strategy for local needs. Implementation of the Guidelines may be supported by existing resources and networks. These include:

- the *Stroke Services in Australia* report, which outlines how stroke services may be organised in different parts of Australia and the resources that may be needed to do this (available at www.strokefoundation.com.au);

- the *Stroke Care Pathway,* which provides a checklist addressing key processes of care as outlined in both documents (Acute, and Rehabilitation and Recovery) and a guide to developing local protocols; and

- the *Australasian Stroke Unit Network:* comprising health professionals from acute and post-acute settings across Australasia from different disciplines who are interested in stroke care (see www.asun.com.au).

Priorities for Research

The guidelines reflect the current evidence base and its limitations. For some interventions, there is good evidence for or against their use; however, many other interventions in current use are not discussed because there is neither good quality evidence on their effectiveness, nor sufficient consensus in the field concerning their potential benefits. The substantial gaps in the evidence base highlight the need for practitioners to build quality research studies into their clinical practice.

Currently there is more research focussed at the impairment level of function than at the levels of activity and participation. Although no consistent link has been demonstrated between impairment, activity and participation, a clearer association may become evident with further research. This document highlights the lack of research to date based at the level of participation and further research is particularly needed at this level, to complement and extend the existing and projected impairment-level research.

Research is also needed to assist our understanding of how to maximise brain recovery, minimise stroke impact (both at an individual and societal level), and best regain function and quality of life by adaptive processes. Further research is also vital regarding models of service delivery for rural and remote areas, as well as economic implications and socioeconomic implications of stroke rehabilitation and recovery.

Areas in which research is particularly needed include (but are not limited to):

- peer support interventions

- self management strategies specific to stroke

- driving assessment and training

- interventions for returning to work

In addition, further research regarding processes of care should include:

- post-discharge follow up services
- certain components of stroke units eg. early mobilisation, inpatient stroke care coordinator
- respite care
- pre-discharge needs assessment

Further evidence at an impairment and activity level is needed for interventions to address:

- shoulder pain in stroke
- cognitive difficulties (attention, concentration and memory)
- agnosia
- apraxia/dyspraxia
- dyspraxia of speech
- dysarthria
- bladder function
- mood

APPENDIX 3: USEFUL WEBSITES

The following are recommended websites that provide evidence-based information regarding stroke care.

- Australasian Cochrane Centre — www.cochrane.org.au
- Evidence-Based Review of Stroke Rehabilitation — www.ebrsr.com
- National Stroke Foundation — www.strokefoundation.com.au
- New Zealand Guideline for Management of Stroke — www.nzgg.org.nz
- Occupational Therapy Systematic Evaluation of Evidence — www.otseeker.com
- Physiotherapy Evidence Database (PEDro) — www.pedro.fhs.usyd.edu.au/index.htm
- Psycbite (Psychological database for Brain Impairment Treatment Efficacy) — www.psycbite.com
- PsycINFO — www.psycinfo.com
- Royal College of Physicians Stroke Guidelines — www.rcplondon.ac.uk/pubs/books/stroke
- Scottish Intercollegiate Guidelines Network (SIGN) Stroke Guidelines — www.sign.ac.uk (Guideline 64)
- Stroke Information Directory — www.stroke-info.com
- Stroke Therapy Evaluation Program (STEP) — www.effectivestrokecare.org

GLOSSARY AND ABBREVIATIONS

Glossary of terms

Activities of daily living: The basic elements of personal care such as eating, washing and showering, grooming, walking, standing up from a chair and using the toilet.

Activity: The execution of a task or action by an individual. Activity limitations are difficulties an individual may have in executing activities.

Agnosia: The inability to recognise sounds, smells, objects or body parts (other people's or one's own) despite having no primary sensory deficits.

Aphasia: Impairment of language, affecting the production or comprehension of speech and the ability to read and write.

Apraxia: Impaired planning and sequencing of movement that is not due to weakness, incoordination, or sensory loss.

Atrial fibrillation: Rapid, irregular beating of the heart.

Augmentative and alternative communication: Non-verbal communication, eg. through gestures or by using computerised devices.

Central post-stroke pain: An unpleasant burning, lancinating, or pricking sensation that is generated by a lesion or dysfunction within the central nervous system that was caused by stroke.

Continuous positive airway pressure: A treatment for sleep apnoea which keeps the airways open by the constant delivery of pressurised air through a nasal mask or pillow.

Conventional therapy: any therapy provided to participants that comprises of the usual or routine care within a particular clinical trial. Conventional care is often provided to both groups to control for variations in care (eg. Therapy A v Therapy A+B) as it may be impractical to provide a suitable placebo.

Deep vein thrombosis: Thrombosis (a clot of blood) in the deep veins of the leg, arm, or abdomen.

Disability: A defect in performing a normal activity or action (eg, inability to dress or walk).

Dysarthria: Impaired ability to produce clear speech due to the impaired function of the speech muscles.

Dysphagia: Difficulty swallowing.

Dysphasia: Reduced ability to communicate using language (spoken, written or gesture).

Dyspraxia of speech: Inability to produce clear speech due to impaired planning and sequencing of movement in the muscles used for speech.

Enteral tube feeding: Delivery of nutrients directly into the intestine via a tube.

Executive function: Cognitive functions usually associated with the frontal lobes including planning, reasoning, time perception, complex goal-directed behaviour, decision making and working memory.

Family support / liaison worker: A person who assists stroke survivors and their families to achieve improved quality of life by providing psychosocial support and information referrals to other stroke service providers.

Homonymous hemianopia: A loss of the visual field to one side of the body, affecting both eyes.

Ideation apraxia: A disturbance of voluntary movement characterised by the incorrect use of objects due to impaired conceptual understanding regarding their appropriate use.

Ideomotor apraxia: The impaired ability to execute voluntary movements in a smooth, spatially accurate and correctly timed manner.

Impairment: A problem in the structure of the body (eg loss of a limb) or the way the body or a body part functions (eg, hemiplegia).

Infarction: Death of cells in an organ (eg, the brain or heart) due to lack of blood supply.

Inpatient stroke care coordinator: A person who works with people with stroke and with their carers to construct care plans and discharge plans and to help coordinate the use of health care services during recovery in hospital.

Interdisciplinary team: The entire rehabilitation team, made up of doctors, nurses, therapists, social workers, psychologists etc.

Ischaemia: An inadequate flow of blood to part of the body due to blockage or constriction of the arteries that supply it.

Motor relearning approach: An approach that uses active practice of context-specific motor tasks with appropriate feedback to promote learning and motor recovery.

Neglect: The failure to attend or respond to, or make movements towards one side of the environment.

Obstructive sleep apnoea: a condition in which airflow to the upper airways becomes restricted during sleep.

Orthopaedic approach: Corrective exercises based on orthopaedic principles related to the contraction and relaxation of muscles, with the emphasis placed on regaining function by compensating with the unaffected limbs.

Participation: Involvement in a life situation.

Participation restrictions: are problems an individual may experience in involvement in life situations.

Percutaneous endoscopic gastrostomy: A form of enteral feeding in which nutrition is delivered via a tube that is surgically inserted into the stomach through the skin.

Phonological deficits: Language deficits characterised by impaired recognition and/or selection of speech sounds.

Pulmonary embolism: Blockage of the pulmonary artery (which carries blood from the heart to the lungs) with a solid material, usually a blood clot or fat, that has travelled there via the circulatory system.

Rehabilitation: Restoration of the disabled person to optimal physical and psychological functional independence.

Risk factor: A characteristic of a person (or people) that is positively associated with a particular disease or condition.

Self-management: A process in which the person with stroke engages in activities that protect and promote health; monitors and manages any signs or symptoms of stroke and other illness; manages the impact of stroke; and adheres to treatment regimes as discussed and agreed upon with those assisting in care.

Spasticity: a motor disorder characterised by a velocity-dependent increase in tonic stretch reflexes (muscle tone) with exaggerated tendon jerks resulting from hyperexcitability of the stretch reflex as one component of the upper motor neuron syndrome. [425]

Stroke unit: A section of a hospital dedicated to comprehensive rehabilitation programs for people with a stroke.

Stroke: Sudden and unexpected damage to brain cells that causes symptoms that last for more than 24 hours, in the parts of the body controlled by those cells. It happens when the blood supply to part of the brain is suddenly disrupted, either by blockage of an artery or by bleeding within the brain.

Task-specific training: Training that involves repetition of the task or part of the task.

Transient ischaemic attack: Stroke-like symptoms that last less than 24 hours. While TIA is not actually a stroke, it has the same cause. A TIA may be the precursor of a stroke, and people who have had a TIA require urgent assessment and treatment to prevent stroke.

Abbreviations

AAC: Augmentative and alternative communication

ADL: Activities of daily living

CPAP: Continuous positive airway pressure

CPSP: Central post stroke pain

DVT: Deep vein thrombosis

EMG: Electromyogram/electromyography

ES: Electrical stimulation

ESD: Early supported discharge

EWG: Expert Working Group

NDT: Neuro-developmental therapy

NHMRC: National Health and Medical Research Council

OSA: Obstructive sleep apnoea

OT: Occupational therapist

PE: Pulmonary embolism

PEG: Percutaneous endoscopic gastrostomy

RCT: Randomised controlled trial

STAIR: Stroke transition after inpatient care

STEP: Stroke Therapy Evaluation Program

TIA: Transient ischaemic attack

REFERENCES

1. National Health and Medical Research Council. A guide to the development and evaluation of clinical practice guidelines. Commonwealth of Australia 1999.

2. National Stroke Foundation. National Stroke Foundation website. Accessed on February 1, 2005 at http://www.strokefoundation.com.au

3. Dewey HM, Thrift AG, Mihalopoulos C, Carter R, Macdonell RA, McNeil JJ, et al. Lifetime cost of stroke subtypes in Australia: Findings from the North East Melbourne Stroke Incidence Study (NEMESIS). Stroke 2003;34(10):2502-7.

4. Australian Institute of Health and Welfare. The International Classification of Functioning, Disability and Health. Disability Data Briefing. 2002(Number 20).

5. Kunst AE, del Rios M, Groenhof F, Mackenbach JP. Socioeconomic inequalities in stroke mortality among middle-aged men: An international overview. European Union Working Group on Socioeconomic Inequalities in Health Stroke 1998;29(11):2285-2291.

6. Engström G, Jerntorp I, Pessah-Rasmussen H, Hedblad B, Berglund G, Janzon L. Geographic distribution of stroke incidence within an urban population: Relations to socioeconomic circumstances and prevalence of cardiovascular risk factors. Stroke 2001;32(5):1098-1103.

7. Wolfe CD, Rudd AG, Howard R, Coshall C, Stewart J, Lawrence E, et al. Incidence and case fatality rates of stroke subtypes in a multiethnic population: The South London Stroke Register. J Neurol Neurosurg Psychiatry 2002;72(2):211-216.

8. Gillum RF, Mussolino ME. Education, poverty, and stroke incidence in whites and blacks: The NHANES I Epidemiologic Follow-up Study. J Clin Epidemiol 2003;56(2):188-195.

9. Jakovljevic D, Sarti C, Sivenius J, Torppa J, Mahonen M, Immonen-Raiha P, et al. Socioeconomic status and ischemic stroke: The FINMONICA Stroke Register. Stroke 2001;32(7):1492-8.

10. Arrich J, Lalouschek W, Mullner M. Influence of socioeconomic status on mortality after stroke: retrospective cohort study. Stroke 2005;36(2):310-314.

11. Kapral MK, Wang H, Mamdani M, Tu JV. Effect of socioeconomic status on treatment and mortality after stroke. Stroke 2002;33(1):268-273.

12. Thrift AG, Dewey HM, Sturm JW, Paul SL, Gilligan AK, Srikanth VK, et al. Increasing stroke incidence with increasing levels of socioeconomic disadvantage. Australasian Epidemiologist 2004;11(3):52-53.

13. Patel A, Knapp M, Perez I, Evans A, Kalra L. Alternative strategies for stroke care: Cost-effectiveness and cost-utility analyses from a prospective randomized controlled trial. Stroke 2004;35(1):196-203.

14. Stroke Unit Trialists' Collaboration. Organised inpatient (stroke unit) care for stroke. The Cochrane Database of Systematic Reviews 2001, Issue 3. Art. No.: Cd000197. Doi: 10.1002/14651858.Cd000197.

15. Cadilhac DA, Ibrahim J, Pearce DC, Ogden KJ, McNeill J, Davis SM, et al. Multicenter comparison of processes of care between Stroke Units and conventional care wards in Australia. Stroke 2004;35(5):1035-40.

16. Langhorne P, Pollock A. What are the components of effective stroke unit care? Age and Ageing 2002;31(5):365-71.

17. National Stroke Foundation. Stroke Services in Australia - National Stroke Unit Program Policy Document. (unpublished) 2002.

