2010 Evidence Update on Stroke Rehabilitation

The 2010 Evidence Update on Stroke Rehabilitation covers systematic reviews published between 1st July 2009 and 30th September 2010, with expert reviewers summarising evidence and commenting on key developments in the field.

2010 Evidence Update on Stroke Rehabilitation - Introduction

Introduction

I am delighted to introduce this 2010 Evidence Update on Stroke Rehabilitation, the result of collaboration between NHS Evidence – stroke, the Society for Research in Rehabilitation and the NHS Stroke Improvement Programme, published online to coincide with the UK Stroke Forum, being held in Glasgow.

Evidence Updates provide an overview of new information in a given topic area. Usually this covers a twelve month period. In particular, Evidence Updates highlight any new evidence that might challenge current practice, as described in the most recent, accredited national guidance, and provide a commentary on the likely impact. The Updates also provide a list of relevant national policy, guidelines and systematic reviews, and other significant primary research in the area of interest. This year also sees the launch of the UK Forum for Stroke Training, an important addition to joint efforts to improve the quality of patient care.

Findings from Evidence Updates also contribute to the UK DUETS (Database of Uncertainties about the Effects of treatments). We list potential uncertainties here, and will in due course be adding these formally to UK DUETS in PICO format. We welcome volunteers to assist us with this important task!

This year’s Update provides a wealth of interesting new information and is, I think, the most comprehensive we have published to date. I am particularly grateful to the NHS Evidence – stroke team at the University of Surrey (Magda Robertson, Mandy Howell and Dr Freda Mold), and to our expert reviewers who have given up their valuable time to provide commentaries on the systematic reviews identified by our comprehensive search strategy.

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2010 Evidence Update on Stroke Rehabilitation - Organisation of Care

Expert summary on Organisation of Care

by Dr Terry Quinn, Lecturer in Geriatric Medicine, University of Glasgow and Professor P Langhorne, Professor of Stroke Care, University of Glasgow

Practitioners working in the field of stroke rehabilitation have a growing evidence base to inform service delivery and processes of care. The publication of the Scottish Intercollegiate Guideline Network document – Management of patients with stroke: Rehabilitation, prevention and management of complications and discharge planning (SIGN 118) is proof positive that stroke
rehabilitation is no longer an “evidence free” discipline. Many questions remain to be answered, recent important reviews are considered below and ongoing synthesis of data through systematic review and meta-analysis is welcome.

**Stroke units**
The mortality benefits of admission to a dedicated stroke unit have been established through randomised controlled trials and confirmed with observational data. In a review of stroke unit care O’Rourke (O’Rourke et al 2010) argues that these observational data may be susceptible to bias and offers a novel analysis of the evidence using Bayesian techniques. It is reassuring that the resulting sequential analysis of 17 patient groups (n=42009 participants), subject to fairly strict correction for potential bias (likelihood adjusted by 30% towards null hypothesis), still describes a mortality benefit for stroke unit care (odds ratio:0.86, 95% confidence interval:0.77-0.85). This result is in keeping with previous estimates using traditional “frequentist” analysis (odds ratio:0.82, 95% confidence interval:0.71-0.94)

Benefits of admission to a dedicated stroke unit seem to apply irrespective of clinical or demographic factors. However, the benefits of rehabilitation in a frail, elderly cohort have been questioned. Studies relating to more “general” geriatric rehabilitation are relevant to stroke care as stroke remains primarily a disease of the older adult. Bachmann (Bachmann et al 2010) presents a meta-analysis of multidisciplinary rehabilitation (active physiotherapy, occupational therapy or both) for hospital inpatients aged over 65 years, comprising data from eight trials (n=2927 participants). Overall rehabilitation is associated with lower care home admission rate (Odds ratio:0.53, 95% confidence interval:0.33–0.86) and improved outcome at point of discharge. (Odds ratio:1.34, 95% confidence interval 1.12–1.60) Longer term benefits are less apparent. This may not represent a failure of rehabilitation, rather it may reflect a propensity for future functional deterioration in frail, elderly.

**Early discharge**
We know from previous Cochrane reviews that early discharge with community support is effective for mild to moderate stroke and that community based rehabilitation is not inferior to inpatient care. The best rehabilitation model for delivering rehabilitation to community dwelling stroke survivors remains to be definitively demonstrated. A systematic review of home or centre based therapy for stroke survivors is presented by Hillier et al 2010. Eleven studies are analysed (n=1711 participants). The authors attempt meta-analysis but heterogeneity in outcome measures makes the resulting data difficult to interpret and the narrative review presented is more informative. Across the included studies, there is no evidence that home based therapy is inferior to centre based therapy in the short term. In fact, many studies suggest benefits of home based rehabilitation in terms of patient satisfaction and cost.

**Rehabilitation programmes**
Studies of brain injury cohorts often include stroke survivors and review of good quality research in the area is pertinent to stroke rehabilitation. The systematic review by Geurtsen et al 2010 describes differing rehabilitation programmes in brain injury, paying particular attention to studies in the “chronic” phase (defined as one year post event) and separating interventions into “neuro-behavioural”; “residential community reintegration” and “holistic day treatment” models. This work compliments previous reviews in brain injury, although the authors adopt more inclusive criteria than previous systematic reviews (for example Turner-Stokes et al 2005) and thus methodological quality of included studies may be less robust. Across 13 studies, substantial heterogeneity precludes meta-analysis and so narrative review is offered. The authors conclude that rehabilitation interventions are associated with improved functional and participation outcomes but acknowledge the small numbers included. They offer no convincing evidence to favour a particular approach. Although stroke patients are included in the analysis, the majority of participants were traumatic brain injury survivors and were relatively young (age 19-64 was a pre-specified eligibility criteria). Thus we should be cautious in directly extrapolating these results to an exclusively stroke cohort.

A complimentary review by Doig et al 2010 compares rehabilitation for brain injury, delivered in either home or day hospital environment. Seventeen relevant papers are included. In contrast to the previous review, majority of included patients were older, stroke survivors. Again there is heterogeneity in studies and meta-analysis is not performed. Overall, conclusions were in keeping with the Hillier et al 2010 review – with no evidence that short term (three month) rehabilitation
delivered at home is inferior to day hospital therapy. Content of interventions varied across the included studies and no particular rehabilitation model can be recommended. Thus another rehabilitation “black box” remains to be opened. Outcomes are mostly described in terms of activities of daily living. In the current era, studies of cost effectiveness may prove more important for informing decisions regarding rehabilitation service planning and delivery.

