

## Tele-Rehabilitation for Multiple Sclerosis: A Case Study

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**Abstract :** Multiple Sclerosis (MS) is a neurological disease that may cause restriction in participation in daily activities of young adults. Main symptoms include fatigue, weakness and cognitive decline. The appearance of symptoms, their severity and deterioration rate, change between patients. The challenge of health services is to provide long-term rehabilitation services to people with MS. The objective of this presentation is to describe a course of tele-rehabilitation service of a woman with MS. Methods; R is a 48 years-old woman, diagnosed with MS when she was 22. She started to suffer from weakness of her non-dominant left upper extremity about ten years after the diagnosis. She was referred to the tele-rehabilitation service by her rehabilitation team, 16 years after diagnosis. Her goals were to improve ability to use her affected upper extremity in daily activities. On admission her score in the Mini-Mental State Exam was 30/30. Her Fugl-Meyer Assessment (FMA) score of the left upper extremity was 48/60, indicating mild weakness and she had a limitation of her shoulder abduction (90 degrees). In addition, she reported little use of her arm in daily activities as shown in her responses to the Motor Activity Log (MAL) that were equal to 1.25/5 in amount and 1.37 in quality of use. R. received two 30 minutes on-line sessions per week in the tele-rehabilitation service, with the CogniMotion system. These were complemented by self-practice with the system. The CogniMotion system provides a hybrid (synchronous-asynchronous), the home-based tele-rehabilitation program to improve the motor, cognitive and functional status of people with neurological deficits. The system consists of a computer, large monitor, and the Microsoft's Kinect 3D sensor. This equipment is located in the client's home and connected to a clinician's computer setup in a remote clinic via WiFi. The client sits in front of the monitor and uses his body movements to interact with games and tasks presented on the monitor. The system provides feedback in the form of 'knowledge of results' (e.g., the success of a game) and 'knowledge of performance' (e.g., alerts for compensatory movements) to enhance motor learning. The games and tasks were adapted for R. motor abilities and level of difficulty was gradually increased according to her abilities. The results of her second assessment (after 35 on-line sessions) showed improvement in her FMA score to 52 and shoulder abduction to 140 degrees. Moreover, her responses to the MAL indicated an increased amount (2.4) and quality (2.2) of use of her left upper extremity in daily activities. She reported high level of enjoyment from the treatments (5/5), specifically the combination of cognitive challenges while moving her body. In addition, she found the system easy to use as reflected by her responses to the System Usability Scale (85/100). To-date, R. continues to receive treatments in the tele-rehabilitation service. To conclude, this case report shows the potential of using tele-rehabilitation for people with MS to provide strategies to enhance the use of the upper extremity in daily activities as well as for maintaining motor function.

**Keywords :** motor function, multiple-sclerosis, tele-rehabilitation, daily activities

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