

Integrating home monitoring for transcranial direct current stimulation (tDCS) therapy to professional care environment

Elena ROSSI^{a,b,1}, Giuseppe POZZI^a, Lorenzo ROSSI^b, Alberto PRIORI^b, and Sara MARCEGLIA^{b,c}

^a *Dip. di Elettronica, Informazione e Bioingegneria, Politecnico di Milano, Milan, Italy*

^b *Fondazione IRCCS Ca' Granda Ospedale Maggiore Policlinico, Milan, Italy*

^c *National Library of Medicine, National Institutes of Health, Bethesda, MD, USA*

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Introduction

Daily management of neurodegenerative diseases is one of the most striking scenarios where an integrated health care system is essential for the continuous assistance to the patient and requires qualification of the caregivers and their training. In particular, patients affected by depression or chronic pain, as well as rehabilitating after stroke, can be treated at home with non-invasive electrical neuromodulation (transcranial Direct Current Stimulation, tDCS) in order to reduce daily travel expenses between home and hospital. Home monitoring of patient undergoing tDCS is essential to (1) optimize the stimulation parameters according to the current health status and to the stimulation outcomes, and (2) assess disease progression. However, monitoring effectiveness depends on the exchange of this information between the patient at home and his/her reference neurologist. Currently, the health IT scenario is composed by two independent environments, one dedicated to healthcare professionals (e.g., Electronic Health Records, EHRs), and one including mobile devices applications dedicated to citizens, caregivers and patients. Safety, communication and interoperability gaps prevented from an effective data exchange between these two environments. The aim of our work is to implement an integrated home monitoring system for tDCS patients, in which a web-based platform for EHR management exchanges data with a patient's mobile app.

¹ Corresponding Author. Elena ROSSI. eHealthLAB, Dip. di Elettronica, Informazione e Bioingegneria, Politecnico di Milano, piazza Leonardo da Vinci 32, 20133, Milan, Italy. Email: elena.rossi@polimi.it

1. Methods

After modelling the integrated care process, we developed a prototype using a communication protocol based on HL7 standards and IHE profiles adapted for the home-based monitoring of tDCS patients, to ensure data protection and accuracy.

2. Results

The system is composed of the “Care Pathway” module, dedicated to the clinicians and allowing the definition of the monitoring plan (e.g: evaluation scales), and the "Caregiver Support" module, a mobile app providing appropriate information for the caregiver to administer tDCS treatments to the patients (e.g: operative instructions for safety tDCS management) and allowing treatment and patients’ monitoring according to the care pathway defined by the clinicians. Both modules are connected to a dedicated web-based platform named WebBioBank, and a specific program (called “cApp Suite”) was implemented to allow the clinicians to configure the “Caregiver support” module. The prototype is still in a development stage: software validation and an evaluation inside a control group of patients, caregivers and clinicians will be necessary.