Data on community based rehabilitation is pertinent, O’Brien et al 2010 review of quality of care indicators for stroke (12 studies) suggests a gradual decrease in length of inpatient stay over the 1990s. In one study, inpatient stay decreased from 24 to 16 days. Data on functional outcome and discharge destination are limited, but these outcomes appear to be stable despite the shorter inpatient stay. A sub-analysis to explore the effects of a recent change in reimbursement for inpatient rehabilitation facilities (the prospective payment system), suggests that attempts to further reduce inpatient stay may be associated with poorer outcomes. These data are American and based on a limited number of observational studies, however they highlight an International concern that health services cost efficiency savings may impact on rehabilitation outcomes.

Resource allocation
When allocating limited resources it is important that we do not assume the benefits of an intervention. A dedicated stroke worker, providing information and support seems intuitively valuable. However, Ellis’ (Ellis et al 2010) individual patient meta-analysis of this intervention, under the rubric “stroke liaison worker”, does not show evidence of benefit as measured by health status or functional ability (16 trials, n=4759 participants). Sub-analysis suggests improvements in satisfaction scores for both patients and carers and possible morbidity and mortality benefit in stroke survivors with mild-moderate activity limitation. These latter findings are intriguing and would suggest the need for further targeted studies of “stroke liaison”.

6 Systematic Reviews were identified

**Doig E, Fleming J, Kuipers P, Cornwell PL. Comparison of rehabilitation outcomes in day hospital and home settings for people with acquired brain injury - a systematic review. Disability and Rehabilitation 2010 May 4**

**Bottom-line conclusion:** The available studies indicate that outcomes of outpatient rehabilitation programmes delivered at home, of short-term duration (mostly 3 months) for people with stroke recently discharged from hospital, are at least equivalent to day hospital-based outpatient rehabilitation programme outcomes. However, there have been no controlled studies designed to investigate the influence of therapy context (home and clinic settings) on outcomes for people receiving outpatient neurological rehabilitation. Furthermore, investigations of the efficacy of community-based rehabilitation with younger people with brain injuries, caused by mechanisms other than stroke, are required.

[PubMed abstract]

**Ellis G, Mant J, Langhorne P, Dennis M, Winner S. Stroke liaison workers for stroke patients and carers: an individual patient data meta-analysis. Cochrane Database Of Systematic Reviews (Online) 2010;5:CD005066.**

**Bottom-line conclusion:** There is no evidence for the effectiveness of this multifaceted intervention in improving outcomes for all groups of patients or carers. Patients with mild to moderate disability benefit from a reduction in death and disability. Patients and carers do report improved satisfaction with some aspects of service provision

[DARE commentary] [PubMed abstract]


**Bottom-line conclusion:** Comprehensive rehabilitation programmes appear to be effective in terms of a reduction in psychosocial problems, a higher level of community integration and an increase in employment. Although this is the first review to differentiate between specific programmes, clear-cut clinical recommendations cannot yet be set out due to limited methodological quality and poor
description of patient and intervention characteristics. Specific recommendations for future studies are given.


**Bottom-line conclusion:** The provision of rehabilitation for people living in the community should trend towards home-based. Further research is required into adverse events and the experiences of all stakeholders.


**Bottom-line conclusion:** The impact of PPS on quality care indicators for inpatient stroke rehabilitation, trends for LOS, and trends for functional outcomes are insufficiently documented in the medical literature. Further research is needed to understand the influence of LOS on functional outcomes and discharge destination. More information is needed on post-PPS outcomes to substantiate the benefit of inpatient rehabilitation for individuals with stroke.


**Bottom-line conclusion:** The current estimates are robust, with demonstrable stability despite the addition of recent large studies. Further studies are very unlikely to alter current knowledge but may have a role in ensuring regional stability of outcome.

**Additional expert references**


Early Supported Discharge Trialists. Services for reducing duration of hospital care for acute stroke patients. Cochrane database of Systematic Reviews 2004, issue 4, art. no.: CD000443.

Outpatient Service Trialists. Therapy-based rehabilitation services for stroke patients at home. Cochrane Database of Systematic Reviews 2003, issue 1, art. no.: CD002925.


Additional systematic review identified since initial searches were run (not reviewed by expert)


**Bottom-line conclusion:** There is a need for researchers, to work together with other stakeholders to develop and test interventions that can support self-management skills and confidence to make continued progress after stroke. This could help to reduce some of the negative consequences of stroke such as reduced quality of life and social isolation.

[PubMed abstract]

Other Key Documents

**Guidelines**

American Heart Association - AHA Scientific Statement: Comprehensive Overview of Nursing and Interdisciplinary Rehabilitation Care of the Stroke Patient (September 2010) [full text]


SIGN - Management of patients with stroke: rehabilitation, prevention and management of complications, and discharge planning (June 2010) [full text]

**Economic evaluations**


[WHO International Clinical Trials Registry Platform]

2010 Evidence Update on Stroke Rehabilitation - Upper Limb

**Expert summary on Upper Limbs**

Dr Anand Pandyan, Senior Lecturer, Keele University
Dr Sybil Farmer, Senior Physiotherapist, Keele University

This summary statement was based on a methodological examination of review papers using the methodology described in Appendix 1.

**Strength training**

A graded resistance based strength training programme (with appropriate progression) improves function with no adverse events (Harris et al 2010). Virtual reality (VR) also provides feedback and has been used with tele-rehabilitation. As yet the evidence identified includes other conditions so that further work is required to explore the efficacy of VR (Gövercin et al 2010).
Sensory impairment
Evidence is lacking for treatments of sensory impairment (Doyle et al 2010). Bio feedback (auditory, visual and sensory) gives added value to UL (motor) rehabilitation in chronic stroke patients (Molier et al 2010, Subramanian et al 2010). “Knowledge of performance - KP” and “knowledge of result - KR” were both considered useful (Molier et al 2010, Subramanian et al 2010).

Constraint induced movement therapy
All forms of constraint induced movement (CIMT) therapy are likely to be beneficial in chronic stroke patients with adequate pre-treatment active control of wrist and fingers, giving an effect size=0.36 (Sirtori et al 2009). However, the benefits were not maintained at follow-up with follow-up effect size=-0.07 (Sirtori et al 2009). There is some suggestion that this high intensity CIMT, in an acute stroke population, may be detrimental in the long term (Liepert 2010).

Bilateral arm training
Reviewers’ opinions differ regarding bilateral arm training. Cauraugh et al (2010), following a review that included studies without a control group, suggest that bilateral task training is effective. Contrarily, Coupar et al (2010), in a Cochrane review, conclude that there is insufficient evidence of effectiveness of bilateral training to improve UL performance. In summary, there is some low evidence that bilateral task training maybe effective in a sub population of stroke patients (Latimer et al 2010). It is not clear from the literature as to whether there are task specific benefits to bilateral arm training as most outcome measures in the primary studies assessed unilateral impairments (Coupar et al 2010, Cauraugh et al 2010, Latimer et al 2010).

