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Titolo tesi: Physical fitness in adults with heart failure

ABSTRACT

Background: Heart failure (HF) is a pandemic chronic disease that affect more than 20 million people worldwide. Its prevalence and incidence is on the rise due to an ageing population and increased survival from ischemic and other heart disease. Typical symptoms, such as breathless, ankle swelling and fatigue, and signs, such as elevated jugular venous pressure and peripheral oedema, characterize HF. Adequate self-care can be considered an essential strategy to sustain medical treatments in delaying progressive worsening of HF symptoms. One element of self-care in HF patients is the regular exercise that improves quality of life, symptoms of HF, muscular strength and reduce hospitalization and mortality. Despite international guidelines recommendation about regular exercise, there is a scarce adherence among HF patients. Physical fitness is a complex concept, not only based on the physical capacity of HF patients. A structured approach to modifiable predictors of physical fitness and tailored advice and strategies about regular exercise could improve exercise adherence, and consequently physical fitness.

Objective: The objective of this doctoral program was: (1) to evaluate the relationship among different measures of physical fitness (exercise capacity, muscle function and functional capacity), exploring also if physical fitness assessment can be valid in HF patients with movement impairment; (2) to evaluate the relationship between psychological (anxiety and depression) and cognitive symptoms and the exercise capacity in HF patients; (3) to design a study that evaluates a novel way of improving exercise capacity in patients with HF.

Methods: The first two studies were based on the data collected for Italian patients who participated in the HF-Wii study. Patients were enrolled in the Villa delle Querce hospital in Nemi (Rome, Italy) from October 2014 to December 2016. The eligibility criteria were as follows: (a) a diagnosis of HF [New York Heart Association (NYHA) I–IV], independent from the ejection fraction; (b) older than 18 years, without an upper age limit; and (c) able to speak/understand the Italian language. The exclusion criteria were as follows: (a) unable to use the Wii exergame due to visual, hearingcognitive, or motor impairments, as judged by the research team; (b) unable to fill in data collection material; (c) a life expectancy shorter than 6 months; and (d) already having a Wii exergame. Ninety-six HF patients agreed to participate (mean age 72 ± 10 years); 328 were screened. The third article included in this thesis dissertation is a study protocol that include rationale and methods of the HF-Wii study.

Results: In the first study, three different measures of physical fitness (exercise capacity, muscle function and functional capacity) revealed a low to moderate correlations among them. The principal component analysis grouped them into two factors: one related to lower limbs capacity and another related to the upper limbs capacity, explaining the 58% of the total variance of the measure variables. In the second study, correlations among exercise capacity (6MWT), anxiety, depression (HADS) and cognitive impairment (MoCA) were found. In the stepwise regression model, with the 6MWT as the dependent variable and the HADS, MoCA, age, gender, and NYHA class as independent variables, the significant predictors of the 6MWT were the NYHA class, age, gender, and depression. This model explained the 47% variance in the 6MWT. The third study proposed an intervention based on a structured access to virtual reality application to improve exercise capacity in HF patients.

Conclusions: This doctoral program has provided wider information about physical fitness in HF patients, showing and confirming its multidimensionality. This characteristic may help clinicians in choosing tailored and more complete



assessment strategy of physical fitness in HF patients, especially in those with movement impairment. Moreover, this doctoral program showed that despite the good correlation between exercise capacity, anxiety, depression and cognition, only depression is a predictor of exercise capacity. This result may help clinicians to address patients with depressive symptoms toward specific programs aimed to their reduction, such as cognitive behavioural therapy or intervention based on repeated recall or mindfulness. Lastly, the structure introduction to virtual reality application, such as exergaming, could help HF patients removing barriers to reduced adherence in exercise and increasing their exercise capacity.