



PhD student:

Marina Garofano

Research project:

Effectiveness Evaluation of a Cardiac Telerehabilitation Program in Chronic Heart Failure

Abstract:

Introduction

Chronic heart failure (CHF) is a complex clinical syndrome and one of the leading causes of morbidity, mortality, and hospitalization worldwide. Although cardiac rehabilitation is recognized as a fundamental component of treatment, it remains underutilized. The implementation of telerehabilitation, enabled by advances in telemedicine, offers a concrete solution to improve access to care and continuity of treatment, particularly for patients facing logistical or geographical barriers.

Study Objectives

The primary objective of this study is to evaluate the effectiveness of a home-based cardiac telerehabilitation program in improving the functional capacity of CHF patients, as measured by VO₂max, compared to the traditional in-hospital rehabilitation approach. Secondary objectives include improvements in quality of life, instrumental and biochemical parameters, and the sustainability of benefits up to 24 weeks.

Study Design

This is a prospective, observational, monocentric, non-pharmacological study. Patients are recruited at the Cardiac Rehabilitation Unit of the University Hospital “San Giovanni di Dio e Ruggi d’Aragona” and divided into two groups: one assigned to home-based telerehabilitation, and the other to conventional supervised in-person rehabilitation. The rehabilitation protocol includes a total of 32 treatment sessions: five sessions per week for the first 4 weeks, followed by three sessions per week for the subsequent 4 weeks. Each session lasts approximately one hour.

Training and Assessments

Patients in the telerehabilitation group undergo an initial in-person training phase at the clinic to learn how to use the digital platform and monitoring devices (sensors, spirometers, ECG, tablet). All clinical and functional assessments defined by the protocol (T₀, T₁, T₂, T₃, T₄) are conducted in person using validated tools and supervised by specialized healthcare professionals. This ensures data reliability, patient safety, and comparability between groups.

Technology and Intervention

The telerehabilitation group uses a complete system (VRRS Home Kit – Khymeia) equipped with motion sensors, devices for telemetric monitoring of vital signs, and a platform that allows real-time supervision by the physiotherapist. The entire rehabilitation program is monitored and tailored to each patient, with the possibility of clinical intervention in case of alert signals or technical issues.

Outcomes

The primary endpoint is a $\geq 20\%$ increase in VO₂max at 8 weeks. Secondary endpoints include improvements in cardiac function (ejection fraction, diastolic function), exercise tolerance (6MWT), biomarkers (BNP, ANP), quality of life (KCCQ-12, SF-36), and maintenance of benefits at 24 weeks. Statistical analyses include t-tests, repeated measures ANOVA, and logistic regression.

Relevance



This study is aligned with national directives (PNRR, Ministry of Health guidelines 2021) aimed at promoting innovative, digital, and personalized care models for patients with chronic conditions. In this context, telerehabilitation may represent a promising alternative to traditional rehabilitation, with the potential to improve clinical outcomes and contribute to reducing disparities in access to healthcare services. However, further evidence will be needed to confirm the scalability and long-term effectiveness of this approach.