There is no evidence of benefit from positioning to maintain external rotation of the shoulder (Doyle et al 2010).

Imaging
PET and fMRI can be used to monitor brain activity and thus identify changes after stroke (Buma et al 2010). However, the clinical usefulness of these techniques, in predicting or explaining arm recovery, remains limited due to methodological inadequacies and lack of control of confounding variables. Buma et al (2010) concluded that dexterity specific measures should be used in future research to determine associations between PET and fMRI and recovery of upper limb function after stroke.

rTMS and tDCS has been shown to instantaneously induce changes in cortical excitability but effects are small and short-lived so further work is required to harness the potential of these technologies (Nowak et al 2010).

Discussion
The Scottish Intercollegiate Guidelines Network (SIGN, 118) have been revised and updated for the management of stroke; rehabilitation, prevention and management of complications and discharge planning. This extensive document includes management and prevention strategies for upper limb function, post stroke spasticity, prevention and treatment of shoulder subluxation and shoulder pain. Readers are recommended to read this document in its entirety.

From this update and those of previous years it can be seen that some treatments appear to have some immediate benefit at the impairment level but current research does not provide evidence as to how these benefits can be sustained nor how such benefits can be developed to improve activity levels and participation.

A further common problem is selection of appropriate measures that inform effects of treatment at all levels. This difficulty is compounded in UL rehabilitation by the differences in use of dominant and assisting hand for many functional activities.

There are key gaps, as identified from these reviews, which clinicians who participate in research need to consider and could be bridged by work that asks:

1. When would you discontinue an intervention?
2. Given that all treatments are not applicable to all stroke patients - Which are the subgroups benefitting
The reviewed research suggests that strength training should be included in the standard rehabilitation after stroke, that some modalities give short term benefit but that further research is required to determine how traditional and emerging treatments could be integrated to optimise UL functional recovery.

14 systematic reviews were identified

**Bottom-line conclusion:** Positioning of the paretic shoulder following stroke did not appear to help prevent or reduce impairment in shoulder external rotation range of movement.
[PubMed abstract]

**Bottom-line conclusion:** Despite methodological shortcomings and heterogeneity, trends can be discerned. However, statistically sound associations with recovery are not consistent. The challenges in future research will be, controlling for confounding factors, finding outcomes that specifically measure dexterity of the paretic limb, to control for the extent of white matter damage and changes in perfusion in order to establish the longitudinal construct validity of fMRI and PET with regard to upper limb recovery after stroke.
[PubMed abstract]

**Bottom-line conclusion:** These novel findings provide strong evidence supporting bilateral arm training with the caveat that two coupled protocols, rhythmic alternating movements and active stimulation, are most effective.
[PubMed abstract]

**Bottom-line conclusion:** There is insufficient good quality evidence to make recommendations about the relative effect of simultaneous bilateral training compared to placebo, no intervention or usual care. We identified evidence that suggests that bilateral training may be no more (or less) effective than usual care or other upper limb interventions for performance in ADL, functional movement of the upper limb or motor impairment outcomes.
[DARE commentary] [PubMed abstract]

Doyle S, Bennett S, Fasoli SE, McKenna KT. Interventions for sensory impairment in the upper limb after stroke. Cochrane Database Of Systematic Reviews (Online) 2010;6:CD006331.
**Bottom-line conclusion:** Multiple interventions for upper limb sensory impairment after stroke are described but there is insufficient evidence to support or refute their effectiveness in improving sensory impairment, upper limb function, or participants' functional status and participation. There is a need for more well-designed, better reported studies of sensory rehabilitation.
[DARE commentary] [PubMed abstract]

**Bottom-line conclusion:** Immersive VR approaches were shown to be effective compared to control groups. While nonimmersive VR did not prove to be effective, evidence from noncontrolled trials revealed that nonimmersive VR may prove to be effective compared to standard care.
[Journal abstract]

**Bottom-line conclusion:** There is evidence that strength training can improve upper-limb strength and function without increasing tone or pain in individuals with stroke.


**Bottom-line conclusion:** There is some evidence that bilateral therapy improves function in adults with chronic stroke, however more quality RCTs are required to strengthen this evidence.

Liepert J. Evidence-based therapies for upper extremity dysfunction. Curr Opin Neurol 2010 Sep 16

**Bottom-line conclusion:** For some interventions (e.g. constraint-induced movement therapy, botulinum toxin), efficacy is evident, for others (e.g. mental practice, virtual reality), well designed studies with sufficient numbers of patients are needed. The ultimate goal still is to develop evidence-based therapies for all different degrees of motor impairment.


**Bottom-line conclusion:** On the basis of this study, it was not possible to determine which combinations of aspects and types of augmented feedback are most essential for a beneficial effect on motor activities and motor functions of the hemiparetic arm after stroke. This was due to the combination of multiple aspects and types of augmented feedback in the included studies. This systematic review indicates that augmented feedback in general has an added value for stroke rehabilitation.


**Bottom-line conclusion:** Neuromodulation, by means of noninvasive brain stimulation techniques, has been shown to be a safe, feasible and effective method to promote recovery of motor function after stroke. However, several methodological and theoretical issues remain to be addressed in future work.

Sirtori V, Corbetta D, Moja L, Gatti R. Constraint-induced movement therapy for upper extremities in stroke patients. Cochrane Database of Systematic Reviews 2009(4)

**Bottom-line conclusion:** CIMT is a multifaceted intervention: the restriction to the normal limb is accompanied by a certain amount of exercise of the appropriate quality. It is associated with a moderate reduction in disability assessed at the end of the treatment period. However, for disability measured some months after the end of treatment, there was no evidence of persisting benefit. Further randomised trials, with larger sample sizes and longer follow up, are justified.


**Bottom-line conclusion:** The results suggest that people with stroke may be capable of using extrinsic feedback for implicit motor learning and improving UL motor recovery. Emergent questions regarding the advantages of using different media for feedback delivery and the optimal type and schedule of feedback to enhance motor learning in patient populations still need to be addressed.

An additional 2 non-English systematic reviews were identified – unable to appraise
[full text]
In Portuguese with an English abstract

[full text]
In Chinese with an English abstract

Additional expert reference

[full text]

Upper Limb – key docs

Protocols

Barclay-Goddard RE, Stevenson TJ, Poluha W, Thalman L. Mental practice for treating upper extremity deficits in individuals with hemiparesis after stroke. Cochrane Database of Systematic Reviews: Protocols 2010;(1)
[DARE commentary]

Gustafsson L, Bennett S. Interventions for maintaining soft tissue length in the stroke-affected shoulder. Cochrane Database of Systematic Reviews. 2010;(8)
[DARE commentary]

Economic evaluations

[NEED commentary]
For details of ongoing research visit UK Clinical Research Network, Current Controlled Trials and WHO International Clinical Trials Registry Platform.

