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were instructed to perform identical bilateral hand and arm exercises, either with or without mirror visual feedback (MVF) under supervision of a parent. Arm and hand function were tested pre and post an 8 week intervention (15 minutes, 5 days/week) using a customized reaching and grasping test. Retention rate was ← 40%, though children who remained in the study did the recommended amount of exercise per day. After the intervention we found improved motor function in 3 (out of 4) children of the mirror group as observed by reductions in movement duration or (compensatory) trunk movement and increased ROM of the elbow during reaching and grasping. Similar improvements were observed in 2 out of 4 children of the control group. We conclude that an intervention with mirror therapy leads to similar improvements in motor function of the hand/arm as compared with conventional bilateral exercises without MVF, however, in the current format, neither of these therapies appear to be feasible to implement as independent practice for children.
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Definitive design of interactive hand and wrist exoskeleton for post-stroke rehabilitation at home

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Background: Stroke recovery would benefit tremendously if patients could continue their therapy at home while, for many patients, this requires a therapy device that helps them to overcome the hyper-flexion of wrist/fingers that is limiting their ability to open and use their hand.
Objective: To develop an interactive hand/wrist exoskeleton for post-stroke rehabilitation, that provides adaptive extension assistance at the wrist/fingers, interfaces with motivational games based on activities of daily-life, and can be used independently by patients at home.
Methods: Passive/active hand/wrist exoskeletons have been developed that provide the required interaction/assistance. They have been evaluated by therapists in clinical settings and used at home by 24 patients in three countries (for six weeks, ~15 [minutes/day] of active gaming). We used those experiences to create the definitive design of the SCRIPT hand/wrist exoskeleton.
Results: The hand/wrist exoskeleton is able to deal with joint misalignments

by its wrist/finger mechanisms such as spring-loaded self-aligning double parallelogram at the wrist, and individual hinged cantilevers with adjustable springs at the fingers/thumb for both extension assistance. Potentiometers at the wrist/finger/thumb measure flexion/extension which provide the interaction torque/forces via multiplying by the stiffness of the springs. The signals are used to interact with motivation games and to measure therapy progress.
Conclusion: Using technical/clinical evaluations, we improved on our initial design that had limitations in range of motion, measurement accuracy and maximum applicable assistance, while also reducing setup and device calibration times, since our definitive design of the interactive hand/wrist exoskeleton for post-stroke rehabilitation at home is a compromise between complexity and functionality.
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Conflict of interest: none declared.

Efficacy assessment of a newly developed ROM exercise device using air pressure system in patients with stroke induced spasticity

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Introduction: Spasticity is a common feature in patients with stroke or spinal cord injury. It may lead to decreased activity of living and even development of joint contracture. Range of motion (ROM) exercise has been performed as a treatment for preventing disease progress and contracture. For increasing accessibility and convenience of treatment, we have developed a ROM exercise device using air pressure system, which could provide patient-specific application. The aim of this study was to assess the efficacy of the device in patients with stroke induced spasticity in comparison with manual ROM exercise.
Methods: We prospectively recruited 30 subacute stroke patients who had spasticity less than 2 of Modified Ashworth (MAS) scale in the wrist and finger motions. Each participant was randomized to control group (N=15, manual