

## Evaluation of Cooperative Hand Movement Capacity in Stroke Patients Using the Cooperative Activity Stroke Assessment

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**Abstract :** Stroke is the main cause of adult disability. Especially upper limb function is affected in most patients. Recently, cooperative hand movements have been shown to be a promising type of upper limb training in stroke rehabilitation. In these movements, which are frequently found in activities of daily living (e.g. opening a bottle, winding up a blind), the force of one upper limb has to be equally counteracted by the other limb to successfully accomplish a task. The use of standardized and reliable clinical assessments is essential to evaluate the efficacy of therapy and the functional outcome of a patient. Many assessments for upper limb function or impairment are available. However, the evaluation of cooperative hand movement tasks are rarely included in those. Thus, the aim of this study was (i) to develop a novel clinical assessment (CASA - Cooperative Activity Stroke Assessment) for the evaluation of patients' capacity to perform cooperative hand movements and (ii) to test its inter- and interrater reliability. Furthermore, CASA scores were compared to current gold standard assessments for upper extremity in stroke patients (i.e. Fugl-Meyer Assessment, Box & Blocks Test). The CASA consists of five cooperative activities of daily living including (1) opening a jar, (2) opening a bottle, (3) open and closing of a zip, (4) unscrew a nut and (5) opening a clipbox. Here, the goal is to accomplish the tasks as fast as possible. In addition to the quantitative rating (i.e. time) which is converted to a 7-point scale, also the quality of the movement is rated in a 4-point scale. To test the reliability of CASA, fifteen stroke subjects were tested within a week twice by the same two raters. Intra- and interrater reliability was calculated using the intraclass correlation coefficient (ICC) for total CASA score and single items. Furthermore, Pearson-correlation was used to compare the CASA scores to the scores of Fugl-Meyer upper limb assessment and the box and blocks test, which were assessed in every patient additionally to the CASA. ICC scores of the total CASA score indicated an excellent- and single items established a good to excellent inter- and interrater reliability. Furthermore, the CASA score was significantly correlated to the Fugl-Meyer and Box & Blocks score. The CASA provides a reliable assessment for cooperative hand movements which are crucial for many activities of daily living. Due to its non-costly setup, easy and fast implementation, we suggest it to be well suitable for clinical application. In conclusion, the CASA is a useful tool in assessing the functional status and therapy related recovery in cooperative hand movement capacity in stroke patients.

**Keywords :** activities of daily living, clinical assessment, cooperative hand movements, reliability, stroke

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