2010 Evidence Update on Stroke Rehabilitation - Mobility

Expert summary on Mobility

by Professor Sarah Tyson, University of Salford

Professor Sarah Tyson has reviewed the evidence found during the update process, and concludes that the new evidence published does not change the summary and recommendations published in the 2009 Stroke Rehabilitation – Mobility update.
The new evidence identified during the update process is listed below.

11 systematic reviews were identified

**Bottom-line conclusion:** Mechanically assisted walking with body weight support is more effective than overground walking at increasing independent walking in non-ambulatory patients early after stroke. Furthermore, it is not detrimental to walking speed or capacity and clinicians should therefore be confident about implementing this intervention.

[PubMed abstract]

**Bottom-line conclusion:** Fall risk is high in stroke survivors; however, the only intervention shown to be effective in reducing falls in this review was vitamin D supplementation. Consistency in outcome measurement would enable comparisons across studies. Additionally, further research evaluating a range of single and multifactorial interventions for fall prevention in the stroke population is required.

[PubMed abstract]

**Bottom-line conclusion:** Although limited, evidence exists that FIM scores can be used to accurately predict outcomes in patients poststroke across civilian and veteran populations. Because of its narrow search criteria, this systematic review produced limited articles for review, and of those, even fewer were considered to be of high quality. If additional research clinical trials support this evidence, rehabilitation practice patterns could be focused on the specific measures identified to improve outcomes of patients poststroke.

[full text]

**Bottom-line conclusion:** CCT is safe and effective in improving mobility for people after moderate stroke and may reduce inpatient length of stay. Further research is required, investigating quality of life, participation and cost-benefits, that compares CCT to standard care and that also investigates the differential effects of stroke severity, latency and age.

[DARE commentary] [PubMed abstract]

**Bottom-line conclusion:** Repetitive task training resulted in modest improvement across a range of lower limb outcome measures, but not upper limb outcome measures. Training may be sufficient to have a small impact on activities of daily living. Interventions involving elements of repetition and task training are diverse and difficult to classify: the results presented are specific to trials where both elements are clearly present in the intervention, without major confounding by other potential mechanisms of action.

[full text] [PubMed abstract]

**Bottom-line conclusion:** This review supports the use of balance training exercises to improve balance performance for individuals with moderately severe stroke.

[PubMed abstract]
Bottom-line conclusion: No conclusions about the effectiveness of mobility devices and their effects on activity and participation could be drawn due to the poor quality of data.

DARE commentary [full text]

Saunders DH, Greig CA, Mead GE, Young A. Physical fitness training for stroke patients. Cochrane Database of Systematic Reviews 2009(4)
Bottom-line conclusion: The effects of training on death, dependence and disability after stroke are unclear. There is sufficient evidence to incorporate cardiorespiratory training, involving walking, within post-stroke rehabilitation in order to improve speed, tolerance and independence during walking. Further trials are needed to determine the optimal exercise prescription after stroke and identify any long-term benefits.

DARE commentary [PubMed abstract]

Bottom-line conclusion: After the analysis of research studies, it was possible to verify that resisted exercise did not promote tonus increase in the trained subjects, yet presented beneficial effects in relation to the power of spastic muscles.

full text

Bottom-line conclusion: Following stroke, biofeedback therapy for dysfunction was shown to result in significant and valid outcomes, increased motor function and electromyogram values, improved joint range of motion, and improved daily living activities.

full text

Bottom-line conclusion: The measurement tools identified above are psychometrically robust and feasible to use in clinical practice. Future objective measure development should consider the theoretical construct of the measure, the minimal detectable change and use in clinical populations other than stroke

PubMed abstract [Free full-text]

An additional 3 non-English systematic reviews were identified – unable to appraise

Journal abstract
German

Journal abstract
German

PubMed abstract
Chinese
**Other key documents**

**Cochrane protocol**


For details of ongoing research visit UK Clinical Research Network, Current Controlled Trials and WHO International Clinical Trials Registry Platform.

**2010 Evidence Update on Stroke Rehabilitation - Speech and Language**

Expert summary on Speech and Language

by Professor Jane Maxim, University College London

**Dysphagia**

Patients admitted to hospital with neurological disorders are at risk of dysphagia which, in stroke, has an incidence of about 40%. The potential consequences of dysphagia in acute stroke are (i) a higher risk of death, (ii) chest infection and (iii) longer hospital stay (see, for example, Foley et al, 2009). The need for a robust bedside screening test is therefore clinically very important. Such a test, used by appropriately trained healthcare professionals, should be quick and easy to administer immediately after admittance to identify at risk patients. A review of such bedside screening tests considered 35 studies of which 11 were of appropriate quality (Bours et al, 2010). Of these 11, 2 studies provided evidence for tests which had the potential to screen out dysphagia but not to diagnose it. The review stresses the difficulty of specific and accurate screening diagnosis because no single clinical feature can identify aspiration in a fully conscious patient. The review concluded that a water test (small volumes of water given are judged against coughing, choking and a change in voice quality) combined with pulse oximetry was the best bedside predictor.

**Speech and language therapy**

Aphasia, a language disorder secondary to stroke and other neurological disorders, has a profound impact on the individual and their family. The language disorder may change the ability to use and understand language, to read and to write. Although there is evidence for the efficacy of speech and language therapy intervention for aphasia, it has been difficult to deduce more specific information concerning timing, dosage and type of intervention. An updated Cochrane review of efficacy of speech and language therapy has reiterated the findings of the previous review (Greener et al, 1999) that speech and language therapy is effective but, in addition, also concludes that there is now evidence that intensive therapy is likely to be more effective (Kelly et al, 2010). The evidence on type of intervention and delivery (speech and language therapist versus trained other) is inconclusive.

