

## The Armeo Spring as training tool to improve upper limb functionality in multiple sclerosis: a pilot study

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### ABSTRACT

**Objective:** The aim of this study was to examine feasibility and effectiveness of Armeo@Spring training in MS patients with upper limb paresis

**Setting:** Case series

**Participants** 10 MS patients with a high level of general disability (EDSS 7.0 – 8.5) and severe upper limb dysfunction due to paresis (MI score  $\geq 50$  and  $\leq 84$ )

**Intervention:** Armeo@Spring training was performed 3x per week, 8 – 9 weeks (24 sessions) for 30 min per session. Initial amount of gravity support was defined based on the patients' ability to maintain the arm at a standardized position and gradually adjusted over time. Patients performed 5 out of 15 virtual tasks (5 minutes per task ranging from gross motor movement to more precise movements to subtle strength dose movements as well as one preferred game. Mechanical-assisted training was given supplementary, 2 to 3 times per week for 30 minutes per session on customary care comprising physical and/or occupational therapy aimed at maintenance of general functional status.

**Main Outcome Measures:** Upper limb and handgrip muscle strength was determined by motricity index (MI) and the Jamar-held dynamometer. Upper limb functional capacity was assessed with the TEMPA (max 120 seconds), the ARAT and the 9HPT (max. 300 seconds). Participants rated their global impression of change in upper limb function by the 7-point ordinal scale.

**Results:** Improvements in the MI score for upper limb muscle strength as well as functional capacity parameters for TEMPA and 9HPT were found. Functional activities of the TEMPA were performed significantly faster compared to baseline. ARAT score increased 4 points on average. Largest gains were found for subjects most affected at baseline. These 4 individuals were not able to perform one or more TEMPA tasks or the 9HPT within the specified maximal time frame before the intervention but were capable to do so after the intervention.

At 2 months follow up gains for TEMPA and ARAT were significantly greater in comparison to baseline despite the fact that in the meantime no supplementary mechanical assisted training had taken place.

3 participants rated themselves much improved, 1 patient moderately improved. These were the same patients that showed best improvements on the functional tests. 4 patients reported no improvement without stating any side effects.

**Conclusions:** ArmeoSpring training is effective for improving upper limb function in high level disability MS patients and these improvements persisted over time. Beneficial effects were mainly noted in individuals most affected at baseline.

### Paper Reference:

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