

Title: A new computer-based platform for autonomous rehabilitation of balance in patients with MS: a pilot study on usability

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Background: Computer games are promising in supporting intensive rehabilitation, but until now they did not incorporate supervision provided by a physical therapist nor allowed a safe and effective use at patient's home. In this regard the innovative platform IGER is the only exception, and its usability for autonomous rehabilitation after stroke has already been demonstrated.

Aims: adaptation and evaluation of usability of IGER system for a safe, high quality home rehabilitation for patients with MS (PwMS).

Methods: IGER combined the use of Nintendo Wii balance board and Microsoft Kinect. Ten highly tailored exer-games aimed to train postural rehabilitation were realized. To monitor the correctness of motion, a novel informative color coding was applied to patient's avatar to provide a real time feedback. To evaluate system suitability, the platform has been used with PwMS at hospital. After a session with IGER, they were asked to fill in an ad hoc questionnaire based on Technology Acceptance Model covering 5 areas (30 items with 5 points Likert scale. 5 indicates higher satisfaction): Overall Satisfaction (OS), Computer Interface (CI), Feedback Utility (FU), Monitoring Utility (MU), Satisfaction with Games Settings (SwGS). Percentage of answer ≥ 4 was calculated. Comments reported by patients during sessions have been recorded. Physiotherapists provided continuous feedback to computer science team to adapt the exer-games for balance rehabilitation.

Results: Up to now 4 PwMS used IGER. Percentages of answer ≥ 4 were: 61.1% for OS; 70.0% for CI; 100% for FU; 70.0% for MU; 75% for SwGS. All the 4 patients asked for other IGER sessions. They found real time monitoring innovative and useful to self-correct their posture. Tight collaboration between computer scientists and physiotherapists brought to the implementations of monitors (i.e. distribution of vertical force on feet; more precise detection of the instant in which leg is raised; control of angle spine), and improvement of exer-games usability (i.e introduction of new exercises; changes in stimuli frequency).

Conclusions: These preliminary results demonstrate the potential utility in using IGER platform with PwMS. Tight collaboration between clinicians and computer scientists has been fundamental to further develop and adapt IGER to the needs of PwMS, developing bidirectional translational research. We are now testing the feasibility and usability of this version through a more structured protocol.