**Screening**

The role of an organised stroke care team in better outcomes for stroke patients is well documented (see National Clinical Guidelines for Stroke, 2008) although the reasons for this advantage are difficult to specify. A review of nursing rehabilitation for stroke patients with aphasia (Poslawsky et al 2010) considers the early identification of aphasia by nurses. This review emphasises the importance of early screening for aphasia post stroke and the potential for nurse led screening. Crucially, the review discusses the evidence that mild to moderate aphasia (in particular anomia) is often undiagnosed in the first two weeks post stroke. The review also considers the potential for nurse involvement in intervention for aphasia, given the shortage of speech and language therapists and the need to integrate treatment into everyday care.
Constraint induced language therapy

One specific intervention for aphasia after stroke which has undergone systematic review is constraint induced language (aphasia) therapy (CILT, CIAT), currently not common in the clinical intervention repertoire of UK SLTs but more so in mainland Europe. This therapy uses an intensive programme for a short period (10 days), shaping (increasing response difficulty) and constraint (only spoken response; constraint on use of compensatory non verbal communication strategies). A systematic review (Cherney et al 2009) of 9 studies concluded that there was only modest evidence of effectiveness. A further review (Balardin et al, 2009) identified 2 studies at Level 1 (randomised controlled trial) and 2 at Level II (non randomised controlled trial) using the criteria put forward by Cicerone et al (2000). The review concluded that the evidence of an advantage of CILT/CIAT over other therapies is not proven, and while this therapy may improve language and communication outcomes for some people with aphasia, its impact may not be long term.

4 systematic reviews were identified

**Bottom-line conclusion:** These recommendations should be interpreted with caution, given the small number of studies involved, but serve as a guideline for future studies in aphasia therapy. [full text]

**Bottom-line conclusion:** A water test combined with pulse oximetry using coughing, choking and voice alteration as endpoints was currently the best method to screen patients with neurological disorders for dysphagia. [DARE commentary] [PubMed abstract]

Kelly H, Brady MC, Enderby P. Speech and language therapy for aphasia following stroke. Cochrane Database of Systematic Reviews 2010;5:CD000425.
**Bottom-line conclusion:** There was insufficient evidence to draw any conclusions in relation to the effectiveness of one SLT approach over another. [DARE commentary] [PubMed abstract]

**Bottom-line conclusion:** The findings of this study can be used to develop nursing rehabilitation guidelines for stroke patients with aphasia. Further research is necessary to explore the feasibility of using such guidelines in clinical nursing practice and to examine the experiences of patients with nursing interventions directed at aphasia. [full text] [PubMed abstract]

An additional 2 non-English systematic reviews were identified but not reviewed by expert

**Bottom-line conclusion:** More methodologically sound group studies are required to determine the neural correlates of treatment-induced recovery in the chronic stage of aphasia. Supplemented by other imaging techniques, this knowledge may eventually contribute to the target-oriented allocation of treatment resources in aphasia patients and may increase treatment efficiency. [Journal abstract] German

Bottom-line conclusion: It is approved that acupuncture (or acupuncture combined language training) is effective for apoplectic aphasia. But the quality of inclusive literature is low. Therefore, more RCTs of high methodological quality is requested to be carried out.

**References added by reviewer**


**Other key documents**

**Guidelines**

SIGN - Management of patients with stroke: identification and management of dysphagia (June 2010)

2010 Evidence Update on Stroke Rehabilitation - Post-stroke depression

Post-stroke depression

There is no expert review on Post-stroke depression - instead significant new evidence is listed below

5 systematic reviews were identified


Bottom-line conclusion: Antidepressants can reduce the frequency and severity of crying or
laughing episodes. The effect does not seem specific to one drug or class of drugs. Our conclusions must be qualified by several methodological deficiencies in the studies. More reliable data are required before recommendations can be made about the treatment of post-stroke emotionalism.


Bottom-line conclusion: Depressive symptoms are common in the acute phase after stroke and associated with persistency of depression and mortality after 12 months. A gold standard for the measurement of depressive symptoms in relation to stroke is missing. The knowledge of PSD in the acute phase is still limited, and there is a need for continued empirical research on its profile and patterns.


Bottom-line conclusion: PSD is highly prevalent in both sexes, but appears to be slightly more common among women than men. Untreated depression after stroke can lead to a reduced quality of life, poorer prognosis, and increased mortality. All stroke patients should be routinely screened for depression, and further research is needed to determine whether there are sex-specific differences in response to treatment.


Bottom-line conclusion: Fluoxetine was beneficial for the prophylaxis of poststroke depression in patients with stroke but not in reducing symptom severity of PSD.

An additional non-English systematic review was identified – unable to appraise


In Chinese, no English abstract online

For details of ongoing research visit UK Clinical Research Network, Current Controlled Trials and WHO International Clinical Trials Registry Platform.

2010 Evidence Update on Stroke Rehabilitation - Cognition and Perception

Cognition and Perception
There is no expert review on Cognition and Perception - instead significant new evidence is listed below

3 systematic reviews were identified

**Bottom-line conclusion:** RAS may be beneficial for gait improvement in people with stroke. These results are encouraging, but more RCTs are needed before recommendations can be made for clinical practice. More research is needed to examine the effects of music therapy on other outcomes in people with ABI.


**Bottom-line conclusion:** There were not an adequate number of high quality trials to be able to make recommendations that support or refute the use of specific cognitive retraining interventions to improve functional outcomes following a stroke. More research is required before conclusions can be made about the effect of cognitive interventions on functional outcomes post stroke.

**Additional key documents**

**Cochrane protocols**

Chung CSY, Pollock A, Campbell T, Durward BR, Hagen S. Cognitive rehabilitation for executive dysfunction in patients with stroke or other adult non-progressive acquired brain damage. Cochrane Database of Systematic Reviews: Protocols 2010;Issue 3

**2010 Evidence Update on Stroke Rehabilitation - Living with Stroke**

**Living with Stroke**

There is no expert review on living with stroke - instead significant new evidence is listed below

**5 systematic reviews were identified**


**Bottom-line conclusion:** The results of this review emphasize the need to apply more rigorous research approaches, appropriate theories, and mixed-method designs to advance the state-of-the-art. Such improvements will provide practitioners with stronger evidence to guide the development, targeting, and timing of clinical interventions.


**Bottom-line conclusion:** Acknowledgment by clinicians of the impact of caring and of carers’
reactions to it, will mean that they will be better equipped to understand and respond to carers’ needs.  


**Bottom-line conclusion:** The studies were equivocal in their reports of needs not being identified and addressed during hospitalization. The Supportive Care National Framework (SCNF) provided a comprehensive means of organizing the broad spectrum of needs of this population reported in the literature. No new domains were uncovered in the review.  


**Bottom-line conclusion:** There is insufficient evidence available to guide the management of fatigue after stroke. Further trials are required.  


**Bottom-line conclusion:** The synthesis showed that stroke survivors’ experiences of rehabilitation reflected individual and relational aspects of power and empowerment. The capacity to assume power and empowerment was a dynamic rather than a progressive issue, and enabling empowerment was a matter of weighing contrasting issues against each other, e.g. the right to decide versus the right not to decide.  

