



**Service Priorities and Programmes**  
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**Pilot effectiveness study on the use of Hand Robotic device in Occupational Therapy training for day neurological patients in TWEH**

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**Introduction**

Restoration of dexterous hand function in hemiplegic stroke patients has always been a real challenge in rehabilitation throughout decades. Robotics has been one of the spotlights in the field of stroke rehabilitation with many illuminating results published worldwide. ICRC occupational therapists(OT) have incorporated robotic hand device Hand of Hope(HOH) in the rehabilitation of hemiplegic stroke patients since November 2016.

**Objectives**

This pilot study intended to evaluate the clinical effectiveness and patients' satisfactory levels of hand rehabilitation programs using hand robotic device HOH and conventional training modalities in ambulatory stroke patients in ICRC.

**Methodology**

From December 2016 to March 2017, 20 stroke patients were recruited following the inclusion criteria and randomly assigned into the study and control group. Patients in the study group(N=10) had received 12 sessions of robotic hand training HOH plus hand function training, while the control group(N=10) had received same number of sessions of conventional hand function training. Outcomes of training were evaluated by pre-training and post-training clinical test scores(Fugl-Meyer Assessment of Upper Extremity[FMA-UE], Modified Ashworth Score[MAS], Functional Test for Hemiplegic Upper Extremity[FTHUE-HK] and active range of motion[AROM] of upper limb). Functional Independence Measures(FIM) was used as the secondary outcome measure. Besides, patients' satisfaction on the training modalities was also investigated.

**Result**

Result:

Both groups showed significant improvements in FMA-UE scores with the total FMA-UE scores improved from average 27.2 to 36.2(p=0.018) in the study group and from average 31.6 to 38.6 in the control group(p=0.028). Wrist control, coordination and speed were particularly enhanced with the robotic hand device. Both groups showed improvement in AROM of fingers(p<0.03) but only the study group

significantly improved in AROM of the wrist( $p=0.000$ ). Robotic training was also able to decrease spasticity of finger joints( $p=0.043$ ). FTHUE-HK improved from average level 4 to level 5( $p=0.05$ ) in the study group while no significant enhancement was noted in the conventional group. Both groups improved the self-care ability after training but only the control group showed a statistical significance in FIM( $p=0.027$ ). All patients in the study group agreed that HOH has facilitated their rehabilitation process and they were very motivated to the robotic hand training.

Conclusions and Recommendations:

Both robotic training using HOH and conventional rehabilitation programs are effective modalities in training of hand function in hemiplegic stroke patients. Robotic training with HOH could further alleviate hand spasticity and enhance dexterous hand and upper limb functions. The acceptance and satisfaction to this new modality is excellent.

Benefits and Implications:

Robotic training using HOH can achieve a high degree of training intensity and create interactive atmosphere during stroke rehabilitation. Robotic hand training plus conventional training may contribute to additional clinical improvement.