Innovative rehabilitative care models based on a multidisciplinary approach and new technology in thermal setting

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The aim of this work is to measure the movement in water and to store the data for the patient follow-up. It is based on the added value generated by the association of biofeedback with water rehabilitation, thanks to the instrumental prototype known as Biofeedback Scuba Suit (BFSS) suitable for water motion analysis and proper data transmission to both the biofeedback system and the therapist. The BFSS prototype is a hybrid motion capture system, portable and waterproof, coupled with a software that can analyze and reproduce on a virtual platform the kinematic data of the anatomical segments of the subject that wears it, generating a visual biofeedback by capturing and transmitting the data from the patient in the water. The algorithm allows the measurement of relative and absolute angular positions as well as axial rotary movements of the different anatomic segments to which the sensors are applied. In this study, the prototype was tested and validated by analyzing and comparing the movements of the upper left arm of healthy volunteers; being a pilot study, it was considered sufficient to analyze the movement of a single limb to demonstrate its accuracy. The results of the validation tests described in the results section, first performed out-of-water and then in water, provided excellent results comparable with those obtained by the gold standard of kinematic measurement, represented by optokinetic systems. The potentials of BFSS for therapeutic purposes is vast: a) in aquatic rehabilitation; b) to improve the interaction with the patient and his motricity, as well as a basis for the continuous adaptation of the therapeutic program; c) allow to record, visualize and memorize the kinematic data during the aquatic rehabilitation.

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