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**2010 Evidence Update on Stroke Rehabilitation - Miscellany**  

**Miscellany**  

**Miscellaneous - the role of Traditional Chinese Medicine in Stroke rehabilitation**  

This year's update retrieved a number of publications relating to the use of traditional Chinese medicine in stroke rehabilitation. Some of these publications are included in 2010 Annual Evidence Update on Acupuncture – Stroke from NHS Evidence Specialist Collection - Complementary and alternative medicine.  

**Mike Cummings,** Medical Director, British Medical Acupuncture Society and member of the [NHS Evidence - complementary and alternative medicine](https://www.nhsbsa.nhs.uk/evidence) project team, briefly reviewed the abstracts. He comments “I do not think these publications would result in any fundamental change to the conclusions of the most recent reviews on acupuncture in stroke. There does not seem to be any significant influence on the rate of recovery in acute stroke within the context of optimal stroke care, but there may be a role in symptomatic treatment of pain and other symptoms related to the disability e.g. shoulder stiffness.  

7 systematic reviews on the use of Traditional Chinese Medicine in stroke rehabilitation were

**Bottom-line conclusion:** The results of our systematic review and meta-analysis suggest that there is limited evidence for CAT being superior to IAT in the treatment of cerebral infarction. The total number of RCTs included in our analysis was low, however, and the RCTs included had a high risk of bias. Future RCTs appear to be warranted.

[PubMed abstract]


**Bottom-line conclusion:** Our meta-analyses of data from rigorous randomized sham-controlled trials did not show a positive effect of acupuncture as a treatment for functional recovery after stroke.

[PubMed abstract]


**Bottom-line conclusion:** the evidence is not significantly convincing to suggest cupping is effective for treating hypertension. Further research is required to investigate whether it generates any specific effects for that condition.

[PubMed abstract]


**Bottom-line conclusion:** This systematic review found limited effectiveness of moxibustion as an adjunct to standard care in stroke rehabilitation.

[PubMed abstract]


**Bottom-line conclusion:** The results of our review suggest that acupuncture may be effective for treating shoulder hand syndrome, but because of the defects in the methodological quality of included trials, further large sample, double-blind RCTs are urgently needed.

[full text]


**Bottom-line conclusion:** Following stroke, biofeedback therapy for dysfunction was shown to result in significant and valid outcomes, increased motor function and electromyogram values, improved joint range of motion, and improved daily living activities.

[full text]


**Bottom-line conclusion:** Randomized clinical trials demonstrate that acupuncture may be effective in the treatment of poststroke rehabilitation. Poor study quality and the possibility of publication bias hinder the strength of this recommendation and argue for a large, transparent, well-conducted randomized clinical trial to support this claim and implement changes to clinical practice.

[PubMed abstract]

An additional 3 non-English systematic reviews were identified


**Bottom-line conclusion:** It is approved that acupuncture (or acupuncture combined language training) is effective for apoplectic aphasia. But the quality of inclusive literature is low. Therefore, more RCTs of high methodological quality is requested to be carried out.

[PubMed abstract]

Article in Chinese


**Bottom-line conclusion:** A reliable conclusion can not be drawn from the present data because of the defects in methodological quality and insufficient numbers of trials, especially lack the long-term terminal outcomes, although it appears a tendency that acupuncture can improve the conditions of post-stroke spastic paralysis. Therefore, it is necessary to perform more multi-central RCTs of high quality in future.

[PubMed abstract]

Article in Chinese

Bottom-line conclusion: The therapeutic effect of acupuncture for treatment of the depression in patients of poststroke is superior to other common medicine with safety, but it still needs more large sample RCTs to verify.

Bottom-line conclusion: There is insufficient evidence to conclude that neuromodulating drugs targeting serotonin, norepinephrine, or dopamine influence motor recovery after stroke.

Bottom-line conclusion: These findings challenge the concept of a plateau in functional recovery of patients who had experienced stroke and should be valued in planning community rehabilitation services.

Bottom line conclusion: No evidence exists at present to support the use of amphetamine after stroke. Despite a trend to improved motor function, doubts remain over safety and there are significant haemodynamic effects, the consequences of which are unknown.

Miscellaneous – key documents

Cochrane protocols


Laver KE., George S, Thomas S, Deutsch JE, Crotty M. Virtual reality for stroke rehabilitation. Cochrane
2010 Evidence Update on Stroke Rehabilitation - Key Documents

Key Documents

Guidelines

- American Heart Association - AHA Scientific Statement: Comprehensive Overview of Nursing and Interdisciplinary Rehabilitation Care of the Stroke Patient (September 2010) [full text]
- CKS - Stroke and transient ischaemic attack [full text]
- Department of Health - Demonstrating how to deliver stroke care for adults in the community (April 2009) [full text]
- NICE Stroke care quality standard (June 2010) [full text]
- SIGN - Management of patients with stroke: identification and management of dysphagia (June 2010) [full text]
- SIGN - Management of patients with stroke: rehabilitation, prevention and management of complications, and discharge planning (June 2010) [full text]

Audit and statistics

- American Heart Association – Heart disease and stroke statistics 2010 Update (At-A-Glance Version) [full text]
- American Heart Association – Heart disease and stroke statistics 2010 Update (All charts) [full text]
- British Heart Foundation – Stroke statistics April 2009 [weblink]
- Care Quality Commission – Review of services for people who have had a stroke and their carers 2009/10 [weblink]
- National Audit Office - Progress in improving stroke care 2010 [weblink]
- Royal College of Physicians – National Sentinel Stroke Audit 2010 [weblink]
• SINAP (Stroke Improvement National Audit Programme) 2010-2011 [weblink]

Useful websites

• NHS Choices – Stroke [weblink]
• European Stroke Organisation [weblink]
• NHS Improvement – Stroke [weblink]
• The Stroke Association [weblink]
• UK Forum for Stroke Training [weblink]

Cochrane protocols

• Barclay-Goddard RE, Stevenson TJ, Poluha W, Thalman L. Mental practice for treating upper extremity deficits in individuals with hemiparesis after stroke. Cochrane Database of Systematic Reviews: Protocols 2010;(1) [DARE abstract]

• Chung CSY, Pollock A, Campbell T, Durward BR, Hagen S. Cognitive rehabilitation for executive dysfunction in patients with stroke or other adult non-progressive acquired brain damage. Cochrane Database of Systematic Reviews: Protocols 2010;(3) [DARE abstract]

• George Stacey CM, Gelinas Isabelle, Devos Hannes. Rehabilitation for improving automobile driving after stroke. Cochrane Database of Systematic Reviews: Protocols 2010;(2) [DARE abstract]

• Gustafsson L, Bennett S. Interventions for maintaining soft tissue length in the stroke-affected shoulder. Cochrane Database of Systematic Reviews. 2010;(8) [DARE abstract]

• Laver Kate E, GS, Thomas Susie, Deutsch Judith E, Crotty Maria. Virtual reality for stroke rehabilitation. Cochrane Database of Systematic Reviews: Protocols 2010;(2) [DARE abstract]


Economic evaluations


For details of ongoing research visit UK Clinical Research Network, Current Controlled Trials and WHO International Clinical Trials Registry Platform.

