

## **Long-term Rehabilitation after Stroke: Effects of Cognitive Training in Groups with the Stengel-Therapy. The ApCog Study.**

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### **Abstract**

#### ***Objectives:***

To evaluate the effectiveness of cognitive training in groups with the Stengel-Method for non-aphasic stroke patients in long-term rehabilitation and to evaluate the sensitivity and specificity of physical examination for detecting cognitive deficits.

#### ***Design:***

Prospective non-randomized clinical controlled trial.

#### ***Setting:***

Study at a rehabilitation clinic of the Deutsche Rentenversicherung Bund of patients undergoing secondary rehabilitation after stroke to regain or maintain the ability to work.

#### ***Participants:***

Forty-three non-aphasic patients; last stroke before 2.4 years; 38 patients (88%) able to work again.

#### ***Interventions:***

After routine physical examination and history, patients with assumed cognitive deficits entered Group A, and patients without assumed cognitive deficits entered Group B. Group B received the standard rehabilitation program (physical and relaxation therapy), and Group A received additional cognitive training. The duration of the clinical rehabilitation program: Group A: 28 days  $\pm$  7, Group B: 27 days  $\pm$  7. The standard rehabilitation therapy: Group A: 59.6 units  $\pm$  21.4, Group B: 58.4 units  $\pm$  26. The socio-communicative cognitive training (only Group A): 8.8 units  $\pm$  2.2, each unit 60 minutes with up to 15 participants per group, three times per week.

#### ***Main outcome measures:***

After physical examination and grouping of all patients: Neuropsychological testing (memory, executive functions/word fluency, cognitive speed), measuring of mental state (Bf-S- and Bf-S'-Scale) and state of health (SF-36) pre- and post-therapy.

#### ***Results:***

The sensitivity of physical examination with history for detecting cognitive deficits was 68%, and the specificity was 60%. 88% of the patients were able to work after stroke. In the neuropsychological tests, 65% of the patients demonstrated cognitive deficits pre-therapy. The affected cognitive domains were cognitive speed (25%), memory (46%) and executive functions/word-fluency (93%). In addition, 37% of all patients had a depressive state. The standard rehabilitation improved cognitive speed and mental state significantly. Nevertheless, 4 out of the 9 patients of Group B without cognitive deficits

at the beginning developed new cognitive deficits during the standard rehabilitation program. Adding only 8.8 units of a socio-communicative cognitive training additionally improved executive functions and word fluency significantly and prevented the deterioration of cognitive functions during therapy. The improvement of state of health was also doubled, and mental health improved threefold.

***Conclusions:***

Despite being able to work again after stroke many patients have cognitive deficits months to years after the event. As sensitivity and specificity of a physical examination alone for detecting cognitive deficits was low, test batteries should be used in a routine setting for the diagnosis of cognitive deficits in long-term rehabilitation of stroke patients. Socio-communicative cognitive training in groups with the Stengel-Therapy is a cost-effective and novel therapeutic approach to improving the effectiveness of a standard rehabilitation program for patients after stroke.

***Key words:***

**cognition, rehabilitation, stroke, training, Stengel-Therapy**

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