A synthesis of the effects of occupational therapy for persons with stroke. Part II: remediation of impairments

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Authors' objectives
To assess the effectiveness of occupational therapy to remediate impairments of bodily functions for persons with stroke.

Searching
MEDLINE, PsycLIT and CINAHL were searched; further details of the searches were provided elsewhere (see Other Publications of Related Interest no.1). In addition, peer-reviewed occupational therapy journals published in the English language were handsearched from 1980 to 2000.

Study selection
Study designs of evaluations included in the review
The reviewers do not state any inclusion criteria relating to the design of the studies included in the review. The included studies were randomised controlled trials (RCTs), controlled trials (CCTs) without randomisation, one-group pre-test post-test studies and single-case studies.

Specific interventions included in the review
Studies using an occupational therapy intervention aimed at the remediation of psychosocial, cognitive-perceptual or sensorimotor impairments were eligible for inclusion. Occupational therapy was defined as treatments administered by occupational therapists or researched or reported by occupational therapists. The interventions evaluated varied depending on the impairment, and varied across studies evaluating the same impairment. For psychosocial impairments they included interventions related to activities of daily living and function. For cognitive-perceptual impairments they involved intellectual training functional approaches. For sensorimotor impairments they involved functional activities including standing, grasping, isokinetic training and reaching functional goals. For splinting to normalise tone or reduce spasticity, a range of splints were used. Control groups received either no treatment or traditional occupational therapy without the novel slot machine intervention.

Participants included in the review
The reviewers do not state any inclusion criteria relating to the participants. The review included persons with stroke and healthy participants. Most studies reported the side of CVA, with an even distribution of left and right sided. Across the studies, the mean age of the participants ranged from 43.7 to 76.0 years (overall mean: 64.3 years). A large minority of studies were in patients that were at least 12 months’ post-stroke; an equal number of studies were in patient who were 7 months’ post-stroke or less.

Outcomes assessed in the review
The reviewers do not state any inclusion criteria relating to the outcomes assessed in the review. The outcome measures used for psychosocial impairments were the Nottingham Health Profile, the Geriatric Depression Scale (short form), the Wakefield Depression Inventory and the Beck Depression Inventory. The outcome measures for cognitive-perceptual impairments were: Intellectual Functional Housework Assessment, Mini-Mental State Exam, speed accuracy test, the number of trials needed to learn a task, the speed accuracy of one-hand typing, Bias Index of Line Bisection, letter cancellation and counting faces test score, Rivermead Perceptual Assessment Battery and Sensorimotor Integration Test Battery. The outcome measures for sensorimotor impairments were: endurance, standing endurance, cardiopulmonary measures, degrees of handle rotation, elbow range of motion, active range of motion of finger extension, Southern Motor Group's Motor Assessment test, timed ten-hole peg test, kinematic measures, movement time (speed), movement units, peak velocity, percentage of reach where peak velocity occurs, speed and accuracy psychomotor measures, and the Fugl-Meyer Motor Assessment-UE subtest. The outcome measure for splinting was an electromyographic measure of muscle contraction.

How were decisions on the relevance of primary studies made?
Two reviewers independently assessed the relevance of the primary studies for inclusion in the review. and any
disagreements were resolved by discussion.

**Assessment of study quality**
The studies were assigned different grades of evidence according to the study design and whether randomisation was undertaken; details of the grading scale were provided elsewhere (see Other Publications of Related Interest no.1). Two reviewers independently assessed the validity of the primary studies, and any disagreements were resolved by discussion.

**Data extraction**
The authors do not state how the data were extracted for the review, or how many of the reviewers performed the data extraction.

The following data were extracted and tabulated: the study authors, level of evidence, sample size, intervention, dosage, outcome, estimate of effect and the threats to internal validity.

Probability levels associated with differences in treatment effects and the effect sizes were calculated.

**Methods of synthesis**

How were the studies combined?
The aggregate effect sizes were calculated for studies of treatments with similar goals if they were statistically homogeneous. Where the studies differed in terms of the intervention or were statistically heterogeneous, the authors used a narrative approach to combine the studies.

How were differences between studies investigated?
Differences between the studies were examined by recourse to the study design (controlled versus non-controlled) and the type of intervention.

**Results of the review**

Twenty-nine studies (n=832 participants) were included: 17 RCTs (n=631), nine CCTs (n=174), two single-group pre-test post-post studies (n=15), and one single-case design replicated over 12 participants.

Psychosocial: Results were mixed, with depression or psychological well-being for the experimental group in comparison with the conventional therapy groups (2 studies), psychological well-being improved regardless of the treatment (1 study), and depression being less in the control group (1 study).

