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The Effects of Gait Rehabilitation After Stroke by Treadmill-based Robotics versus Traditional Gait Training: a single blind multi-site RCT *(Tread_Stroke Group: ClinicalTrials.gov ID: NCT03688165)*

The Gaslini Institute is a Children Hospital with 350 beds and various pediatric medical and surgical specialties. Physical Medicine and Rehabilitation Unit belongs to the Neurosciences and Rehabilitation Department. The Neuroscience and Rehabilitation Department includes Neurosurgery Unit, Neuroradiology Unit, Neurophysiology Unit, Pediatric Neuropsichyatry Unit, Neuropathology Unit, Orthopedics Unit, Ophthalmology Unit, and Otolaringology Unit. The process of care is child and family centered and multidisciplinary approach is the preferred model of care.

The Gaslini Physical Medicine and Rehabilitation Unit and its related labs (analysis of movement, robotic and augmented reality) are involved in multidisciplinary clinics (cerebral palsy, stroke and spasticity) and in this context they carry on programs and projects in ICT and robotic.

Multimodal systems for interactive computer play are recently receiving an increasing attention as tools for supporting rehabilitation with a special focus on child rehabilitation. ICP systems motivate children with several mechanisms: control over game and task selection, competition against another player or presence of a virtual opponent, the challenging variety of game options and environments. Auditory and/or visual feedback provides information about task performances or results. User problem-solving is promoted through task driven training, game unpredictability, and provision of obstacles. Moreover, ICP systems allow tailoring parameters to the user needs, they enable remote monitoring, and equalize opportunities for impaired children by providing social interaction, acceptance, and barrier-free inclusion in play situation.

Easy availability and low costs have promoted, in recent years, the diffusion of commercial interactive videogame consoles in rehabilitation. The introduction of systems based on detecting actual users movements has led to include “exergames” in many rehabilitation protocols. The proof of this evolution is the introduction of the neologism Wiihabilitation. However these platforms are designed for the entertainment of people with normal abilities, and they have many limitations when used for rehabilitation targets. They cannot be adapted to the specific needs and abilities of impaired children and the measurements acquired by the devices cannot be transferred and used elsewhere to assess rehabilitation progress. On the other hand, ICT solutions specifically designed for rehabilitation are often expensive, difficult to use and with multimedia content not-so challenging and appealing for children.

We discuss here our experiences in adapting a simple “immersive” virtual reality device to children rehabilitation and in developing and refine a flexible and modular open platform for interactive exergames. The platform is conceived as a complement to conventional rehabilitation interventions both by improving monitoring and collecting information, and by supporting the recovery process of children with motor and/or cognitive and/ or sensory impairment.

Moreover, we discuss possible application of new ICT and robotic technologies in pediatric multidisciplinary context as stroke and cerebral palsy clinics.

Refrences

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