18. Kwan J, Sandercock P. In-hospital care pathways for stroke. The Cochrane Database of Systematic Reviews 2004, Issue 4. Art. No.: Cd002924.Pub2. Doi: 10.1002/14651858.Cd002924.Pub2.

19. Mcdonald PS, Mayer P, Dunn L. National Service Framework for Older People: stroke coordinators. Br J Nurs 2002;11(19):1259-61, 1263-5.

20. Burton CR. An exploration of the stroke co-ordinator role. J Clin Nurs 1999;8(5):535-41.

21. Donnelly M, Power M, Russell M, Fullerton K. Randomized controlled trial of an early discharge rehabilitation service: The Belfast Community Stroke Trial. Stroke 2004;35(1):127-133.

22. Langhorne P, Taylor G, Murray G, Dennis M, Anderson C, Bautz-Holter E, et al. Early supported discharge services for stroke patients: a meta-analysis of individual patients' data. Lancet 2005;365(9458):501-6.

23. Teasell RW, Foley NC, Bhogal SK, Speechley MR. Early supported discharge in stroke rehabilitation. Top Stroke Rehabil 2003;10(2):19-33.

24. Anderson C, Ni Mhurchu C, Brown PM, Carter K. Stroke Rehabilitation Services to Accelerate Hospital Discharge and Provide Home-Based Care: An Overview and Cost Analysis. Pharmacoeconomics 2002;20(8):537.

25. Early Supported Discharge Trialists. Services for reducing duration of hospital care for acute stroke patients. The Cochrane Database of Systematic Reviews 2001, Issue 3. Art. No.: Cd000443. Doi: 10.1002/14651858.Cd000443.

26. Outpatient Service Trialists. Therapy-based rehabilitation services for stroke patients at home. The Cochrane Database of Systematic Reviews 2002, Issue 2. Art. No.: Cd002925. Doi: 10.1002/14651858.Cd002925.

27. Britton M, Andersson A. Home rehabilitation after stroke: Reviewing the scientific evidence on effects and costs. Int J Technol Assess Health Care 2000;16(3):842-848.

28. Baskett JJ, Broad JB, Reekie G, Hocking C, Green G. Shared responsibility for ongoing rehabilitation: A new approach to home-based therapy after stroke. Clin Rehabil 1999;13(1):23-33.

29. Roderick P, Low J, Day R, Peasgood T, Mullee MA, Turnbull JC, et al. Stroke rehabilitation after hospital discharge: a randomized trial comparing domiciliary and day-hospital care. Age and Ageing 2001;30(4):303-10.

30. Forster A, Young J, Langhorne P, for the Day Hospital Group. Medical day hospital care for the elderly versus alternative forms of care. The Cochrane Database of Systematic Reviews 1999, Issue 3. Art. No.: Cd001730. Doi: 10.1002/14651858.Cd001730.

31. Lincoln NB, Walker MF, Dixon A, Knights P. Evaluation of a multiprofessional community stroke team: A randomized controlled trial. Clin Rehabil 2004;18(1):40-7.

32. Mottram P, Pitkala K, Lees C. Institutional versus at-home long term care for functionally dependent older people. The Cochrane Database of Systematic Reviews 2002, Issue 1. Art. No.: Cd003542. Doi: 10.1002/14651858.Cd003542.

33. Lee H, Cameron M. Respite care for people with dementia and their carers. The Cochrane Database of Systematic Reviews 2004, Issue 1. Art. No.: Cd004396.Pub2. Doi: 10.1002/14651858.Cd004396.Pub2.

34. Warlow C, Dennis M, van Gihn J, Hankey G, Sandercock P, Bamford J, et al. Stroke: A practical guide to management. 2 ed. Melbourne: Blackwell Science Ltd; 2001.

35. Rudd AG, Wolfe CD, Tilling K, Beech R. Randomised controlled trial to evaluate early discharge scheme for patients with stroke. Br Med J 1997;315(7115):1039-44.

36. Royal College of Physicians. National clinical guidelines for stroke. The intercollegiate working party for stroke; 2004.

37. Tyson S, Turner G. Discharge and follow-up for people with stroke: What happens and why. Clin Rehabil 2000;14(4):381-92.

38. Noone I, Fan CW, Tarrant H, O'Keeffe S, McDonnell R, Crowe M. What happens to stroke patients after hospital discharge? Ir Med J 2001;94(5):151-2.

39. Evans RL, Hendricks RD. Evaluating hospital discharge planning: A randomized clinical trial. Med Care 1993;31(4):358-70.

40. Naylor M, Brooten D, Jones R, Lavizzo-Mourey R, Mezey M, Pauly M. Comprehensive discharge planning for the hospitalized elderly. A randomized clinical trial. Ann Intern Med 1994;120(12):999-1006.

41. Shepperd S, Parkes J, McClaran J, Phillips C. Dis charge planning from hospital to home. The Cochrane Database of Systematic Reviews 2004, Issue 1. Art. No.: Cd000313.Pub2. Doi: 10.1002/14651858.Cd000313.Pub2.

42. Simon C, Kendrick T. Community provision for informal live-in carers of stroke patients. Br J Community Nurs 2002;7(6):292-8.

43. Kalra L, Evans A, Perez I, Melbourn A, Patel A, Knapp M, et al. Training carers of stroke patients: randomised controlled trial. Br Med J 2004;328(7448):1099.

44. Christie D, Weigall D. Social work effectiveness in two-year stroke survivors: a randomised controlled trial. Community Health Stud 1984;8(1):26-32.

45. Towle D, Lincoln NB, Mayfield LM. Service provision and functional independence in depressed stroke patients and the effect of social work intervention on these. J Neurol Neurosurg Psychiatry 1989;52(4):519-22.

46. Forster A, Young J. Specialist nurse support for patients with stroke in the community: a randomised controlled trial. Br Med J 1996;312(7047):1642-6.

47. Goldberg G, Segal ME, Berk SN, Schall RR, Gershkoff AM. Stroke transition after inpatient rehabilitation. Topics in Stroke Rehabilitation 1997(1):64-79.

48. Dennis M, O'Rourke S, Slattery J, Staniforth T, Warlow C. Evaluation of a stroke family care worker: Results of a randomised controlled trial. Br Med J 1997;314(7087):1071-6; discussion 1076-7.

49. Glass TA, Berkman LF, Hiltunen EF, Furie K, Glymour MM, Fay ME, et al. The Families In Recovery From Stroke Trial (FIRST): primary study results. Psychosom Med 2004;66(6):889-97.

50. Andersen HE, Eriksen K, Brown A, Schultz-Larsen K, Forchhammer BH. Follow-up services for stroke survivors after hospital discharge--a randomized control study. Clin Rehabil 2002;16(6):593-603.

51. Mant J, Carter J, Wade DT, Winner S. Family support for stroke: A randomised controlled trial. Lancet 2000;356(9232):808-13.

52. Lincoln NB, Francis VM, Lilley SA, Sharma JC, Summerfield M. Evaluation of a stroke family support organiser: a randomized controlled trial. Stroke 2003;34(1):116-21.

53. Bhogal SK, Teasell RW, Foley NC, Speechley MR. Community reintegration after stroke. Topics in Stroke Rehabilitation. 2003;10(2):107-29.

54. Forster A, Smith J, Young J, Knapp P, House A, Wright J. Information provision for stroke patients and their caregivers. The Cochrane Database of Systematic Reviews 2001, Issue 2. Art. No.: Cd001919. Doi: 10.1002/14651858.Cd001919.

55. Smith J, Forster A, Young J. A randomized trial to evaluate an education programme for patients and carers after stroke. Clin Rehabil 2004;18(7):726-736.

56. Clark MS, Rubenach S, Winsor A. A randomized controlled trial of an education and counselling intervention for families after stroke. Clin Rehabil 2003;17(7):703-12.

57. Morris SL, Dodd KJ, Morris ME. Outcomes of progressive resistance strength training following stroke: A systematic review. Clin Rehabil 2004;18(1):27-39.

58. Duncan P, Studenski S, Richards L, Gollub S, Lai SM, Reker D, et al. Randomized clinical trial of therapeutic exercise in subacute stroke. Stroke 2003;34(9):2173-80.

59. Winstein CJ, Rose DK, Tan SM, Lewthwaite R, Chui HC, Azen SP. A randomized controlled comparison of upper-extremity rehabilitation strategies in acute stroke: A pilot study of immediate and long-term outcomes. Arch Phys Med Rehabil 2004;85(4):620-8.

60. Ouellette MM, LeBrasseur NK, Bean JF, Phillips E, Stein J, Frontera WR, et al. High-intensity resistance training improves muscle strength, self-reported function, and disability in long-term stroke survivors. Stroke 2004;35(6):1404-9.

61. Basmajian JV, Kukulka CG, Narayan MG, Takebe K. Biofeedback treatment of foot-drop after stroke compared with standard rehabilitation technique: Effects on voluntary control and strength. Arch Phys Med Rehabil 1975;56(6):231-6.

62. Inglis J, Donald MW, Monga TN, Sproule M, Young MJ. Electromyographic biofeedback and physical therapy of the hemiplegic upper limb. Arch Phys Med Rehabil 1984;65(12):755-9.

63. Glanz M, Klawansky S, Stason W, Berkey C, Chalmers TC. Functional electrostimulation in poststroke rehabilitation: A meta-analysis of the randomized controlled trials. Arch Phys Med Rehabil 1996;77(6):549-553.

64. Cauraugh J, Light K, Kim S, Thigpen M, Behrman A. Chronic motor dysfunction after stroke: Recovering wrist and finger extension by electromyography-triggered neuromuscular stimulation. Stroke 2000;31(6):1360-4.

65. Conforto AB, Kaelin-Lang A, Cohen LG. Increase in hand muscle strength of stroke patients after somatosensory stimulation. Ann Neurol 2002;51(1):122-5.

66. Teixeira-Salmela LF, Olney SJ, Nadeau S, Brouwer B. Muscle strengthening and physical conditioning to reduce impairment and disability in chronic stroke survivors. Arch Phys Med Rehabil 1999;80(10):1211-8.

67. Lum PS, Burgar CG, Shor PC, Majmundar M, Van der Loos M. Robot-assisted movement training compared with conventional therapy techniques for the rehabilitation of upper-limb motor function after stroke. Arch Phys Med Rehabil 2002;83(7):952-9.

68. Bourbonnais D, Bilodeau S, Lepage Y, Beaudoin N, Gravel D, Forget R. Effect of force-feedback treatments in patients with chronic motor deficits after a stroke. Am J Phys Med Rehabil 2002;81(12):890-7.

69. Cauraugh JH, Kim S. Two coupled motor recovery protocols are better than one: Electromyogram-triggered neuromuscular stimulation and bilateral movements. Stroke 2002;33(6):1589-94.

70. Kraft GH, Fitts SS, Hammond MC. Techniques to improve function of the arm and hand in chronic hemiplegia. Arch Phys Med Rehabil 1992;73(3):220-7.

71. Bolton DA, Cauraugh JH, Hausenblas HA. Electromyogram-triggered neuromuscular stimulation and stroke motor recovery of arm/hand functions: A meta-analysis. J Neurol Sci 2004;223(2):121-7.

72. Heckmann J, Mokrusch T, Krockel A, Warnke S, Von S, Neundorfer B. EMG-triggered electrical muscle stimulation in the treatment of central hemiparesis after a stroke. European Journal of Physical Medicine & Rehabilitation 1997;7(5):138-141.

73. Carey LM, Matyas TA, Oke LE. Sensory loss in stroke patients: Effective training of tactile and proprioceptive discrimination. Arch Phys Med Rehabil 1993;74(6):602-11.

74. Yekutiel M, Guttman E. A controlled trial of the retraining of the sensory function of the hand in stroke patients. J Neurol Neurosurg Psychiatry 1993;56(3):241-4.

75. Byl N, Roderick J, Mohamed O, Hanny M, Kotler J, Smith A, et al. Effectiveness of sensory and motor rehabilitation of the upper limb following the principles of neuroplasticity: Patients stable poststroke. Neurorehabil Neural Repair 2003;17(3):176-91.

76. Carey J, Matyas T. Somatosensory discrimination after stroke: Stimulus specific versus generalisation training. In: Bennett K, Gregory S, editors. Perception for action: Proceedings from the 3rd annual perception for action conference. Melbourne: Cleveland Digital Printing; 2000. P. 61-72.

77. Peurala SH, Pitkanen K, Sivenius J, Tarkka IM. Cutaneous electrical stimulation may enhance sensorimotor recovery in chronic stroke. Clin Rehabil 2002;16(7):709-16.

