The influence of the original multimedia self-management intervention on selected psychological and functional aspects and physical activity in stroke patients after stroke

Background

Stroke survivors often perceive recovery as a natural process over which they have little control and have no idea how they could regain mobility. Perhaps this is because they often do not have a detailed knowledge of what a stroke is and why they are disabled. In turn, the rigid timeframes and organizational framework of rehabilitation units make it difficult to provide effective education and self-management (learning how patients themselves can support their rehabilitation). However, despite the huge number of people paralysed due to stroke, to author's knowledge, the eHealth industry still does not offer mobile applications that would help non-ambulatory stroke patients and physiotherapists manage such a large and difficult project as gait re-education. Looking for the missing element (bridge) between stroke patients and rehabilitation services, the *RehaWinners* application (an original multimedia self-management intervention) was developed. This application was intended to be a collaborative platform for interactive education, communication, planning and monitoring of the next steps of improvement in functional mobility.

Objective

The primary goal of the project was to investigate whether the implementation of the *RehaWinners* application into the early inpatient rehabilitation of non-ambulatory stroke patients would influence their: physical activity, psychological aspects (stroke-specific self-efficacy in daily activities and self-management, motivation for post-stroke rehabilitation, recovery locus of control, and depression), and functional aspects (functional independence, trunk control, balance, and functional mobility). A secondary aim of the project was to qualitatively analyse various aspects related to stroke consequences and rehabilitation.

Material and methods

A randomized controlled pilot trial with a three-arm parallel design included 26 non-ambulatory stroke patients undergoing early in-patient rehabilitation was performed. Participants were randomly assigned to a control (usual care), mixed (*RehaWinners* application from 3rd to 6th week) or experimental group (*RehaWinners* application from 1st to 6th week). Physiotherapists operated the application on tablets. The original multimedia self-management intervention (*RehaWinners* application) consisted of 3 elements. 1. Educational and motivational videos that

comprehensively presented stroke and post-stroke rehabilitation, the next stages of recovery and neuroplasticity. 2. The multimedia module to support planning the next stages of mobility recovery and goal setting. From 27 icons representing activities integrally related to mobility, the patient and the physiotherapist together designed an individual rehabilitation progress path, forming the basis for further monitoring. 3. The multimedia support module for monitoring rehabilitation progress with a motivation system. The physiotherapists recorded selected functional activities at the beginning and subsequent stages of rehabilitation with a tablet, together with the patient compared the recordings over time and rewarded progress using the positive interactions of the application. Measurements of psychological and functional aspects, as well as interviews about rehabilitation, were carried out in all groups at three measurement points, i.e. at admission to the project, after 3 and after 6 weeks of rehabilitation. In turn, physical activity was measured using an ActiGraph wGT3X-BT accelerometer worn over the hip on the paresis side and was conducted 2 days a week for 6 weeks. To assess psychological aspects, the following were used: Stroke Self-Efficacy Questionnaire, a short version of the Stroke Rehabilitation Motivation Scale, Recovery Locus of Control Scale and the Hospital Anxiety and Depression Scale. On the other hand, the Barthel Index, Trunk Control Test, Berg Balance Scale and Functional Ambulation Category were used to assess functional aspects. To analyse qualitative aspects related to stroke and rehabilitation, structured interviews were conducted with patients. Finally, analysis of usability, feasibility, and satisfaction of physiotherapists and patients with the use of the *RehaWinners* application was performed. Statistical analysis was carried out using the Jamovi v. 2.3 package (URL X) and the STATISTICA 13.3 program. MANOVA analyses for the dependent variables were used to assess changes over time, with Greenhouse-Geisser correction when the assumption of sphericity of variance was not met.

Results

Patients did not differ significantly ($p>0.05$) in the studied variables at baseline. No statistically significant effect of the *RehaWinners* application ($p>0.05$) on selected psychological, functional or physical activity aspects was observed in any of the tests and questionnaires. There was also no trend (results at the limit of statistical significance $0.10 > p > 0.05$) of higher effectiveness of the *RehaWinners* application with the variables tested. There was no obvious effect of the multimedia self-management intervention on patients' perceptions of the studied aspects related to rehabilitation and the consequences of stroke. It was not observed that participants gained detailed knowledge regarding neuroplasticity and post-stroke rehabilitation

after watching the educational and motivational videos. However, according to many patients, the films provided them with valuable knowledge regarding their disease and post-stroke rehabilitation, as well as motivation to exercise. Almost all participants expressed satisfaction, having watched those videos. In turn, 85% of the patients gave a response indicating that the educational and motivational films contributed something positive to their rehabilitation. Most patients and therapists were positive about the ability to monitor rehabilitation progress with the *RehaWinners* application. Although most of the physical therapists liked the application, a large percentage of them would prefer not to use it in the current conditions of limited time for individual patient therapy.

Summary and conclusions

The multimedia self-management intervention did not significantly influence neither physical activity nor selected psychological and functional aspects in participants. Nevertheless, the implementation of the *RehaWinners* application by a physiotherapist can be useful in monitoring the rehabilitation progress of post-stroke patients who are non-ambulatory on admission to the rehabilitation unit. In turn, the author's educational and motivational films can provide patients with new, positively perceived information about stroke and rehabilitation.

Keywords: stroke, self-management, multimedia, mobile application, mobility recovery, post-stroke rehabilitation