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STROKE TELEREHABILITATION IN SICILY: A COST-EFFECTIVE APPROACH TO REDUCE DISABILITY?

Dear Editor:

Various surveillance systems are used to identify stroke and its sequelae around the world, yet it is clear that stroke remains one of the top causes of mortality and long-term disability.[1] The disease generates a substantial proportion of direct (i.e., related to the goods and services for prevention, diagnosis, treatment, and rehabilitation) and indirect (i.e., social services, lost of working days, and early retirement) costs.[2]

The amount of time patients spend in acute care hospitalization after a severe neurological event such as stroke is getting shorter, and the rehabilitative phase is increasingly shifted toward an outpatient setting, thus minimizing expenditures. Nevertheless, a high percentage of discharged patients do not receive adequate rehabilitation. Indeed, given that healthcare resources are limited, stroke survivors often receive rehabilitative services according to nonclinical factors, such as resource availability, geographical location, age, and personal wealth, rather than clinical factors.[1,2]

Use of telerehabilitation (TR) might address these limitations by supplying homebound subjects with rehabilitation treatments without displacement of therapist or patient. Indeed, TR was developed to care for patients after they have been transfered home following the acute phase of a disease in order to reduce patient hospitalization times and costs for both patients and healthcare providers. Moreover, telerehabilitation can assist patients that are unable to access traditional rehabilitation infrastructures due to location.[3]

Because of the complex Sicilian geographical and territorial socioeconomic problems, the local government sought to develop guidelines for clinical practice that would reduce unsuitable and unsustainable forms of stroke assistance and improve the cost-effectiveness ratio of healthcare services to the health status of the citizens.[4,5]

Thus, for the first time in Italy, the IRCCS Centro Neurolesi "Bonino-Pulejo" of Messina, together with the Sicilian government and the Ministry of Health, have incorporated a telehealth system into the long-term stroke care program that provides continuous stroke rehabilitation and reduces disability.

The project follows a hub-and-spoke system, which is a model that arranges service delivery assets into a network consisting of an anchor establishment (hub) that offers a full array of services, complemented by secondary establishments (spokes) that offer more limited service arrays, routing patients needing more intensive services to the hub for treatment. The project involves five stroke units (SU) along with general practitioners from around Sicily that are outside the IRCCS system (acting as the Rehab HUB Center). Patients will be followed during their entire individual rehabilitation path (i.e., from SU to intensive rehab to extensive outpatient rehab until their return home). The patients will be treated by means of *ad hoc* exercises that are modified continually according to their individual motor and cognitive status via the Virtual Reality Rehabilitation System (VRRS, Khymeia, Italy). VRRS can be used in two modalities: 1) online, with a live interaction between the patient and the therapist via two-way videoconferencing system, and 2) offline, when exercise protocols are downloaded and performed by the patient remotely with the help of a virtual assistant, allowing the therapist to provide feedback on his or her performance later.[6]

VR allows the user to experience and interact with a computer-generated environment that is designed to enhance patient motivation and enjoyment (important factors for successful rehabilitation), The system can also simulate those activities of daily living that might be too difficult or dangerous to perform in real life.[7]

During rehabilitation in a virtual environment, the patient's central nervous system receives augmented feedback signals, which induces profound changes in neural plasticity that are responsible for the restoration of motor activity and/or cognitive function.[8,9]

We expect that in post-stroke patients, the clinical efficacy of rehabilitative treatments delivered by TR with the same frequency and characteristics of inpatient/oupatient rehabilitation will be at least equal in efficacy compared to treatments traditionally delivered, potentially saving healthcare resources.[10]

In conclusion, telehealth systems can play a role in regional care and services by supporting a more appropriate management of stroke survivors. The main challenges moving forward will be to adapt the technical systems to fit the needs and resources of patients with cognitive and physical limitations and comorbidities and to make the telecare services suitable and available for a larger group of post-stroke patients, while taking into account the cost-effective ratio.

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With regard,

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