78. Van Deusen-Fox J. Cutaneous stimulation: Effects on selected tests of perception. Am J Occup Ther 1964(2):53-55.

79. Van Kuijk AA, Geurts AC, Bevaart BJ, van Limbeek J. Treatment of upper extremity spasticity in stroke patients by focal neuronal or neuromuscular blockade: A systematic review of the literature. J Rehabil Med 2002;34(2):51-61.

80. Bakheit AM, Pittock S, Moore AP, Wurker M, Otto S, Erbguth F, et al. A randomized, double-blind, placebo-controlled study of the efficacy and safety of botulinum toxin type A in upper limb spasticity in patients with stroke. Eur J Neurol 2001;8(6):559-65.

81. Brashear A, Gordon MF, Elovic E, Kassicieh VD, Marciniak C, Do M, et al. Intramuscular injection of botulinum toxin for the treatment of wrist and finger spasticity after a stroke. N Engl J Med 2002;347(6):395-400.

82. Pittock SJ, Moore AP, Hardiman O, Ehler E, Kovac M, Bojakowski J, et al. A double-blind randomised placebo-controlled evaluation of three doses of botulinum toxin type A (Dysport) in the treatment of spastic equinovarus deformity after stroke. Cerebrovasc Dis 2003;15(4):289-300.

83. Childers MK, Brashear A, Jozefczyk P, Reding M, Alexander D, Good D, et al. Dose-dependent response to intramuscular botulinum toxin type A for upper-limb spasticity in patients after a stroke. Arch Phys Med Rehabil 2004;85(7):1063-9.

84. Bakheit AM, Thilmann AF, Ward AB, Poewe W, Wissel J, Muller J, et al. A randomized, double-blind, placebo-controlled, dose-ranging study to compare the efficacy and safety of three doses of botulinum toxin type A (Dysport) with placebo in upper limb spasticity after stroke. Stroke 2000;31(10):2402-6.

85. Brashear A, McAfee AL, Kuhn ER, Fyffe J. Botulinum toxin type B in upper-limb poststroke spasticity: A double-blind, placebo-controlled trial. Arch Phys Med Rehabil 2004;85:705-9.

86. Creedon SD, Dijkers MP, Hinderer SR. Intrathecal baclofen for severe spasticity: A meta-analysis. International Journal of Rehabilitation and Health 1997;3(3):171-185.

87. Meythaler JM, Guin-Renfroe S, Brunner RC, Hadley MN. Intrathecal baclofen for spastic hypertonia from stroke. Stroke 2001;32:2099-109.

88. Steinbok P, O'Donnell M. Baclofen infusion for spastic cerebral palsy. Clin Neurosurg 2000;47:440-57.

89. Ageranioti SA, al. E. Effects of vibration on hypertonia and hyperreflexia in the wrist joint of patients with spastic hemiparesis. Physiother Can 1990;42:24-33.

90. Gracies JM, Marosszeky JE, Renton R, Sandanam J, Gandevia SC, Burke D. Short-term effects of dynamic lycra splints on upper limb in hemiplegic patients. Arch Phys Med Rehabil 2000;81(12):1547-55.

91. Carey JR. Manual stretch: Effect on finger movement control and force control in stroke subjects with spastic extrinsic finger flexor muscles. Arch Phys Med Rehabil 1990;71(11):888-94.

92. Nuyens GE, De Weerdt WJ, Spaepen AJ, Jr., Kie kens C, Feys HM. Reduction of spastic hypertonia during repeated passive knee movements in stroke patients. Arch Phys Med Rehabil 2002;83(7):930-5.

93. Swaan D, van Wieringen PC, Fokkema SD. Auditory electromyographic feedback therapy to inhibit undesired motor activity. Arch Phys Med Rehabil 1974;55(6):251-4.

94. Hesse S, Reiter F, Konrad M, Jahnke MT. Botulinum toxin type A and short-term electrical stimulation in the treatment of upper limb flexor spasticity after stroke: A randomized, double-blind, placebo-controlled trial. Clin Rehabil 1998;12(5):381-8.

95. Johnson CA, Burridge JH, Strike PW, Wood DE, Swain ID. The effect of combined use of botulinum toxin type A and functional electric stimulation in the treatment of spastic drop foot after stroke: A preliminary investigation. Arch Phys Med Rehabil 2004;85(6):902-9.

96. Montane E, Vallano A, Laporte JR. Oral antispastic drugs in nonprogressive neurologic diseases: A systematic review. Neurology 2004;63(8):1357-63.

97. Ada L, Goddard E, McCully J, Stavrinos T, Bampton J. 30 minutes of positioning reduces the development of external rotation but not flexion contracture in the shoulder after stroke: A randomised controlled trial. Arch Phys Med Rehabil 2005;86(2):230-4.

98. Dean CM, Mackey FH, Katrak P. Examination of shoulder positioning after stroke: A randomised controlled pilot trial. Australian Journal of Physiotherapy 2000;46(1):35-40.

99. Lannin NA, Herbert RD. Is hand splinting effective for adults following stroke? A systematic review and methodologic critique of published research. Clin Rehabil; 2003;17(8):807-16.

100. Lannin NA, Horsley SA, Herbert R, McCluskey A, Cusick A. Splinting the hand in the functional position after brain impairment: A randomized, controlled trial. Arch Phys Med Rehabil 2003;84(2):297-302.

101. Kumar R, Metter EJ, Mehta AJ, Chew T. Shoulder pain in hemiplegia. The role of exercise. Am J Phys Med Rehabil 1990;69(4):205-8.

102. Pandyan AD, Granat MH, Stott DJ. Effects of electrical stimulation on flexion contractures in the hemiplegic wrist. Clin Rehabil 1997;11(2):123-30.

103. Mortenson PA, Eng JJ. The use of casts in the management of joint mobility and hypertonia following brain injury in adults: A systematic review. Phys Ther 2003;83(7):648-58.

104. Ada L, Foongchomcheay A. Efficacy of electrical stimulation in preventing or reducing subluxation of the shoulder after stroke: A meta-analysis. Australian Journal of Physiotherapy 2002;48(4):257-67.

105. Ada L, Foongchomcheay A, Canning C. Supportive devices for preventing and treating subluxation of the shoulder after stroke. The Cochrane Database of Systematic Reviews 2002, Issue 4. Art. No.: Cd003863. Doi:10.1002/14651858.Cd003863.

106. Brooke MM, de Lateur BJ, Diana-Rigby GC, Questad KA. Shoulder subluxation in hemiplegia: Effects of three different supports. Arch Phys Med Rehabil 1991;72(8):582-6.

107. Moodie N, Brisbin J, Morgan A. Subluxation of the glenohumeral joint in hemiplegia: Evaluation of supportive devices. Physiother Can 1986;38:151-157.

108. Williams R, Taffs L, Minuk T. Evaluation of two support methods for the subluxated shoulder of hemiplegic patients. Phys Ther 1988;68(8):1209-14.

109. Zorowitz RD, Idank D, Ikai T, Hughes MB, Johnston MV. Shoulder subluxation after stroke: a comparison of four supports. Arch Phys Med Rehabil 1995;76(8):763-71.

110. Price CIM, Pandyan AD. Electrical stimulation for preventing and treating post-stroke shoulder pain. The Cochrane Database of Systematic Reviews 1999, Issue 3. Art. No.: Cd001698. Doi:10.1002/14651858.Cd001698.

111. Snels IAK, Beckerman H, Twisk JWR, Dekker JHM, de Koning P, Koppe PA, et al. Effect of triamcinolone acetonide injections on hemiplegic shoulder pain: A randomized clinical trial. Stroke 2000;31(10):2396-401.

112. Partridge C, Edwards S, Mee R, van Langenberghe H. Hemiplegic shoulder pain: A study of two methods of physiotherapy treatment. Clin Rehabil 1990;4:43-49.

113. Inaba MK, Piorkowski M. Ultrasound in treatment of painful shoulders in patients with hemiplegia. Phys Ther 1972;52(7):737-42.

114. Australian Acute Musculoskeletal Pain Guidelines Group. Evidence-based management of acute musculoskeletal pain. Bowen Hills, Queensland: Australian Academic Press Pty Ltd; 2003.

115. Roper TA, Redford S, Tallis RC. Intermittent compression for the treatment of the oedematous hand in hemiplegic stroke: A randomized controlled trial. Age and Ageing 1999;28(1):9-13.

116. Faghri PD. The effects of neuromuscular stimulation-induced muscle contraction versus elevation on hand edema in CVA patients. J Hand Ther 1997;10(1):29-34.

117. Giudice ML. Effects of continuous passive motion and elevation on hand edema. Am J Occup Ther 1990;44(10):914-21.

118. Kelly JO, Kilbreath SL, Davis GM, Zeman B, Raymond J. Cardiorespiratory fitness and walking ability in subacute stroke patients. Arch Phys Med Rehabil 2003;84(12):1780-5.

119. Saunders DH, Greig CA, Young A, Mead GE. Physical fitness training for stroke patients. The Cochrane Database of Systematic Reviews 2004, Issue 1. Art. No.: Cd003316.Pub2. Doi: 10.1002/14651858.Cd003316.Pub2.

120. Van Peppen RPS, Kwakkel G, Wood-Dauphinee S, Hendriks HJM, Van Der Wees PJ, Dekker J. The impact of physical therapy on functional outcomes after stroke: What's the evidence? Clin Rehabil 2004;18:833-62.

121. Chu KS, Eng JJ, Dawson AS, Harris JE, Ozkaplan A, Gylfadottir S. Water-based exercise for cardiovascular fitness in people with chronic stroke: A randomized controlled trial. Arch Phys Med Rehabil 2004;85(6):870-4.

122. Potempa K, Lopez M, Braun LT, Szidon JP, Fogg L, Tincknell T. Physiological outcomes of aerobic exercise training in hemiparetic stroke patients. Stroke 1995;26(1):101-5.

123. Macko RF, DeSouza CA, Tretter LD, Silver KH, Smith GV, Anderson PA, et al. Treadmill aerobic exercise training reduces the energy expenditure and cardiovascular demands of hemiparetic gait in chronic stroke patients. A preliminary report. Stroke 1997;28(2):326-30.

124. Duncan P, Richards L, Wallace D, Stoker-Yates J, Pohl P, Luchies C, et al. A randomized, controlled pilot study of a home-based exercise program for individuals with mild and moderate stroke. Stroke 1998;29(10):2055-60.

125. Rimmer JH, Riley B, Creviston T, Nicola T. Exercise training in a predominantly African-American group of stroke survivors. Med Sci Sports Exerc 2000;32(12):1990-6.

126. Jorgensen L, Engstad T, Jacobsen BK. Higher incidence of falls in long-term stroke survivors than in population controls: depressive symptoms predict falls after stroke. Stroke 2002;33(2):542-7.

127. Tutuarima JA, van der Meulen JH, de Haan RJ, van Straten A, Limburg M. Risk factors for falls of hospitalized stroke patients. Stroke 1997;28(2):297-301.

128. Yates JS, Lai SM, Duncan PW, Studenski S. Falls in community-dwelling stroke survivors: an accumulated impairments model. J Rehabil Res Dev Clin Suppl 2002;39(3):385-94.

129. Teasell R, McRae M, Foley N, Bhardwaj A. The incidence and consequences of falls in stroke patients during inpatient rehabilitation: Factors associated with high risk. Arch Phys Med Rehabil 2002;83(3):329-33.

130. Hyndman D, Ashburn A, Stack E. Fall events among people with stroke living in the community: Circumstances of falls and characteristics of fallers. Arch Phys Med Rehabil 2002;83(2):165-70.

131. Cheng PT, Wu SH, Liaw MY, et al. Symmetrical body-weight distribution training in stroke patients and its effect on fall prevention. Arch Phys Med Rehabil 2001;82:1650-54.

132. Cheng PT, Wang CM, Chung CY, Chen CL. Effects of visual feedback rhythmic weight-shift training on hemiplegic stroke patients. Clin Rehabil 2004;18(7):747-53.

133. Barreca S, et al. Effects of extra training on the ability of stroke survivors to perform an independent sit-to-stand: A randomized controlled trial. J Geriatr Phys Ther 2004;27(2):59-64.

134. Green J, Forster A, Bogle S, Young J. Physiotherapy for patients with mobility problems more than 1 year after stroke: A randomised controlled trial. Lancet 2002;359(9302):199-203.

135. Mayo NE, Gloutney L, Levy AR. A randomized trial of identification bracelets to prevent falls among patients in a rehabilitation hospital. Arch Phys Med Rehabil 1994;75(12):1302-8.

136. Gillespie LD, Gillespie WJ, Robertson MC, Lamb SE, Cumming RG, Rowe BH. Interventions for preventing falls in elderly people. The Cochrane Database of Systematic Reviews 2003, Issue 4. Art. No.: Cd000340. Doi: 10.1002/14651858.Cd000340.

