UNIVERSITÀ DEGLI STUDI DI FERRARA
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ABSTRACT PhD

Translational Neurosciences and Neurotechnologies

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Robotic Neurorehabilitation:

Robot-assisted Gait Training within a multidisciplinaryrehabilitation program.

New evidence in neuroscience has led to substantial innovations in the provision of rehabilitation therapy, which includes new therapeutic possibilities for patients suffering from central nervous system lesions. The goal of my dissertation is to understand the role of Robot-assisted Gait Training (RAGT) within a multidisciplinary rehabilitation program for patients suffering from outcomes of central nervous system lesions. In this dissertation, I studied participants with traumatic brain Injury (TBI) to determine how cognitive function at admission can interfere in functional improvement after RAGT training in a rehabilitation program and the impact of gender, age and RAGT dose (sessions) on functional improvement in subacute stroke patients.

In my first experiment, I studied a cohort of patients with severe traumatic brain injury (n=80) to investigate the impact of the cognitive level at admission on recovery after RAGT within a multidisciplinary rehabilitation setting. I found evidence that patients with a low cognitive

level at admission were mainly in the subacute phase of rehabilitation. Cognitive impairment did not preclude recovery so that irrespective of the level of cognition, patients might benefit from RAGT during a multidisciplinary program. Also, although other heterogeneous factors (age, rehabilitation phase, severity) may have influenced recovery, the cognitive level at admission influence the rehabilitation length of stay (LOS) and the time needed to receive RAGT during the multidisciplinary rehabilitation programme.

In the second set of study in this dissertation, I analyzed a cohort of subacute stroke patients (n= 236) who underwent RAGT in rehabilitation programs to determine the gender-related response.

This approach allowed me to highlight that both genders can be subject to the same standards of treatment beyond the differences in anatomical morphology. While I expected to have a difference in recovery, instead, I found a significant positive correlation in clinical outcome. Among subacute stroke patients, equal adherence and benefits were observed following RAGT training in both genders. A conventional rehabilitation treatment empowered by RAGT ensured good results in terms of gait recovery, without any gender differences for all parameters considered.

In the third set of this thesis, I studied a subacute stroke population who were undergoing RAGT training during multidisciplinary rehabilitation (n= 236). The principal aim was to investigate the intensity of RAGT (dose) needed to reach the minimal clinical important difference (MCID), measured with the Functional Independence Measure (FIM) and the Functional Ambulatory Category (FAC). Also evaluate the clinical, demographic and functional characteristics that can predict a good functional recovery.

I found, with a regression model, that a significant number of patients achieved MCID with more than 14 sessions. Also, the independence of walking on discharge was influenced by the

patient's age and the severity of the damage on admission.