Effectiveness of home monitoring mobile application on functional capacity and cardiac function in heart failure subjects: PROFITNESS project

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Background: Decreased functional capacity and reduced cardiac function are the main symptoms in patients with heart failure (HF). Guidelines recommend that exercise training should be considered for medically stable HF ambulatory patients. Studies have confirmed that physical activity can improve functional capacity and prognosis and reduce hospitalization rates. The PROFITNESS Project is a multidisciplinary integrated case management program for outpatients. Specialists included cardiologists, sports medicine physicians, physical trainers and dietitians.

Methods: The PROFITNESS team recruited 10 subjects (10: M and 2: F) with stabilized heart failure aged >60 years (mean 66±5 y) from a general practitioner. Baseline data included age, sex, body weight, height, body mass index, medications, and laboratory data during the study. Cardiorespiratory fitness test (CFT) and strength tests (hand strength) were performed at baseline and six months later to assess subjects' functional capacities. In the first phase of project, subjects participated in tests and physical activities at the Physical Exercise Prescription Center, to complete an exercise training program under the supervision of a physician and a fitness trainer. Then, subjects followed a personalized exercise program at home using a dedicated application. A single session included a total of 40 to 60 minutes of exercise, including warm-up and cool-down. Exercise intensity was determined based on the results of the CFT and strength test, and a personalized exercise program was created that included cycling and/or walking followed by strength exercises. During training, heart rate and rated perceived exertion (scale 6-20) were monitored. Increases in exercise intensity were based on individual tolerance and improvement (e.g., perceived exertion below somewhat heavy, 13/20). Response to home training was tracked by specific application performed by the research group. In addition, abnormal symptom signs were recorded by each subject on the health management mobile application system. The physical trainers reviewed the data and determined that the monitoring parameters were abnormal, immediately contacted the subject, and if necessary, took the subject to the hospital for examination. Finally, medications were adjusted for each subject during the telerehabilitation course.

Results: At POST, $V'O_2max$ increased by 374±546 ml/min and FCmax decrease by -11±9.8 bpm ($P<0.05$); hand force increase by an average 5.7±5.5 N ($P<0.05$). Body mass remain stable (81.1±6.7 kg). Training adherence was 87.3±9.4% of training sessions.

Conclusions: The results of this study show that a personalized training program carried out at home with the help of a dedicated application and a team of experts, is very well accepted by the subjects and has positive health effects. This project, for its effectiveness and feasibility, can also be developed in subjects with other stable chronic illnesses.