137. Parker MJ, Gillespie LD, Gillespie WJ. Hip protectors for preventing hip fractures in the elderly. The Cochrane Database of Systematic Reviews 2004, Issue 3. Art. No.: Cd001255.Pub2. Doi: 10.1002/14651858.Cd001255.Pub2.

138. Dean CM, Shepherd RB. Task-related training improves performance of seated reaching tasks after stroke. A randomized controlled trial. Stroke 1997;28(4):722-8.

139. Pollock AS, Durward BR, Rowe PJ, Paul JP. The effect of independent practice of motor tasks by stroke patients: A pilot randomized controlled trial. Clin Rehabil 2002;16(5):473-80.

140. Mudie MH, Winzeler-Mercay U, Radwan S, Lee L. Training symmetry of weight distribution after stroke: A randomized controlled pilot study comparing task-related reach, Bobath and feedback training approaches. Clin Rehabil 2002;16(6):582-92.

141. Pollock A, Baer G, Pomeroy V, Langhorne P. Physiotherapy treatment approaches for the recovery of postural control and lower limb function following stroke. The Cochrane Database of Systematic Reviews 1999, Issue 4. Art. No.: Cd001920. Doi: 10.1002/14651858.Cd001920.

142. Barclay-Goddard R, Stevenson T, Poluha W, Moffatt MEK, Taback SP. Force platform feedback for standing balance training after stroke. The Cochrane Database of Systematic Reviews 2004, Issue 3. Art. No.: Cd004129.Pub2. Doi: 10.1002/14651858.Cd004129.Pub2.

143. Moreland JD, Thomson MA, Fuoco AR. Electromyographic biofeedback to improve lower extremity function after stroke: A meta-analysis. Arch Phys Med Rehabil 1998;79(2):134-140.

144. Bradley L, Hart BB, Mandana S, Flowers K, Riches M, Sanderson P. Electromyographic biofeedback for gait training after stroke. Clin Rehabil 1998;12(1):11-22.

145. Morris ME, Matyas TA, Bach TM, Goldie PA. Electrogoniometric feedback: Its effect on genu recurvatum in stroke. Arch Phys Med Rehabil 1992;73(12):1147-54.

146. Ceceli E, Dursun E, Cakci A. Comparison of joint-position biofeedback and conventional therapy methods in genu recurvatum after stroke - 6 months' follow-up. European Journal of Physcial Medicine and Rehabilitation 1996;6(5):141-144.

147. Moseley AM, Stark A, Cameron ID, Pollock A. Treadmill training and body weight support for walking after stroke. The Cochrane Database of Systematic Reviews 2003, Issue 3. Art. No.: Cd002840. Doi: 10.1002/14651858.Cd002840.

148. Macdonell R, Triggs W, Leikauskas J, Bourque M, Robb K, Day B, et al. Functional electrical stimulation to the affected lower limb and recovery after cerebral infarction. J Stroke Cerebrovasc Dis 1994;4:155-160.

149. Burridge JH, Taylor PN, Hagan SA, Wood DE, Swain ID. The effects of common peroneal stimulation on the effort and speed of walking: A randomized controlled trial with chronic hemiplegic patients. Clin Rehabil 1997;11(3):201-10.

150. Granat MH, Maxwell DJ, Ferguson AC, Lees KR, Barbenel JC. Peroneal stimulator; evaluation for the correction of spastic drop foot in hemiplegia. Arch Phys Med Rehabil 1996;77(1):19-24.

151. Bogataj U, Gros N, Kljajic M, Acimovic R, Malezic M. The rehabilitation of gait in patients with hemiplegia: A comparison between conventional therapy and multichannel functional electrical stimulation therapy. Phys Ther 1995;75(6):490-502.

152. Malezic M, Kljajic M, Acimovic-Janezic R, Gros N, Krajnik J, Stanic U. Therapeutic effects of multisite electric stimulation of gait in motor-disabled patients. Arch Phys Med Rehabil 1987;68(9):553-60.

153. Cozean CD, Pease WS, Hubbell SL. Biofeedback and functional electric stimulation in stroke rehabilitation. Arch Phys Med Rehabil 1988;69(6):401-5.

154. Dean CM, Richards CL, Malouin F. Task-related circuit training improves performance of locomotor tasks in chronic stroke: A randomized, controlled pilot trial. Arch Phys Med Rehabil 2000;81(4):409-17.

155. Salbach NM, Mayo nenmmc, Wood-Dauphinee S, Hanley JA, Richards CL, Côté R. A task-orientated intervention enhances walking distance and speed in the first year post stroke: A randomized controlled trial. Clin Rehabil 2004;18(5):509-19.

156. Richards CL, Malouin F, Wood-Dauphinee S, Williams JI, Bouchard JP, Brunet D. Task-specific physical therapy for optimization of gait recovery in acute stroke patients. Arch Phys Med Rehabil 1993;74(6):612-20.

157. Leung J, Moseley AM. The impact of ankle-foot-orthosis on walking gait and muscle activity in adult hemiplegia. Physiotherapy 2003;89:29-55.

158. Nelson DL, Konosky K, Fleharty K, Webb R, Newer K, Hazboun VP, et al. The effects of an occupationally embedded exercise on bilaterally assisted supination in persons with hemiplegia. Am J Occup Ther 1996;50(8):639-46.

159. Feys HM, De Weerdt WJ, Selz BE, Cox Steck GA, Spichiger R, Vereeck LE, et al. Effect of a therapeutic intervention for the hemiplegic upper limb in the acute phase after stroke: A single-blind, randomized, controlled multicenter trial. Stroke 1998;29(4):785-92.

160. Lewis GN, Byblow WD. Neurophysiological and behavioural adaptations to a bilateral trainingintervention in individuals following stroke. Clin Rehabil 2004;18(1):48-59.

161. Luft AR, McCombe-Waller S, Whitall J, Forrester LW, Macko R, Sorkin JD, et al. Repetitive bilateral arm training and motor cortex activation in chronic stroke: A randomized controlled trial. [erratum appears in JAMA. 2004 nov 24; 292 (20):2470)]. JAMA 2004;292(15):1853-61.

162. McCombe Waller S, Whitall J. Fine motor control in adults with and without chronic hemiparesis: Baseline comparison to nondisabled adults and effects of bilateral arm training. Arch Phys Med Rehabil 2004;85(7):1076-83.

163. Mudie MH, Matyas TA. Responses of the densely hemiplegic upper extremity to bilateral training. Neurorehabil. Neural Repair 2001;15(2):129-40.

164. Platz T, Bock S, Prass K. Reduced skilfulness of arm motor behaviour among motor stroke patients with good clinical recovery: Does it indicate reduced automaticity? Can it be improved by unilateral or bilateral training? A kinematic motion analysis study. Neuropsychologia 2001;39(7):687-98.

165. Whitall J, McCombe Waller S, Silver KH, Macko RF. Repetitive bilateral arm training with rhythmic auditory cueing improves motor function in chronic hemiparetic stroke. Stroke 2000;31(10):2390-5.

166. Gelber D, Josefcyz P, Herrman D, Good D, Verhulst S. Comparison of two therapy approaches in the rehabilitation of the pure motor hemiparetic stroke patient. J Neuro Rehab 1995;9:191-196.

167. Jongbloed L, Stacey S, Brighton C. Stroke rehabilitation: Sensorimotor integrative treatment versus functional treatment. Am J Occup Ther 1989;43(6):391-7.

168. Moreland J, Thomson MA. Efficacy of electromyographic biofeedback compared with conventional physical therapy for upper-extremity function in patients following stroke: A research overview and meta- analysis. Phys Ther 1994;74(6):534-547.

169. Maulucci RA, Eckhouse RH. Retraining reaching in chronic stroke with real-time auditory feedback. Neurorehabilitation 2001;16(3):171-82.

170. Volpe BT, Krebs HI, Hogan N, Edelstein OL, Diels C, Aisen M. A novel approach to stroke rehabilitation: Robot-aided sensorimotor stimulation. Neurology 2000;54(10):1938-44.

171. Aisen ML, Krebs HI, Hogan N, McDowell F, Volpe BT. The effect of robot-assisted therapy and rehabilitative training on motor recovery following stroke. Arch Neurol 1997;54(4):443-6.

172. Fasoli SE, Krebs HI, Stein J, Frontera WR, Hughes R, Hogan N. Robotic therapy for chronic motor impairments after stroke: follow-up results. Arch Phys Med Rehabil 2004;85(7):1106-11.

173. Ploughman M, Corbett D. Can forced-use therapy be clinically applied after stroke? An exploratory randomized controlled trial. Arch Phys Med Rehabil 2004;85(9):1417-23.

174. Kwakkel G, van Peppen R, Wagenaar RC, Wood Dauphinee S, Richards C, Ashburn A, et al. Effects of a ugmented exercise therapy time after stroke: A meta-analysis. Stroke 2004;35(11):2529-39.

175. Lincoln NB, Parry RH, Vass CD. Randomized, controlled trial to evaluate increased intensity of physiotherapy treatment of arm function after stroke. Stroke 1999;30(3):573-9.

176. Ada L, Mackey F, Heard R, Adams R. Stroke rehabilitation: Does the therapy area provide a physical challenge? Australian Journal of Physiotherapy 1999;45(1):33-38.

177. De Weerdt W, Nuyens G, Feys H, Vangronsveld P, Van de Winckel A, Nieuwboer A, et al. Group physiotherapy improves time use by patients with stroke in rehabilitation. Australian Journal of Physiotherapy 2001;47(1):53-61.

178. Eng JJ, Chu KS, Kim CM, Dawson AS, Carswell A, Hepburn KE. A community-based group exercise program for persons with chronic stroke. Med Sci Sports Exerc 2003;35(8):1271-8.

179. McClellan R, Ada L. A six-week, resource-efficient mobility program after discharge from rehabilitation improves standing in people affected by stroke: Placebo-controlled, randomised trial. Australian Journal of Physiotherapy 2004;50(3):163-7.

180. Legg L, Drummond AE. Occupational therapy for patients with problems in activities of daily living after stroke. The Cochrane Database of Systematic Reviews 2001, Issue 4. Art. No.: Cd003585. Doi: 10.1002/14651858.Cd003585.

181. Walker MF, Leonardi-Bee J, Bath P, Langhorne P, Dewey M, Corr S, et al. Individual patient data meta-analysis of randomized controlled trials of community occupational therapy for stroke patients. Stroke 2004;35(9):2226-2232.

182. Martinsson L, Wahlgren NG, Hårdemark HG. Amphetamines for improving recovery after stroke. The Cochrane Database of Systematic Reviews 2003, Issue 3. Art. No.: Cd002090. Doi: 10.1002/14651858.Cd002090.

183. Lincoln NB, Majid MJ, Weyman N. Cognitive rehabilitation for attention deficits following stroke. The Cochrane Database of Systematic Reviews 2000, Issue 3. Art. No.: Cd002842. Doi: 10.1002/14651858.Cd002842.

184. Mazer BL, Sofer S, Korner-Bitensky N, Gelinas I, Hanley J, Wood-Dauphinee S. Effectiveness of a visual attention retraining program on the driving performance of clients with stroke. Arch Phys Med Rehabil 2003;84(4):541-50.

185. Giaquinto S, Fraioli L. Enhancement of the somatosensory N140 component during attentional training after stroke. Clin Neurophysiol 2003;114:329-335.

186. Majid MJ, Lincoln NB, Weyman N. Cognitive rehabilitation for memory deficits following stroke. The Cochrane Database of Systematic Reviews 2000, Issue 2. Art. No.: Cd002293. Doi: 10.1002/14651858.Cd002293.

187. Wilson BA, Emslie HC, Quirk K, Evans JJ. Reducing everyday memory and planning problems by means of a paging system: A randomised control crossover study. J Neurol Neurosurg Psychiatry 2001;70(4):477-82.

188. Rose FD, Brooks BM, Attree EA, Parslow DM, Leadbetter AG, McNeil JE, et al. A preliminary investigation into the use of virtual environments in memory retraining after vascular brain injury: Indications for future strategy? Disabil Rehabil 1999;21(12):548-54.

189. Kerkhoff G. Restorative and compensatory therapy approaches in cerebral blindness - a review. Restor Neurol Neurosci 1999;15(2-3):255-71.

190. Rossi PW, Kheyfets S, Reding MJ. Fresnel prisms improve visual perception in stroke patients with homonymous hemianopia or unilateral visual neglect. Neurology 1990;40(10):1597-9.

191. Kasten E, Wust S, Behrens-Baumann W, Sabel BA. Computer-based training for the treatment of partial blindness. Nat Med 1998;4(9):1083-7.