2010 Evidence Update on Stroke Rehabilitation - Contributors

Dr Mike Cummings
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Medical Director, British Medical Acupuncture Society

Mike Cummings is Medical Director of the British Medical Acupuncture Society (BMAS), a role which involves running the BMAS London Teaching Clinic (LTC), co-ordinating and lecturing on BMAS courses in Western medical acupuncture, acting as an associate editor for the Medline-listed journal Acupuncture in Medicine, and representing the BMAS at various academic and political meetings. He is an Honorary Clinical Specialist at the Royal London Hospital for Integrated Medicine, which is in the Queen Square group of the University College London Hospitals Trust, and has an academic position as a Senior Visiting Clinical Fellow at the Bedfordshire and Hertfordshire Postgraduate Medical School.

Dr Sybil Farmer
Project Coordinator, Keele University

Dr Sybil Farmer is a senior physiotherapist who works with Dr Pandyan at Keele University. Her current appointment is as the Project Coordinator for Work Package 2 (literature review) in the Assistive Technology in the Rehabilitation of the Arm following Stroke Research Programme. Her previous clinical and research work has focussed on clinical gait analysis and the orthotic management of contractures in neurological conditions.

Dr Beverley French
Reader in Evidence Based Healthcare, University of Central Lancashire

Beverley French is a Reader in Evidence Based HealthCare at the University of Central Lancashire, specialising in systematic review and knowledge transfer. She has completed reviews in stroke for HTA, NIHR, and the Stroke Association. Her research interests include behavioural mechanisms and organisational context for evidence-based change in health and social care.

Professor Peter Langhorne
Professor of Stroke Care, Western Infirmary, Glasgow

After completing undergraduate and postgraduate work in Zoology, Peter Langhorne studied medicine at the University of Aberdeen and undertook postgraduate medical training in Edinburgh and Glasgow. He was appointed as a Senior Lecturer (1994) and then personal Professor (2001) in the Academic Section of Geriatric Medicine of the University of Glasgow. Since 1994 he has also been an Honorary Consultant for Greater Glasgow Health Board with clinical interests in geriatric medicine and stroke medicine. He was lead clinician for stroke in East Glasgow (1997-2007) and continues to contribute to the East Glasgow Stroke Service.
Professor Jane Maxim  
Emeritus Professor of Human Communication Science, University College London  
Professor Jane Maxim is Emeritus Professor of Human Communication Science and a principal research fellow at University College, London. She is an HPC registered speech and language therapist whose work has focussed on aphasia rehabilitation for many years. Her research interests include language processing in normal and abnormal populations, Conversation Analysis intervention for people with aphasia and evaluating communication training for care workers. She chaired the Stroke standard working group, National Service Framework for Older People, and was an external reference group member for the NSF at the Department of Health.

Dr Anand Pandyan  
Senior Lecturer, School of Health and Rehabilitation, Keele University  
Dr Anand Pandyan is a Senior Lecturer with the School of Health and Rehabilitation and the Research Institute for Science Technology and Medicine (Keele University). My current, externally funded, research portfolio is aimed at: (a) Developing a better understanding of the pathophysiological basis of spasticity and it’s impact on people with upper motor neurone lesions; (b) Exploring the mechanisms for disordered motor control following stroke and cerebral palsy; (c) Identifying the therapeutic benefits (and mechanism of action) associated with treatment involving electrical stimulation; (d) Exploring the effects of early antispasticity treatment; (e) Exploring the impact of exercise on motor recovery, independence and well being.

Dr Terry Quinn  
Clinical Lecturer, Department of Academic Geriatric Medicine, Institute of Cardiovascular and Medical Sciences, University of Glasgow  
Dr Terry Quinn holds the post of clinical lecturer in the Department of Academic Geriatric Medicine, Institute of Cardiovascular and Medical Sciences, University of Glasgow. After completing general medical training and Membership of the Royal College of Physicians, he worked as research fellow in the Acute Stroke Unit, Western Infirmary Glasgow. His MD was entitled “Improving functional outcome assessment for clinical trials in stroke”. He continues to develop work in the fields of outcome assessment and clinical trial methodologies, in addition to research interests in cerebrovascular disease, rehabilitation and cognitive decline. He has contributed to book chapters and guidelines on rehabilitation as well as numerous editorial, review and original research papers. He combines his active research portfolio with clinical work in the stroke and geriatric assessment wards of Glasgow Royal Infirmary.

Professor Tom Quinn  
Professor of Clinical Practice, University of Surrey and Clinical Lead, NHS Evidence - cardiovascular, stroke and vascular

Professor Sarah Tyson  
Professor of Rehabilitation, School of Health, University of Salford  
Sarah Tyson trained as a physiotherapist at Sheffield Hallam University. After clinical work specialising in neurological rehabilitation, she completed Masters and Doctoral study at the University of Southampton and Brunel University. She is now a Professor in
Rehabilitation at the University of Salford where she leads the neurological rehabilitation research programme is President of the Physiotherapy Research Society, and Chairs of the North West Stroke Local Research Network steering group.

2010 Evidence Update on Stroke Rehabilitation - Methodology

Methodology

Our literature search was designed to add to the body of knowledge from last year’s Stroke Rehabilitation Evidence Update.

Searches were designed with a slight overlap period to ensure a good fit.

We brought together a small panel of experts to support us by summarising key evidence and commenting on key developments in the field.

We identified systematic reviews published between 1st July 2009 and 30th September 2010 and sifted them for relevance and quality. Material included in the last Evidence Update was excluded. Our reviewers were able to identify additional evidence relevant to any section.

In addition to a wide range of databases, we hand searched other key resources for relevant guidance, statistics and reports. Those sources can be seen in the Key Documents section. We were able to include some evidence published after the main search period.

Further details of the methods used to produce this Evidence Update can be viewed below together with the complete reference list.

2010 Evidence Update on Stroke Rehabilitation - Uncertainties

Uncertainties

Below is a list of uncertainties from systematic reviews identified in the course of this evidence update. These will be translated into PICO format (Patient, Intervention, Comparison, Outcome) for entry onto the DUETs (Database of Uncertainties about the Effects of Treatments) database of uncertainties in due course. We welcome volunteers to assist us with this important task!

