

Abstract

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Evaluation of a Tele-Health System for Upper Extremity Stroke Rehabilitation

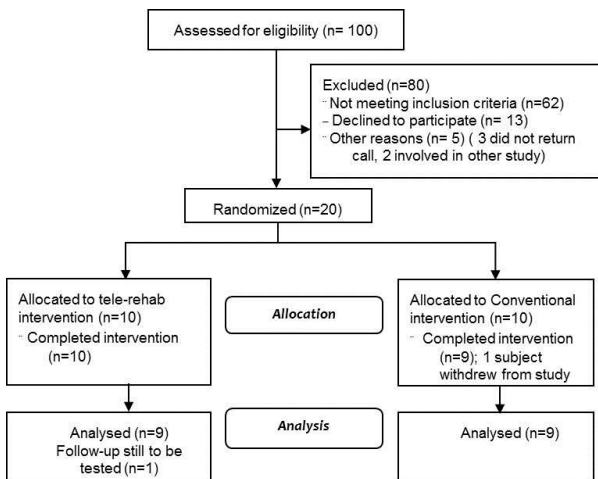
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Research in neuroscience and especially brain plasticity emphasizes the need for intense treatment and rehabilitation following the acute phase and continuing when the person returns home. The goal of tele-rehabilitation is to improve patient access to care by providing therapy beyond a traditional healthcare facility with more continuity of care, lower costs and longer duration. ReAbility (<http://www.reabilityonline.com/>) is a video-capture (Microsoft Kinect) virtual reality gaming system designed to provide a home-based tele-rehabilitation program to improve the upper extremity motor and overall functional status of people who have neurological dysfunction such as stroke (Fig. 1).



Figure 1. Typical client setup in qu

The goal of this study was to evaluate ReAbility's clinical effectiveness in improving outcomes of active movements and functional performance of the weak upper extremity compared to home-based self-instruction exercises. We carried out a single site, 2-arm, single-blinded Randomized Control Trial. As shown more fully in Fig. 2, 19 subjects (research group $n = 10$, age = 54.6 ± 13.6 years; control group $n = 9$, 59.3 ± 11.3 years) were tested prior to, immediately following and one month after a 12 session intervention (3 time per week for 4 weeks). There were no significant pre-intervention differences between the groups (Table 1).



* low scores indicate fewer deficits

	Research (Tele) (n=9) Mean \pm SD (median)	Control (n=9) Mean \pm SD (median)	Mann-Whitney U
Age	59.3 \pm 11.3 (59)	54.6 \pm 13.6 (53)	32.0
Time since onset (months)	39.7 \pm 23.2 (42)	39.4 \pm 19.9 (36)	37.5
Mini Mental State Exam	28.3 \pm 1.6 (29)	28.6 \pm 1.6 (29)	35.5
NIHSS*	4.7 \pm 1.6 (4)	3.3 \pm 0.9 (4)	19.5
	Number	Number	Chi square χ^2
Gender M/F	5/4	4/5	.90
Side of stroke rt/lt	5/4	5/4	.99

TABLE I. Demographic variables and comparison between groups

Figure 2. Study Consort Diagram showing participant numbers for eligibility,

allocation and analysis.

Significant differences in the Fugl-Meyer Assessment were found with large effects sizes between the pre- and post-assessments for both groups. Results of the Motor Activity Log (Quality scale) showed significant differences only within the research group with large effect size between the pre (MAL Quality 1) and post-assessments (MAL Quality 2 and 3, Fig. 3). Conclusions. Although the results of the current study need to be interpreted cautiously due to the small sample size, they point to the potential of using the ReAbility tele-rehabilitation system to improve functional use of the upper extremity post-stroke.

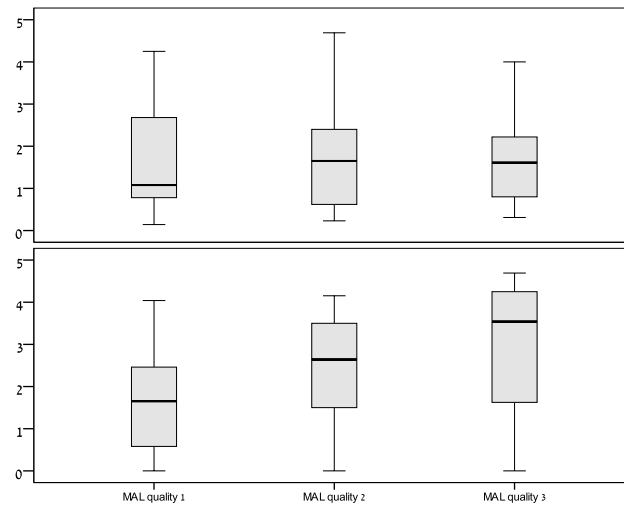


Figure 3. Box plots showing the median, the quartiles and the upper and lower ranges of the Motor Activity Log–Quality for the control (upper panel) and research (lower panel) groups for the pre (1), post (2) and follow-up (3) tests.