192. Barrett AM, Crucian GP, Heilman KM. Eye patching biases spatial attention after thalamic hemorrhage in a patient without spatial neglect: A case report. Arch Phys Med Rehabil 2004;85:1017-20.

193. Burns MS. Clinical management of agnosia. Topics in Stroke Rehabilitation 2004;11(1):1-9.

194. Bowen A, Lincoln NB, Dewey M. Cognitive rehabilitation for spatial neglect following stroke. The Cochrane Database of Systematic Reviews 2002, Issue 2. Art. No.: Cd003586. Doi: 10.1002/14651858.Cd003586.

195. Niemeier JP, Cifu DX, Kishore R. The lighthouse strategy: Improving the functional status of patients with unilateral neglect after stroke and brain injury using a visual imagery intervention. Top Stroke Rehabil 2001;8(2):10-8.

196. Hajek VE, Kates MH, Donnelly R, McGree S. The effect of visuo-spatial training in patients with right hemisphere stroke. Canadian Journal of Rehabilitation 1993(3):175-186.

197. Zeloni G, Farne A, Baccini M. Viewing less to see better. J Neurol 2002(2):195-198.

198. Donkervoort M, Dekker J, Stehmann-Saris FC, Deelman BG. Efficacy of strategy training in left hemisphere stroke patients with apraxia: A randomised clinical trial. Neuropsychological rehabilitation 2001;11(5):549.

199. Smania N, Girardi F, Domenicali C, Lora E, Aglioti S. The rehabilitation of limb apraxia: A study in left-brain-damaged patients. Arch Phys Med Rehabil 2000;81(4):379-88.

200. Greener J, Enderby P, Whurr R. Speech and language therapy for aphasia following stroke. The Cochrane Database of Systematic Reviews 1999, Issue 4. Art. No.: Cd000425. Doi: 10.1002/14651858.Cd000425.

201. Robey RR. A meta-analysis of clinical outcomes in the treatment of aphasia. J Speech Lang Hear Res 1998;41(1):172-87.

202. Bhogal SK, Teasell R, Speechley M. Intensity of aphasia therapy, impact on recovery. Stroke 2003;34(4):987-93.

203. Pulvermuller F, Neininger B, Elbert T, Mohr B, Rockstroh B, Koebbel P, et al. Constraint-induced therapy of chronic aphasia after stroke. Stroke 2001;32(7):1621-6.

204. Doesborgh SJ, van de Sandt-Koenderman MW, Dippel DW, van Harskamp F, Koudstaal PJ, Visch-Brink EG. Effects of semantic treatment on verbal communication and linguistic processing in aphasia after stroke: A randomized controlled trial. Stroke 2004;35(1):141-6.

205. Rose M, Douglas J, Matyas T. The comparative effectiveness of gesture and verbal treatments for a specific phonologic naming impairment. Aphasiology 2002;16(10/11):1001-30.

206. Elman RJ, Bernstein-Ellis E. The efficacy of group communication treatment in adults with chronic aphasia. J Speech Lang Hear Res 1999;42(2):411-9.

207. Kagan A, Black SE, Duchan FJ, Simmons-Mackie N, Square P. Training volunteers as conversation partners using "supported conversation for adults with aphasia" (SCA): A controlled trial. J Speech Lang Hear Res 2001;44(3):624-38.

208. Katz RC, Wertz RT. The efficacy of computer-provided reading treatment for chronic aphasic adults. J Speech Lang Hear Res 1997;40(3):493-507.

209. Crerar MA, Ellis AW, Dean EC. Remediation of sentence processing deficits in aphasia using a computer-based microworld. Brain Lang 1996;52(1):229-75.

210. Aftonomos LB, Steele RD, Wertz RT. Promoting recovery in chronic aphasia with an interactive technology. Arch Phys Med Rehabil 1997;78(8):841-6.

211. Greener J, Enderby P, Whurr R. Pharmacological treatment for aphasia following stroke. The Cochrane Database of Systematic Reviews 2001, Issue 4. Art. No.: Cd000424. Doi: 10.1002/14651858.Cd000424.

212. Walker-Batson D, Curtis S, Natarajan R, et al. A double-blind, placebo controlled study of the use of amphetamine in the treatment of aphasia. Stroke 2001;32:2093-2098.

213. Ricci S, Celani MG, Cantisani AT, Righetti E. Piracetam for acute ischaemic stroke. The Cochrane Database of Systematic Reviews 2002, Issue 4. Art. No.: Cd000419. Doi: 10.1002/14651858.Cd000419.

214. Jacobs B, Drew R, Ogletree B, Pierce K. Augmentative and alternative communication (AAC) for adults with severe aphasia: where we stand and how we can go further. Disabil Rehabil 2004;26(21-22):1231-40.

215. West C, Hesketh A, Bowen A, Vail A. Interventions for apraxia of speech following stroke. The Cochrane Database of Systematic Reviews 2002, Issue 4. Art. No.: Cd004298. Doi: 10.1002/14651858.Cd004298.

216. Wambaugh JL, Doyle PJ. Treatment for acquired apraxia of speech: A review of efficacy reports. Clinical Aphasiology 1994;22:231-243.

217. Wambaugh JL, Kalinyak-Fliszar MM, West JE, Doyle PJ. Effects of treatment for sound errors in apraxia of speech and aphasia. J Speech Lang Hear Res 1998;41(4):725-43.

218. Freed DB, Marshall RC, Frazier KE. Long-term effectiveness of PROMPT treatment in a severely apractic-aphasic speaker. Aphasiology 1997;9(11):356-372.

219. Bose A, Square P, Schlosser R, van Lieshout P. Effects of PROMPT therapy on speech motor function in a person with aphasia and apraxia of speech. Aphasiology 2001;15(8):767-85.

220. Sellars C, Hughes T, Langhorne P. Speech and language therapy for dysarthria due to non-progressive brain damage. The Cochrane Database of Systematic Reviews 2002, Issue 3. Art. No.: Cd002088. Doi: 10.1002/14651858.Cd002088.

221. Simpson MB, Till JA, Goff AM. Long-term treatment of severe dysarthria: A single case study. J Speech Hear Disord 1988;53:433-440.

222. Cariski D, Rosenbek J. The effectiveness of the speech enhancer. J Med Speech Lang Pathol 1999;7(4):315-322.

223. Bedwinek AP, O'Brien RL. A patient selection profile for the use of speech prostheses in adult dysarthria. J Commun Disord 1985;18:169-82.

224. Kerman PC, Singer LS, Davidoff A. Palatal lift and speech therapy for velopharyngeal incompetence. Arch Phys Med Rehabil 1973;54:271-6.

225. Yorkston KM, Honsinger MJ, Beukelman DR, Taylor TD. The effects of palatal lift fitting on the perceived articulatory adequacy of dysarthric speakers. In: Yorkston KM, Beukelman DR, editors. Recent advances in clinical dysarthria. Boston: College-Hill Press.; 1989. P. 85-98.

226. Whelan K. Inadequate fluid intakes in dysphagic acute stroke. Clin Nutr 2001;20(5):423-8.

227. Bath PMW, Bath FJ, Smithard DG. Interventions for dysphagia in acute stroke. The Cochrane Database of Systematic Reviews 1999, Issue 3. Art. No.: Cd000323. Doi: 10.1002/14651858.Cd000323.

228. Elmstahl S, Bulow M, Ekberg O, Petersson M, Tegner H. Treatment of dysphagia improves nutritional conditions in stroke patients. Dysphagia 1999;14(2):61-6.

229. Shaker R, Easterling C, Kern M, Nitschke T, Massey B, Daniels S, et al. Rehabilitation of swallowing by exercise in tube-fed patients with pharyngeal dysphagia secondary to abnormal UES opening. Gastroenterology 2002;122(5):1314-21.

230. Freed M, Christian MO, Beytas EM, Tucker H, Kotton B. Electrical stimulation of the neck: A new effective treatment for dysphagia. Respir Care 2001;46:466-474.

231. Leelamanit V, Limsakul C, Geater A. Synchronized electrical stimulation in treating pharyngeal dysphagia. Laryngoscope 2002;112(12):2204-10.

232. Rosenbek JC, Robbins J, Willford WO, Kirk G, Schiltz A, Sowell TW, et al. Comparing treatment intensities of tactile-thermal application. Dysphagia 1998;13(1):1-9.

233. Kelly J, Hunt BJ, Lewis RR, Swaminathan R, Moody A, Seed PT, et al. Dehydration and venous thromboembolism after acute stroke. QJM 2004;97(5):293-6.

234. Bhalla A, Sankaralingam S, Dundas R, Swaminathan R, Wolfe CD, Rudd AG. Influence of raised plasma osmolality on clinical outcome after acute stroke. Stroke 2000;31(9):2043-8.

235. Davalos A, Ricart W, Gonzalez-Huix F, Soler S, Marrugat J, Molins A, et al. Effect of malnutrition after acute stroke on clinical outcome. Stroke 1996;27(6):1028-32.

236. Finestone HM, Greene-Finestone LS, Wilson ES, Teasell RW. Prolonged length of stay and reduced functional improvement rate in malnourished stroke rehabilitation patients. Arch Phys Med Rehabil 1996;77(4):340-5.

237. The FOOD Trial Collaboration. Routine oral nutritional supplementation for stroke patients in hospital (FOOD): A multicentre randomised controlled trial. Lancet 2005;365(9461):755-63.

238. Finestone HM, Foley NC, Woodbury MG, Greene-Finestone L. Quantifying fluid intake in dysphagic stroke patients: A preliminary comparison of oral and nonoral strategies. Arch Phys Med Rehabil 2001;82(12):1744-6.

239. Challiner YC, Jarrett D, Hayward MJ, al-Jubouri MA, Julious SA. A comparison of intravenous and subcutaneous hydration in elderly acute stroke patients. Postgrad Med J 1994;70(821):195-7.

240. Simmons SF, Alessi C, Schnelle JF. An intervention to increase fluid intake in nursing home residents: Prompting and preference compliance. J Am Geriatr Soc 2001;49(7):926-33.

241. Hodgkinson B, Evans D, Wood J. Maintaining oral hydration in older adults: A systematic review. Int J Nurs Pract 2003;9(3):S19-28.

242. Milne AC, Potter J, Avenell A. Protein and energy supplementation in elderly people at risk from malnutrition. The Cochrane Database of Systematic Reviews 2002, Issue 2. Art. No.: Cd003288. Doi: 10.1002/14651858.Cd003288.

243. Gariballa SE, Parker SG, Taub N, Castleden CM. A randomized, controlled, a single-blind trial of nutritional supplementation after acute stroke. JPEN J Parenter Enteral Nutr 1998;22(5):315-9.

244. The FOOD Trial Collaboration. Effect of timing and method of enteral tube feeding for dysphagic stroke patients (FOOD): A multicentre randomised controlled trial. Lancet 2005;365(9461):764-72.

245. Anderson CS, Hackett ML, House AO. Interventions for preventing depression after stroke. The Cochrane Database of Systematic Reviews 2004, Issue 1. Art. No.: Cd003689.Pub2. Doi: 10.1002/14651858.Cd003689.Pub2.

246. House AO, Hackett ML, Anderson CS, Horrocks JA. Pharmaceutical interventions for emotionalism after stroke. The Cochrane Database of Systematic Reviews 2004, Issue 1. Art. No.: Cd003690.Pub2. Doi: 10.1002/14651858.Cd003690.Pub2.

247. Hackett ML, Anderson CS, House AO. Interventions for treating depression after stroke. The Cochrane Database of Systematic Reviews 2004, Issue 2. Art. No.: Cd003437.Pub2. Doi: 10.1002/14651858.Cd003437.Pub2.

248. Davis MC. Life review therapy as an intervention to manage depression and enhance life satisfaction in individuals with right hemisphere cerebral vascular accidents. Issues Ment Health Nurs 2004;25(5):503-15.

249. Van der Wurff FB, Stek ML, Hoogendijk WL, Beekman ATF. Electroconvulsive therapy for the depressed elderly. The Cochrane Database of Systematic Reviews 2003, Issue 2. Art. No.: Cd003593. Doi: 10.1002/14651858.Cd003593.

250. Barrett JA. Bladder and bowel problems after stroke. Reviews in Clinical Gerontology 2002;12:253-67.

251. Gross JC. Bladder dysfunction after a stroke--it's not always inevitable. J Gerontol Nurs 1990;16(4):20-5.

252. Wikander B, Ekelund P, Milsom I. An evaluation of multidisciplinary intervention governed by functional independence measure (FIMSM) in incontinent stroke patients. Scand J Rehabil Med 1998;30(1):15-22.