Cognitive-perceptual, cognitive: verbal, memory and logical function were improved with either paper-and-pencil tasks plus intellectual housework training and regular rehabilitation (mean effect size 0.46) or intellectual housework training plus regular rehabilitation compared to controls (mean effect size 0.36). All the groups improved on some subtests, suggesting that the effects of treatment may be confounded with the effects of spontaneous recovery (1 study).

Cognitive-perceptual, learning: One CCT reported both groups of patients required significantly fewer trials at retention testing than during the learning phase (mean effect 0.74), indicating that the teaching method was effective and that learning had occurred, whilst another reported no significant difference between groups.

Unilateral neglect: All cuing strategies resulted in significantly better performance than patients receiving no cue (mean effect size 0.87; 1 RCT) and one CCT reported that focused visual scanning training was more effective than generalised treatment (mean effect size r=0.36).

Visual-perceptual: There was no significant difference between the transfer-of-training approach and functional approach to improve functional performance (1 RCT), or between the functional approach versus a sensorimotor integrative approach on the Sensorimotor Integration Test Battery (1 RCT).

Sensorimotor, Endurance: ball throwing (actual or imaginary) improved action repeatability (1 RCT), patients conducting preferred activities improved the time standing (1 CCT) and one-handed sanding in difference levels of
activity intensity showed velocity rather than the incline impacted on metabolic requirements (1 CCT).

Range of motion and muscle strength: Results were varied with two studies that examined different exercises to improve range of finger extension motion showing no significant differences between the groups, one RCT showing game intervention to improve range of movement, compared with ordinary exercises, and one RCT showing a significant improvement in elbow range of motion for both biofeedback and Brunnstrom Movement Therapy.

Organisation of movement (coordination): Of the seven studies that assessed this category, six reported significant improvements with the intervention, and one reported no significant difference between groups; the interventions varied, but all measured kinematic variables of some sort.

Splinting to normalise tone or reduce spasticity: None of the three studies showed a different between the splint and no splint groups.

Authors’ conclusions
The treatments used by occupational therapists to remediate impairments after stroke are generally effective, especially those involving an activity or occupation to effect the change. However, no treatment has been adequately researched. A great deal of work is required to gain a thorough knowledge of these and other treatments used in occupational therapy.

CRD commentary
The authors addressed a very broad review question in relation to the interventions, study designs and outcome measures that were assessed in the review. The numerous, different types of intervention included make it somewhat difficult to draw any clear conclusions from the results of the review. The literature search was adequate, but was restricted to studies published in the English language. This means that unpublished studies or those published in languages other than English may have been missed. The review process, in terms of the inclusion of studies and the validity assessment, was explicit and was undertaken by more than one reviewer. Appropriate steps were taken to minimise bias in both of these processes. However, the authors did not state how the data were extracted; any errors made in this process might have influenced the results obtained. Adequate details of the primary study characteristics were provided in the paper, allowing the reader to assess whether the authors’ results and conclusions are consistent with the evidence base reviewed. The combined approach using a narrative synthesis supported by effect sizes was appropriate given the numerous number of different interventions included. Heterogeneity between the different studies was explored properly by recourse to the design and conduct of the trial.

Overall, the authors’ results and conclusions are consistent with the primary studies reviewed. However, as only two of the interventions were researched in more than one study, the conclusions should be interpreted with a degree of caution.

Implications of the review for practice and research
Practice: The authors state that a major limitation was that only inhibitory splinting and the use of actual goal objects versus rote exercise were researched in more than one study. Given this limitation, the authors tentatively recommend the following based on occupational therapy’s ‘best evidence’ summarised in the review and pending further research.

1. The use of occupational tasks and activities (e.g. homemaking) to improve cognitive abilities and capacities.

2. Providing cuing that involves moving into a neglected space to accomplish a goal, to improve unilateral neglect.

3. Task-specific practices that use strategies of graduated complexity, break tasks into simpler steps, and so forth (see Other Publications of Related Interest no.2), to improve visual-perceptual abilities.

4. The use of games and other activities meaningful to the client to increase participation and therapeutic effect.

5. The practice of movements to accomplish specific goals, preferably moving both arms simultaneously, to increase voluntary active range of movement.

6. Providing a written and illustrated home programme of exercises and ways to do the activities, to help the client
continue to regain voluntary movement after discharge.

7. Teaching the client, when appropriate, to imagine himself or herself doing particular functional activities in order to improve performance.

8. Using actual objects within a functional goal to help the client organise movement.

Furthermore, 'best evidence' indicates that two treatments used by occupational therapists may be ineffective: splinting to decrease spasticity, and exercise to increase motor unit recruitment of a particular prime mover in order to improve movement.

Research: The authors state that definitive research is needed to verify the findings of the studies reported.

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Other publications of related interest

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Record Status
This is a critical abstract of a systematic review that meets the criteria for inclusion on DARE. Each critical abstract contains a brief summary of the review methods, results and conclusions followed by a detailed critical assessment on the reliability of the review and the conclusions drawn.