19 systematic reviews were identified


**Bottom-line conclusion:** These recommendations should be interpreted with caution, given the small number of studies involved, but serve as a guideline for future studies in aphasia therapy.

Bradt J, Magee WL, Dileo C, Wheeler BL, McGilloway E. Music therapy for acquired brain injury. Cochrane Database of Systematic Reviews 2010;7:CD006787. **Bottom-line conclusion:** RAS may be beneficial for gait improvement in people with stroke. These results are encouraging, but more RCTs are needed before recommendations can be made for clinical practice. More research is needed to examine the effects of music therapy on other outcomes in people with ABI.

Coupar F, Pollock A, van Wijck F, Morris J, Langhorne P. Simultaneous bilateral training for improving arm function after stroke. Cochrane Database Of Systematic Reviews (Online) 2010;4:CD006432. **Bottom-line conclusion:** There is insufficient good quality evidence to make recommendations about the relative effect of simultaneous bilateral training compared to placebo, no intervention or usual care. We identified evidence that suggests that bilateral training may be no more (or less) effective than usual care or other upper limb interventions for performance in ADL, functional movement of the upper limb or motor impairment outcomes.

Doig E, Fleming J, Kuipers P, Cornwell PL. Comparison of rehabilitation outcomes in day hospital and home settings for people with acquired brain injury - a systematic review. Disability and Rehabilitation 2010 May 4 **Bottom-line conclusion:** The available studies indicate that outcomes of outpatient rehabilitation programmes delivered at home, of short-term duration (mostly 3 months) for people with stroke recently discharged from hospital, are at least equivalent to day hospital-based outpatient rehabilitation programme outcomes. However, there have been no controlled studies designed to investigate the influence of therapy context (home and clinic settings) on outcomes for people receiving outpatient neurological rehabilitation. Furthermore, investigations of the efficacy of community-based rehabilitation with younger people with brain injuries, caused by mechanisms other than stroke, are required.

Doyle S, Bennett S, Fasoli SE, McKenna KT. Interventions for sensory impairment in the upper limb after stroke. Cochrane...
Bottom-line conclusion: Multiple interventions for upper limb sensory impairment after stroke are described but there is insufficient evidence to support or refute their effectiveness in improving sensory impairment, upper limb function, or participants' functional status and participation. There is a need for more well-designed, better reported studies of sensory rehabilitation.

DARE commentary

Bottom-line conclusion: There is no evidence for the effectiveness of this multifaceted intervention in improving outcomes for all groups of patients or carers. Patients with mild to moderate disability benefit from a reduction in death and disability. Patients and carers do report improved satisfaction with some aspects of service provision

DARE commentary

Bottom-line conclusion: CCT is safe and effective in improving mobility for people after moderate stroke and may reduce inpatient length of stay. Further research is required, investigating quality of life, participation and cost-benefits, that compares CCT to standard care and that also investigates the differential effects of stroke severity, latency and age.

DARE commentary

Bottom-line conclusion: Comprehensive rehabilitation programmes appear to be effective in terms of a reduction in psychosocial problems, a higher level of community integration and an increase in employment. Although this is the first review to differentiate between specific programmes, clear-cut clinical recommendations cannot yet be set out due to limited methodological quality and poor description of patient and intervention characteristics. Specific recommendations for future studies are given.

full text

Bottom-line conclusion: Antidepressants can reduce the frequency and severity of crying or laughing episodes. The effect does not seem specific to one drug or class of drugs. Our conclusions must be qualified by several methodological deficiencies in the studies. More reliable data are required before recommendations can be made about the treatment of post-stroke emotionalism.

**Bottom-line conclusion:** The effectiveness of occupational therapy for cognitive impairment post-stroke remains unclear. The potential benefits of cognitive retraining delivered as part of occupational therapy on improving basic daily activity function or specific cognitive abilities, or both, of people who have had a stroke cannot be supported or refuted by the evidence included in this review. More research is required.


**Bottom-line conclusion:** The results of our systematic review and meta-analysis suggest that there is limited evidence for CAT being superior to IAT in the treatment of cerebral infarction. The total number of RCTs included in our analysis was low, however, and the RCTs included had a high risk of bias. Future RCTs appear to be warranted.


**Bottom-line conclusion:** There is some evidence that bilateral therapy improves function in adults with chronic stroke, however more quality RCTs are required to strengthen this evidence.


**Bottom-line conclusion:** the evidence is not significantly convincing to suggest cupping is effective for treating hypertension. Further research is required to investigate whether it generates any specific effects for that condition.


**Bottom-line conclusion:** No conclusions about the effectiveness of mobility devices and their effects on activity and participation could be drawn due to the poor quality of data.

Saunders DH, Greig CA, Mead GE, Young A. Physical fitness training for stroke patients. Cochrane Database of Systematic Reviews 2009(4)
**Bottom-line conclusion:** The effects of training on death, dependence and disability after stroke are unclear. There is sufficient evidence to incorporate cardiorespiratory training, involving walking, within post-stroke rehabilitation in order to improve speed, tolerance and independence during walking. Further trials are needed to determine the optimal exercise prescription after stroke and identify any long-term benefits.

[DARE commentary] [PubMed abstract]

Sirtori V, Corbetta D, Moja L, Gatti R. Constraint-induced movement therapy for upper extremities in stroke patients. Cochrane Database of Systematic Reviews 2009(4)

**Bottom-line conclusion:** CIMT is a multifaceted intervention: the restriction to the normal limb is accompanied by a certain amount of exercise of the appropriate quality. It is associated with a moderate reduction in disability assessed at the end of the treatment period. However, for disability measured some months after the end of treatment, there was no evidence of persisting benefit. Further randomised trials, with larger sample sizes and longer follow up, are justified.

[DARE commentary] [PubMed abstract]


**Bottom line conclusion:** No evidence exists at present to support the use of amphetamine after stroke. Despite a trend to improved motor function, doubts remain over safety and there are significant haemodynamic effects, the consequences of which are unknown.

[PubMed abstract]


**Bottom-line conclusion:** Randomized clinical trials demonstrate that acupuncture may be effective in the treatment of poststroke rehabilitation. Poor study quality and the possibility of publication bias hinder the strength of this recommendation and argue for a large, transparent, well-conducted randomized clinical trial to support this claim and implement changes to clinical practice.

[PubMed abstract]

For details of ongoing research visit [UK Clinical Research Network](http://www.crn.nhs.uk), [Current Controlled Trials](http://www.currentcontrolledtrials.com) and [WHO International Clinical Trials Registry Platform](http://www.who.int/trialsearch).