253. Hay-Smith J, Herbison P, Ellis G, Moore K. Anticholinergic drugs versus placebo for overactive bladder syndrome in adults. The Cochrane Database of Systematic Reviews 2002, Issue 3. Art. No.: Cd003781. Doi: 10.1002/14651858.Cd003781.

254. Wallace SA, Roe B, Williams K, Palmer M. Bladder training for urinary incontinence in adults. The Cochrane Database of Systematic Reviews 2004, Issue 1. Art. No.: Cd001308. Doi: 10.1002/14651858.Cd001308.Pub2.

255. Gross J. Urinary incontinence after stroke evaluation and behavioural treatment. Topics of rehabilitation medicine 2003;19(1):60-83.

256. Gelber DA, Jozefczyk PB, Good DC, Laven LJ, Verhulst SJ. Urinary retention following acute stroke. Journal of Neurologic Rehabilitation 1994;8:69-74.

257. Niël-Weise BS, van den Broek PJ. Urinary catheter policies for short-term bladder drainage in adults. The Cochrane Database of Systematic Reviews 2005, Issue 3. Art. No.: CD004203. DOI: 10.1002/14651858.CD004203.pub2.

258. Urinary Incontinence Guideline panel. Incontinence in adults: Quick refererence guide for clinicians. Journal of Pharmaceutical Care in Pain and Symptoms Control 1993;1(2):53.

259. Johanna Briggs Institute. Management of short term indwelling urethral catheters to prevent urinary tract infections: Evidence based practice information sheets for health professionals. 2000;4(1).

260. Quigley PA, Riggin OZ. A comparison of open and closed catheterization techniques in rehabilitation patients. Rehabil Nurs 1993;18(1):26-9, 33.

261. Eustice S, Roe B, Paterson J. Prompted voiding for the management of urinary incontinence in adults. The Cochrane Database of Systematic Reviews 2000, Issue 2. Art. No.: Cd002113. Doi: 10.1002/14651858.Cd002113.

262. Harari D, Norton C, Lockwood L, Swift C. Treatment of constipation and fecal incontinence in stroke patients: Randomized controlled trial. Stroke 2004;35(11):2549-55.

263. Venn MR, Taft L, Carpentier B, Applebaugh G. The influence of timing and suppository use on efficiency and effectiveness of bowel training after a stroke. Rehabil Nurs 1992;17(3):116-20.

264. Munchiando JF, Kendall K. Comparison of the effectiveness of two bowel programs for CVA patients. Rehabil Nurs 1993;18(3):168-72.

265. Andersen G, Vestergaad K, Ingeman-Nielsen M, Jensen TS. Incidence of central post-stroke pain. Pain 1995;61:187-193.

266. Leijon G, Boivie J. Central post-stroke pain--a controlled trial of amitriptyline and carbamazepine. Pain 1989;36(1):27-36.

267. Lampl C, Yazdi K, Roper C. Amitriptyline in the prophylaxis of central poststroke pain. Preliminary results of 39 patients in a placebo-controlled, long-term study. Stroke 2002;33(12):3030-2.

268. Mcquay H, Carroll D, Jadad AR, Wiffen P, Moore A. Anticonvulsant drugs for management of pain: A systematic review. Br Med J 1995;311:1047-1052.

269. Wiffen P, Collins S, McQuay H, Carroll D, Jadad A, Moore A. Anticonvulsant drugs for acute and chronic pain. The Cochrane Database of Systematic Reviews 2000, Issue 3. Art. No.: Cd001133. Doi: 10.1002/14651858.Cd001133.

270. Fishbain D. Evidence-based data on pain relief with antidepressants. Ann Med 2000;32(5):305-16.

271. Mellegers M, Furlan A, Mailis A. Gabapentin for neuropathic pain: Systematic review of controlled and uncontrolled literature. Clin J Pain 2001;17:284-395.

272. Duhmke RM, Cornblath DD, Hollingshead JRF. Tramadol for neuropathic pain. The Cochrane Database of Systematic Reviews 2004, Issue 2. Art. No.: Cd003726.Pub2. Doi: 10.1002/14651858.Cd003726.Pub2.

273. Bainton T, Fox M, Bowsher D, Wells C. A double-blind trial of naloxone in central post-stroke pain. Pain 1992;48(2):159-62.

274. Attal N, Gaude V, Brasseur L, Dupuy M, Guirimand F, Parker F, et al. Intravenous lidocaine in central pain: A double-blind, placebo-controlled, psychophysical study. Neurology 2000;54(3):564-74.

275. Attal N, Guirimand F, Brasseur L, Gaude V, Chauvin M, Bouhassira D. Effects of IV morphine in central pain: A randomized placebo-controlled study. Neurology 2002;58(4):554-63.

276. Vestergaard K, Andersen G, Gottrup H, Kristensen BT, Jensen TS. Lamotrigine for central poststroke pain: A randomized controlled trial. Neurology 2001;56(2):184-90.

277. Mailis A, Furlan A. Sympathectomy for neuropathic pain. The Cochrane Database of Systematic Reviews 2002, Issue 1. Art. No.: Cd002918. Doi: 10.1002/14651858.Cd002918.

278. Carroll D, Moore RA, McQuay HJ, Fairman F, Tramèr M, Leijon G. Transcutaneous electrical nerve stimulation (TENS) for chronic pain. The Cochrane Database of Systematic Reviews 2000, Issue 4. Art. No.: Cd003222. Doi: 10.1002/14651858.Cd003222.

279. Antiplatelet Trialists Collaboration (APTC). Collaborative overview of randomised trials of antiplatelet therapy. Br Med J 1994;308:81-106.

280. International Stroke Trial Collaborative Group. The International Stroke Trial (IST): A randomised trial of aspirin, subcutaneous heparin, both, or neither among 19435 patients with acute ischaemic stroke. International Stroke Trial Collaborative Group. Lancet 1997;349(9065):1569-81.

281. Chinese Acute Stroke Trial Collaborative Group (CAST). Randomised, placebo-controlled trial of early aspirin use in 20,000 patients with acute ischaemic stroke. Lancet 1997;349:1641-9.

282. Bath PM, Iddenden R, Bath FJ. Low molecular-weight heparins and heparinoids in acute ischaemic stroke: A meta- analysis of randomised controlled trials. Stroke 2000;31:1770-78.

283. Counsell C, Sandercock P. Low-molecular-weight heparins or heparinoids versus standard unfractionated heparin for acute ischaemic stroke. The Cochrane Database of Systematic Reviews 2001, Issue 4. Art. No.: Cd000119. Doi: 10.1002/14651858.Cd000119.

284. Van Dongen CJJ, van den Belt AGM, Prins MH, Lensing AWA. Fixed dose subcutaneous low molecular weight heparins versus adjusted dose unfractionated heparin for venous thromboembolism. The Cochrane Database of Systematic Reviews 2004, Issue 4. Art. No.: Cd001100.Pub2. Doi:10.1002/14651858.Cd001100.Pub2.

285. Amaragiri SV, Lees TA. Elastic compression stockings for prevention of deep vein thrombosis. The Cochrane Database of Systematic Reviews Issue, 2000 1. Art. No.: Cd001484. Doi: 10.1002/14651858.Cd001484.

286. Mazzone C, Chiodo Grandi F, Sandercock P, Miccio M, Salvi R. Physical methods for preventing deep vein thrombosis in stroke. The Cochrane Database of Systematic Reviews 2004, Issue 4. Art. No.: Cd001922.Pub2. Doi: 10.1002/14651858.Cd001922.Pub2.

287. Langhorne P, Waganaar R, Partridge C. Medical complications in hospitalised stroke patients: A multicentre study. Stroke 2000;31:1223-1229.

288. Hajat C, Hajat S, Sharma P. Effects of post-stroke pyrexia on stroke outcome: A meta-analysis of studies in patients. Stroke 2000;31.

289. Jorgensen HS, Reith J, Nakayama H, Kammersgaard LP, Raaschou HO, Olsen TS. What determines good recovery in patients with the most severe strokes? The Copenhagen Stroke Study. Stroke 1999;30(10):2008-1. 12.

290. Silverman IE, Restrepo L, Mathews GC. Poststroke seizures. Arch Neurol 2002;59(2):195-201.

291. Marson AG, Williamson PR, Hutton JL, Clough HE, Chadwick DW, on behalf of the epilepsy monotherapy trialists. Carbamazepine versus valproate monotherapy for epilepsy. The Cochrane Database of Systematic Reviews 2000, Issue 3. Art. No.: CD001030. DOI: 10.1002/14651858.CD001030.

292. Tudur Smith C, Marson AG, Clough HE, Williamson PR. Carbamazepine versus phenytoin monotherapy for epilepsy. The Cochrane Database of Systematic Reviews 2002, Issue 2. Art. No.: Cd001911. Doi: 10.1002/14651858.Cd001911.

293. Tudur Smith C, Marson AG, Williamson PR. Carbamazepine versus phenobarbitone monotherapy for epilepsy. The Cochrane Database of Systematic Reviews 2003, Issue 1. Art. No.: Cd001904. Doi:10.1002/14651858.Cd001904.

294. Brodie MJ, Overstall PW, Giorgi L, The UK Lamotrigine Elderly Study Group. Multicentre, double-blind, randomised comparison between lamotrigine and carbamazepine in elderly patients with newly diagnosed epilepsy. Epilepsy Res 1999;37(1):81-7.

295. Ferro JM, Pinto F. Poststroke epilepsy: Epidemiology, pathophysiology and management. Drugs Aging 2004;21(10):639-53.

296. Yaggi H, Mohsenin V. Obstructive sleep apnoea and stroke. Lancet Neurol 2004;3(6):333-42.

297. White J, Cates C, Wright J. Continuous positive airways pressure for obstructive sleep apnoea. The Cochrane Database of Systematic Reviews 2001, Issue 4. Art. No.: Cd001106. Doi: 10.1002/14651858.Cd001106.

298. Wessendorf TE, Wang YM, Thilmann AF, Sorgenfrei U, Konietzko N, Teschler H. Treatment of obstructive sleep apnoea with nasal continuous positive airway pressure in stroke. Eur Respir J 2001;18(4):623-2. 9.

299. Sandberg O, Franklin KA, Bucht G, Eriksson S, Gustafson Y. Nasal continuous positive airway pressure in stroke patients with sleep apnoea: A randomized treatment study. Eur Respir J 2001;18(4):630-4.

300. Jokic R, Klimaszewski A, Crossley M, Sridhar G, Fitzpatrick MF. Positional treatment vs continuous positive airway pressure in patients with positional obstructive sleep apnoea. Chest 1999;115:771-81.

301. Lim J, Lasserson T, Fleetham J, Wright J. Oral appliances for obstructive sleep apnoea The Cochrane Database of Systematic Reviews 2004, Issue 4. Art. No.: Cd004435.Pub2. Doi: 10.1002/14651858.Cd004435.Pub2.

302. Smith I, Lasserson TJ, Wright J. Drug treatments for obstructive sleep apnoea. The Cochrane Database of Systematic Reviews 2001, Issue 4. Art. No.: Cd003002. Doi: 10.1002/14651858.Cd003002.

303. Hardie K, Hankey GJ, Jamrozik K, Broadhurst RJ, Anderson C. Ten-year risk of first recurrent stroke and disability after first-ever stroke in the Perth Community Stroke Study. Stroke 2004;35(3):731-5.

304. Berge E, Sandercock P. Anticoagulants versus antiplatelet agents for acute ischaemic stroke. The Cochrane Database of Systematic Reviews 2001, Issue 2. Art. No.: Cd003242. Doi: 10.1002/14651858.Cd003242.

305. Serebruany VL, Malinin AI, Eisert RM, Sane DC. Risk of bleeding complications with antiplatelet agents: Meta-analysis of 338,191 patients enrolled in 50 randomized controlled trials. Am J Hematol 2004;75(1):40-7.

306. Antithrombotic Trialists Collaboration. Collaborative meta-analysis of randomised trials of antiplatelet therapy for prevention of death, myocardial infarction, and stroke in high risk patients. Br Med J 2002;324:71-86.

307. CAPRIE Steering Committee. A randomised, blinded, trial of clopidogrel versus aspirin in patients at risk of ischaemic events (CAPRIE). Lancet 1996;348:1329-39.

308. Diener H, Cinha L, Forbes C, et al. European Stroke Prevention Study 2 (ESPS2) dipyridamole and acetylsalicylic acid in the secondary prevention of stroke. J Neurol Sci 1996; 143:1-13.

309. Diener HC, Bogousslavsky J, Brass LM, Cimminiello C, Csiba L, Kaste M, et al. Aspirin and clopidogrel compared with clopidogrel alone after recent ischaemic stroke or transient ischaemic attack in high- risk patients (MATCH): Randomised, double-blind, placebo-controlled trial. Lancet 2004;364(9431):331-7.

310. Gubitz G, Sandercock P, Counsell C. Anticoagulants for acute ischaemic stroke. The Cochrane Database of Systematic Reviews 2004, Issue 2. Art. No.: Cd000024.Pub2. Doi: 10.1002/14651858.Cd000024.Pub2.

311. Sandercock P, Mielke O, Liu M, Counsell C. Anticoagulants for preventing recurrence following presumed non-cardioembolic ischaemic stroke or transient ischaemic attack. The Cochrane Database of Systematic Reviews 2002, Issue 4. Art. No.: CD000248. DOI: 10.1002/14651858.CD000248.

312. Saxena R, Koudstaal PJ. Anticoagulants versus antiplatelet therapy for preventing stroke in patients with nonrheumatic atrial fibrillation and a history of stroke or transient ischemic attack. The Cochrane Database of Systematic Reviews 2003, Issue 4. Art. No.: Cd000187.Pub2. Doi: 10.1002/14651858.Cd000187.Pub2.

313. Saxena R, Koudstaal PJ. Anticoagulants for preventing stroke in patients with nonrheumatic atrial fibrillation and a history of stroke or transient ischaemic attack. The Cochrane Database of Systematic Reviews 2004, Issue 1. Art. No.: Cd000185.Pub2. Doi: 10.1002/14651858.Cd000185.Pub2.

314. National Heart Foundation of Australia. 2004. Hypertension management guide for doctors [online] [access 2003 December] available from url http://www.heartfoundation.com.au/downloads/hypertension_management_guide_2004.pdf.

315. Rashid P, Leonardi-Bee J, Bath P. Blood pressure reduction and secondary prevention of stroke and other vascular events: A systematic review. Stroke 2003;34(11):2741-8.

316. Rodgers A, Chapman N, Woodward M, Liu LS, Colman S, Lee A, et al. Perindopril-based blood pressure lowering in individuals with cerebrovascular disease: Consistency of benefits by age, sex and region. J Hypertens 2004;22(3):653-9.

317. PROGRESS Collaborative Group. Randomised trial of a perindopril-based blood-pressure lowering regimen among 6105 individuals with previous stroke or transient ischaemic attack. Lancet 2001;358:1033-41.

318. Heart Outcomes Prevention Evaluation Study Investigators (HOPE). Effects of an angiotensin-converting-enzyme inhibitor, Ramipril, on cardiovascular events in high-risk patients. N Engl J Med 2000;342:145-153.

319. Hankey GJ. Role of lipid-modifying therapy in the prevention of initial and recurrent stroke. Curr Opin Lipidol 2002;13(6):645-51.

320. Heart Protection Study Collaborative Group. Effects of cholesterol-lowering with simvastatin on stroke and other major vascular events in 20 536 people with cerebrovascular disease or other high-risk conditions. Lancet 2004;363:757-67.

321. Hooper L, Summerbell CD, Higgins JP, Thompson RL, Clements G, Capps N, et al. Reduced or modified dietary fat for preventing cardiovascular disease. The Cochrane Database of Systematic Reviews 2001, Issue 3. Art. No.: Cd002137. Doi: 10.1002/14651858.Cd002137.

322. Jula A, Marniemi J, Huupponen R, Virtanen A, Rastas M, Ronnemaa T. Effects of diet and simvastatin on serum lipids, insulin, and antioxidants in hypercholesterolemic men: A randomized controlled trial. JAMA 2002;287(5):598-605.

323. Sdringola S, Nakagawa K, Nakagawa Y, Yusuf SW, Boccalandro F, Mullani N, et al. Combined intense lifestyle and pharmacologic lipid treatment further reduce coronary events and myocardial perfusion abnormalities compared with usual-care cholesterol-lowering drugs in coronary artery disease. J Am Coll Cardiol 2003;41(2):263-72.

324. Kurth T, Kase CS, Berger K, Schaeffner ES, Buring JE, Gaziano JM. Smoking and the risk of hemorrhagic stroke in men. Stroke 2003;34(5):1151-5.

325. Kurth T, Kase CS, Berger K, Gaziano JM, Cook NR, Buring JE. Smoking and risk of hemorrhagic stroke in women. Stroke 2003;34(12):2792-5.

326. Lancaster T, Stead LF. Individual behavioural counselling for smoking cessation. The Cochrane Database of Systematic Reviews 2002, Issue 3. Art. No.: Cd001292. Doi: 10.1002/14651858.Cd001292.

327. Silagy C, Lancaster T, Stead L, Mant D, Fowler G. Nicotine replacement therapy for smoking cessation. The Cochrane Database of Systematic Reviews 2004, Issue 3. Art. No.: Cd000146.Pub2. Doi: 10.1002/14651858.Cd000146.Pub2.

328. Rice VH, Stead LF. Nursing interventions for smoking cessation. The Cochrane Database of Systematic Reviews 2004, Issue 1. Art. No.: Cd001188.Pub2. Doi: 10.1002/14651858.Cd001188.Pub2.

329. Rigotti NA, Munafo MR, Murphy MFG, Stead LF. Interventions for smoking cessation in hospitalised patients. The Cochrane Database of Systematic Reviews 2002, Issue 4. Art. No.: Cd001837. Doi: 10.1002/14651858.Cd001837.

330. Stead LF, Lancaster T. Group behaviour therapy programmes for smoking cessation. The Cochrane Database of Systematic Reviews 2002, Issue 2. Art. No.: Cd001007. Doi: 10.1002/14651858.Cd001007.

331. Reynolds K, Lewis B, Nolen JD, Kinney GL, Sathya B, He J, et al. Alcohol consumption and risk of stroke: A meta-analysis. JAMA 2003;289(5):579-88.

332. Lee CD, Folsom AR, Blair SN. Physical activity and stroke risk: A meta-analysis. Stroke 2003;34(10):2475-81.

333. Wendel-Vos GC, Schuit AJ, Feskens EJ, Boshuizen HC, Verschuren WM, Saris WH, et al. Physical activity and stroke. A meta-analysis of observational data. Int J Epidemiol 2004;33(4):787-98.

334. Oguma Y, Shinoda-Tagawa T. Physical activity decreases cardiovascular disease risk in women: Review and meta-analysis. Am J Prev Med 2004;26(5):407-18.

335. Whelton SP, Chin A, Xin X, He J. Effect of aerobic exercise on blood pressure: A meta-analysis of randomized, controlled trials. Ann Intern Med 2002;136(7):493-503.

336. He FJ, MacGregor GA. Effect of longer-term modest salt reduction on blood pressure. The Cochrane Database of Systematic Reviews 2004, Issue 1. Art. No.: Cd004937. Doi: 10.1002/14651858.Cd004937.

337. Hooper L, Bartlett C, Davey Smith G, Ebrahim S. Advice to reduce dietary salt for prevention of cardiovascular disease. The Cochrane Database of Systematic Reviews 2004, Issue 1. Art. No.: Cd003656.Pub2. Doi: 10.1002/14651858.Cd003656.Pub2.

338. Nagata C, Takatsuka N, Shimizu N, Shimizu H, Nagata C, Takatsuka N, et al. Sodium intake and risk of death from stroke in Japanese men and women. Stroke 2004;35:1543-7.

339. Appel LJ, Moore TJ, Obarzanek E, Vollmer WM, Svetkey LP, Sacks FM, et al. A clinical trial of the effects of dietary patterns on blood pressure. DASH Collaborative Research Group. N Engl J Med 1997;336(16):1117-24.

340. De Lorgeril M, Salen P, Martin JL, Monjaud I, Delaye J, Mamelle N. Mediterranean diet, traditional risk factors, and the rate of cardiovascular complications after myocardial infarction: Final report of the Lyon Diet Heart Study. Circulation 1999;99(6):779-85.

341. Sacks FM, Svetkey LP, Vollmer WM, Appel LJ, Bray GA, Harsha D, et al. Effects on blood pressure of reduced dietary sodium and the dietary approaches to stop hypertension (DASH) diet. DASH-Sodium Collaborative Research Group. N Engl J Med 2001;344(1):3-10.

342. Barzi F, Woodward M, Marfisi RM, Tavazzi L, Valagussa F, Marchioli R. Mediterranean diet and all-causes mortality after myocardial infarction: Results from the GISSI-Prevenzione trial. Eur J Clin Nutr 2003;57(4):604-11.

343. Mulrow CD, Chiquette E, Angel L, Cornell J, Summerbell C, Anagnostelis B, et al. Dieting to reduce body weight for controlling hypertension in adults. The Cochrane Database of Systematic Reviews 1998, Issue 4. Art. No.: Cd000484. Doi: 10.1002/14651858.Cd000484.

344. Toole JF, Malinow MR, Chambless LE, Spence JD, Pettigrew LC, Howard VJ, et al. Lowering homocysteine in patients with ischemic stroke to prevent recurrent stroke, myocardial infarction, and death: The Vitamin Intervention for Stroke Prevention (VISP) randomized controlled trial. JAMA 2004;291(5):565-75.

345. Brown BG, Zhao XQ, Chait A, Fisher LD, Cheung MC, Morse JS, et al. Simvastatin and niacin, antioxidant vitamins, or the combination for the prevention of coronary disease. N Engl J Med 2001;345(22):1583-92.

346. Heart Protection Study Collaborative Group. MRC/BHF heart protection study of cholesterol lowering with simvastatin in 20,536 high-risk individuals: A randomised placebo-controlled trial. Lancet 2002;360(9326):7-22.

347. Cappuccio FP, MacGregor GA. Does potassium supplementation lower blood pressure? A meta-analysis of published trials. J Hypertens 1991;9(5):465-73.

348. Fagerberg B, Wikstrand J, Berglund G, Samuelsson O, Agewall S. Mortality rates in treated hypertensive men with additional risk factors are high but can be reduced: A randomized intervention study. Am J Hypertens 1998;11(1 Pt 1):14-22.

349. Haynes RB, McDonald H, Garg AX, Montague P. Interventions for helping patients to follow prescriptions for medications. The Cochrane Database of Systematic Reviews 2002, Issue 2. Art. No.: Cd000011. Doi: 10.1002/14651858.Cd000011.

350. Schroeder K, Fahey T, Ebrahim S. Interventions for improving adherence to treatment in patients with high blood pressure in ambulatory settings. The Cochrane Database of Systematic Reviews 2004, Issue 3. Art. No.: Cd004804. Doi: 10.1002/14651858.Cd004804.

351. Schedlbauer A, Schroeder K, Peters TJ, Fahey T. Interventions to improve adherence to lipid lowering medication. The Cochrane Database of Systematic Reviews 2004, Issue 2. Art. No.: Cd004371.Pub2. Doi: 10.1002/14651858.Cd004371.Pub2.

352. McGraw C. Multi-compartment medication devices and patient compliance. British Journal of Community Nursing:285-90(7):2004.

353. Park J, Hopwood V, White AR, Ernst E. Effectiveness of acupuncture for stroke: A systematic review. J Neurol 2001;248(7):558-563.

354. Sze FK, Wong E, Or KK, Lau J, Woo J. Does acupuncture improve motor recovery after stroke? A meta-analysis of randomized controlled trials. Stroke 2002;33(11):2604-19.

355. Shiflett SC, Nayak S, Bid C, Miles P, Agostinelli S. Effect of reiki treatments on functional recovery in patients in poststroke rehabilitation: A pilot study. J Altern Complement Med 2002;8(6):755-63.

356. Johansson K, Lindgren I, Widner H, Wiklund I, Johansson BB. Can sensory stimulation improve the functional outcome in stroke patients? Neurology 1993;43(11):2189-92.

357. Goodwin DM, Higginson IJ, Edwards AG, Finlay IG, Cook AM, Hood K, et al. An evaluation of systematic reviews of palliative care services. J Palliat Care 2002;18(2):77-83.

358. Fellowes D, Wilkinson S, Moore P. Communication skills training for health care professionals working with cancer patients, their families and/or carers. The Cochrane Database of Systematic Reviews 2004, Issue 2. Art. No.: Cd003751. Doi: 10.1002/14651858.Cd003751.Pub2.

359. Gysels M, Richardson A, Higginson IJ. Communication training for health professionals who care for patients with cancer: A systematic review of effectiveness. Support Care Cancer 2004; 12(10):692-700.

360. Palliative Care Australia. 1999. Palliative care standards (3rd edition). [online] [access 2004 December] available from URL http://www.pallcare.org.au/.

361. Lorig KR, Ritter P, Stewart AL, Sobel DS, Brown BW, Jr., Bandura A, et al. Chronic disease self- management program: 2-year health status and health care utilization outcomes. Medical Care. 2001;39(11):1217-23.

362. Lorig KR, Sobel DS, Stewart AL, Brown BW, Jr., Bandura A, Ritter P, et al. Evidence suggesting that a chronic disease self-management program can improve health status while reducing hospitalization: A randomized trial. Medical Care. 1999;37(1):5-14.

363. Fu D, Fu H, McGowan P, Shen YE, Zhu L, Yang H, et al. Implementation and quantitative evaluation of chronic disease self-management programme in Shanghai, China: Randomized controlled trial. Bulletin of the World Health Organization. 2003;81(3):174-82.

364. Warsi A, Wang PS, lavalley MP, Avorn J, Solomon DH. Self-management education programs in chronic disease: A systematic review and methodological critique of the literature. Arch Intern Med 2004;164(15):1641-9.

365. Catalano T, Dickson P, Kendall E, Kuipers P, Posner TN. The perceived benefits of the chronic disease self-management program among participants with stroke: A qualitative study. Australian Journal of Primary Health 2003;9(2-3):80-9.

366. Werner RA, Kessler S. Effectiveness of an intensive outpatient rehabilitation program for postacute stroke patients. Am J Phys Med Rehabil 1996;75(2):114-20.

367. Mulders AHM, de Witte LP, Diederiks JPM. Evaluation of a rehabilitation after-care programme for stroke patients. J Rehabil Sci 1989;24:97-103.

368. Green J, Young J, Forster A, Collen F, Wade D. Combined analysis of two randomized trials of community physiotherapy for patients more than one year post stroke. Clin Rehabil 2004;18(3):249-52.

369. Ada L, Dean CM, Hall JM, Bampton J, Crompton S. A treadmill and overground walking program improves walking in persons residing in the community after stroke: A placebo-controlled, randomized trial. Arch Phys Med Rehabil 2003;84(10):1486-91.

370. Logan P, Gladman J, Avery A, Walker M, Dyas J, Groom L. Randomised controlled trial of an occupational therapy intervention to increase outdoor mobility after stroke. Br Med J 2004;329:1372-1377.

371. Austroads. Assessing fitness to drive: Commercial and private vehicle drivers. [online] [access 2004 December] available from URL http://www.austroads.com.au/aftd/index

372. Radford KA, Lincoln NB. Concurrent validity of the stroke drivers screening assessment. Arch Phys Med Rehabil 2004;85(2):324-8.

373. Korner-Bitensky NA, Mazer BL, Sofer S, Gelina I, Meyer MB, Morrison C, et al. Visual testing for readiness to drive after stroke: A multicenter study. Am J Phys Med Rehabil 2000;79(3):253-9.

374. Nouri FM, Lincoln NB. Predicting diving performance stroke. Br Med J 1993;307:482-3.

375. Mazer BL, Korner-Bitensky NA, Sofer S. Predicting ability to drive after stroke. Arch Phys Med Rehabil 1998;79(7):743-50.

376. Klavora P, Heslegrave RJ, Young M. Driving skills in elderly persons with stroke: Comparison of two new assessment options. Arch Phys Med Rehabil 2000;81(6):701-5.

377. Akinwuntan AE, DeWeerdt W, Feys H, Baten G, Arno P, Kiekens C. Reliability of a road test after stroke. Arch Phys Med Rehabil 2003;84(12):1792-6.

378. Sjogren K, Fugl-Meyer AR. Adjustment to life after stroke with special reference to sexual intercourse and leisure. J Psychosom Res 1982;26:409-417.

379. Corr S, Phillips CJ, Walker M. Evaluation of a pilot service designed to provide support following stroke: A randomized cross-over design study. Clin Rehabil 2004;18(1):69-75.

380. Wozniak MA, Kittner SJ. Return to work after ischemic stroke: A methodological review. Neuroepidemiology 2002;21(4):159-66.

381. Bray GP, defrank RS, Wolfe TL. Sexual functioning in stroke survivors. Arch Phys Med Rehabil 1981;62(286-288).

382. Boldrini P, Basaglia N, Calanca MC. Sexual changes in hemiparetic patients. Arch Phys Med Rehabil 1991;72:202-207.

383. Korpelainen JT, Nieminen P, Myllyla VV. Sexual functioning among stroke patients and their spouses. Stroke 1999;30(4):715-9.

384. Hawton K. Sexual adjustment of men who have had strokes. J Psychosom Res 1984;28(3):243-9.

385. Giaquinto S, Buzzelli S, Di Francesco L, Nolfe G. Evaluation of sexual changes after stroke. J Clin Psychiatry 2003;64(3):302-7.

386. Aloni R, Schwartz J, Ring H. Sexual function in post-stroke female patients. Sexuality & Disability 1994(3):191-199.

387. McCormick GP, Riffer DJ, Thompson MM. Coital positioning for stroke afflicted couples. Rehabil Nurs 1986;11:17-19.

388. Glass TA, Maddox GL. The quality and quantity of social support: Stroke recovery as psycho-social transition. Soc Sci Med 1992;34(11):1249-61.

389. Friedland JF, McColl M. Social support intervention after stroke: Results of a randomized trial. Arch Phys Med Rehabil 1992;73(6):573-81.

390. Evans RL, Bishop DS, Matlock AL, Stranahan S, Halar EM, Noonan WC. Prestroke family interaction as a predictor of stroke outcome. Arch Phys Med Rehabil 1987;68(8):508-12.

391. Evans RL, Bishop DS, Matlock AL, Stranahan S, Smith GG, Halar EM. Family interaction and treatment adherence after stroke. Arch Phys Med Rehabil 1987;68(8):513-7.

392. Evans RL, Matlock AL, Bishop DS, Stranahan S, Pederson C. Family intervention after stroke: Does counseling or education help? Stroke 1988;19(10):1243-9.

393. Van den Heuvel ET, de Witte LP, Nooyen-Haazen I, Sanderman R, Meyboom-de Jong B. Short-term effects of a group support program and an individual support program for caregivers of stroke patients. Patient Education & Counseling. 2000;40(2):109-20.

394. Van den Heuvel ET, Witte LP, Stewart RE, Schure LM, Sanderman R, Meyboom-de Jong B. Long-term effects of a group support program and an individual support program for informal caregivers of stroke patients: Which caregivers benefit the most? Patient Education & Counseling. 2002;47(4):291-9.

395. Hartke RJ, King RB. Telephone group intervention for older stroke caregivers. Top Stroke Rehabil 2003;9(4):65-81.

396. Grant JS. Social problem-solving partnerships with family caregivers. Rehabil Nurs 1999;24(6):254-60.

397. Grant JS, Elliot TR, Weaver M, Bartolucci AA, Giger JN. Telephone intervention with family caregivers of stroke. Stroke 2002;33:2060-2065.

398. Pierce LL, Steiner V, Govoni AL, Hicks B, Cervantez Thompson TL, Friedemann ML. Internet-based support for rural caregivers of persons with stroke shows promise. Rehabil Nurs 2004;29(3):95-9, 103.

399. Moodie ML, Carter R, Mihalopoulos C, Thrift AG, Chambers BR, Donnan GA, et al. Trial Application Of a Model Of Resource Utilization, Costs, and Outcomes for Stroke (MORUCOS) to assist priority setting in stroke. Stroke 2004;35(5):1041-6.

400. Brady BK, McGahan L, Skidmore B. Systematic review of economic evidence on stroke rehabilitation services. Int J Technol Assess Health Care 2005;21(1):15-21.

401. Launois R, Giroud M, Megnigbeto AC, Le Lay K, Presente G, Mahagne MH, et al. Estimating the cost-effectiveness of stroke units in France compared with conventional care. Stroke 2004;35(3):770-5.

402. Van Exel J, Koopmanschap MA, van Wijngaarden JD, Scholte op Reimer WJ. Costs of stroke and stroke services: Determinants of patient costs and a comparison of costs of regular care and care organised in stroke services. Cost Effectiveness and Resource Allocation 2003, Feb 26;1(1):2

403. Cadilhac D, Pearce D. National Stroke Services Health Survey Report. Unpublished report. Melbourne:National Stroke Foundation; 2005.

404. Patel A, Knapp M, Perez I, Evans A, Kalra L. Alternative strategies for stroke care: cost-effectiveness and cost-utility analyses from a prospective randomized controlled trial. Stroke 2004;35(1):196-203.

405. Patel A, Knapp M, Evans A, Perez I, Kalra L. Training care givers of stroke patients: Economic evaluation. Br Med J 2004;328(7448):1102.

406. Dewey HM, Thrift AG, Mihalopoulos C, Carter R, Macdonell RA, McNeil JJ, et al. Cost of stroke in Australia from a societal perspective: Results from the North East Melbourne Stroke Incidence Study (NEMESIS). Stroke 2001;32(10):2409-16.

407. Dewey HM, Thrift AG, Mihalopoulos C, Carter R, Macdonell RA, McNeil JJ, et al. Informal care for stroke survivors: Results from the North East Melbourne Stroke Incidence Study (NEMESIS). Stroke 2002;33(4):1028-33.

408. Holloway RG, Benesch CG, Rahilly CR, Courtright CE. A systematic review of cost-effectiveness research for stroke evaluation and treatment. Stroke 1999;30(7):1340-1349.

409. Smith MG, Neville AM, Middleton JC. Clinical and economic benefits of ramipril: An Australian analysis of the HOPE study. Internal Medicine Journal 2003;33(9-10):414-419.

410. Chambers M, Hutton J, Gladman J. Cost-effectiveness analysis of antiplatelet therapy in the prevention of recurrent stroke in the UK: Aspirin, dipyridamole and aspirin-dipyridamole. Pharmacoeconomics 1999;16(5 Part 2):577-593.

411. Marissal JP, Selke B. Economic assessment of the secondary prevention of ischaemic stroke with dipyridamole plus aspirin (Aggrenox/Asasantin) in France.[erratum appears in pharmacoeconomics. 2004;22(18):1234]. Pharmacoeconomics 2004;22(10):661-70.

412. Schleinitz MD, Weiss JP, Owens DK. Clopidogrel versus aspirin for secondary prophylaxis of vascular events: A cost-effectiveness analysis. Am J Med 2004;116(12):797-806.

413. Shah H, Gondek K. Aspirin plus extended-release dipyridamole or clopidogrel compared with aspirin monotherapy for the prevention of recurrent ischemic stroke: A cost-effectiveness analysis. Clin Ther 2000;22(3):362-70, discussion 360-1.

414. Jones L, Griffin S, Palmer S, Main C, Orton V, Sculpher M, et al. Clinical effectiveness and cost-effectiveness of clopidogrel and modified-release dipyridamole in the secondary prevention of occlusive vascular events: A systematic review and economic evaluation. Health Technology Assessment 2004;8(38):iii-iv, 1-196.

415. Sarasin FP, Gaspoz JM, Bounameaux H. Cost-effectiveness of new antiplatelet regimens used as secondary prevention of stroke or transient ischemic attack. Arch Intern Med 2000;160(18):2773-8.

416. Avenell A, Broom J, Brown TJ, Poobalan A, Aucott L, Stearns SC, et al. Systematic review of the long-term effects and economic consequences of treatments for obesity and implications for health improvement. Health Technol Assess 2004;8(21):iii-iv, 1-182.

417. Nicholl JPCPBJE. Health and healthcare costs and benefits of exercise. Pharmacoeconomics 1994;5(2):109-122.

418. Ebrahim S. Cost-effectiveness of stroke prevention. Br Med Bull 2000;56(2):557-70.

419. NHMRC (National Health and Medical Research Council). A guide to the development, implementation and evaluation of clinical practice guidelines. Canberra: NHMRC; 1999.

420. NHMRC (National Health and Medical Research Council). How to use the evidence: Assessment and application of scientific evidence. Canberra: NHMRC; 2000.

421. NHMRC (National Health and Medical Research Council). How to review the evidence: Systematic identification and review of the scientific literature. Canberra: NHMRC; 2000.

422. NHMRC (National Health and Medical Research Council). How to put the evidence into practice: Implementation and dissemination strategies. Canberra: NHMRC; 2000.

423. NHMRC (National Health and Medical Research Council). How to compare the costs and benefits: Evaluation of the economic evidence. Canberra: NHMRC; 2000.

424. Grimshaw JM, Thomas RE, MacLennan G, Fraser C, Ramsay CR, Vale L, et al. Effectiveness and efficiency of guideline dissemination and implementation strategies. Health Technol Assess 2004;8(6):iii-iv, 1-72.

425. Lance JW. Symposium synopsis. In: Feldman RG, Young RR, Koella WP, editors. Spasticity: Disordered motor control. Chicago/Miami: Symposia Specialists; 1980. P. 485-494.

426. Beckerman H, Becher J, Lankhorst GJ, Verbeek AL. Walking ability of stroke patients: efficacy of tibial nerve blocking and a polypropylene ankle-foot orthosis. Arch Phys Med Rehabil 1996 Nov;77(11):1144-51.

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