

# ERIC-HF program (Early Rehabilitation In Cardiology - Heart Failure) - pilot study

Bruno Delgado<sup>1</sup>, Ivo Lopes<sup>2</sup>, Bárbara Gomes<sup>3</sup>, André Novo<sup>4</sup>  
<sup>1</sup>Oporto Hospital Center, Porto, Portugal; NURSEID: CINTESIS; <sup>2</sup>Oporto Hospital Center, Porto, Portugal; <sup>3</sup>Infante D. Pedro hospital, Aveiro, Portugal; <sup>4</sup>Hospital Center of Setúbal, Setúbal, Portugal; <sup>5</sup>NURSEID: CINTESIS; Escola Superior de Enfermagem do Porto, Porto, Portugal; <sup>6</sup>NURSEID: CINTESIS; Polytechnic Institute of Bragança, Health School, Bragança, Portugal

NO CONFLICTS TO DECLARE

**Keywords:** heart failure, exercise, rehabilitation, functional capacity || [bruno.m.delgado@gmail.com](mailto:bruno.m.delgado@gmail.com)

## 1. INTRODUCTION

Heart failure (HF) patients often present dyspnea, fatigue and edema that leads to decreased exercise tolerance, functional dependence and impairment of performance in activities of daily living (ADL)<sup>1,2</sup>. Exercise is a well-established intervention, for patients with stable chronic HF, that leads to improvement of symptoms, promotes functional capacity and decrease exercise intolerance<sup>3,5,6</sup>. However, little is known about exercise for HF inpatients<sup>4</sup>. The ERIC-HF (Early Rehabilitation in Cardiology – Heart Failure) program is an aerobic exercise training (AET) program designed for patients admitted due to decompensated HF<sup>7</sup>.

## 2. PURPOSE

To evaluate the feasibility and safety of the ERIC-HF program .

## 3. METHODS

Randomized single-blind controlled trial, where patients were randomized in training group (TG) or control (CG). Data includes cardiovascular history, HF history, London Chest of Daily Living Activities (LCADL) and Barthel Index (BI). TG patients perform the ERIC-HF program twice a day, 5 days a week. ERIC-HF program is a supervised AET program, with increasing levels of intensity (Table 1). Vital signs, Borg Modified Perceived Exertion (BMPE) and any adverse event were evaluated before and immediately after the exercise. CG patients perform physical activity in accordance with the guidelines available for inpatients, always supervised too. At discharge was performed a 6 minute walking test (6MWT), and evaluation of LCADL scale and BI, for comparison. Also a 6MWT was performed as soon as the patients were able to, since it was not possible at admission.

**Endpoints** of the study : difference between admission and discharge score of BI and LCADL, distance walked in the 6MWT and the safety parameters.

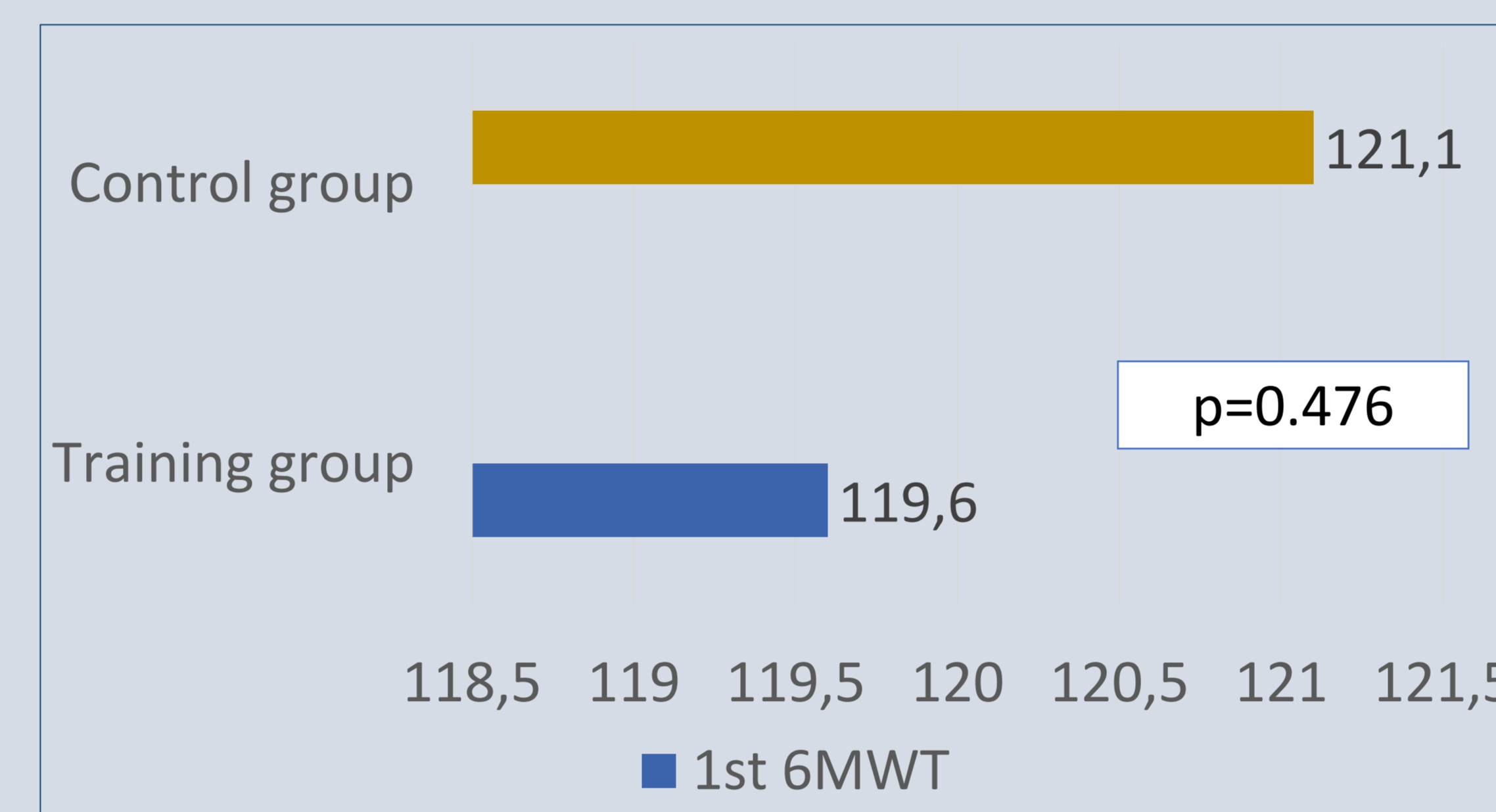
## 4. RESULTS

114 patients were randomized (64 in TG – 932 training sessions). The average age was 72 (±9), 70 were male, 82% are in NYHA class III. At admission, both groups of patients have the same characteristics (Table 2). The major etiology of HF is ischemic and valvular disease and most patients have reduced ejection fraction (Graph 1). On the first 6MWT performed there were no difference between groups (Graph 2). At discharge, TG present lower LCADL and Borg score, higher BI score and higher average distance walked in the 6MWT. Differences in LCADL and 6MWT are statistically and clinically significant (Graph 3). The average distance on 6MWT at discharge by TG is 47 meters higher.

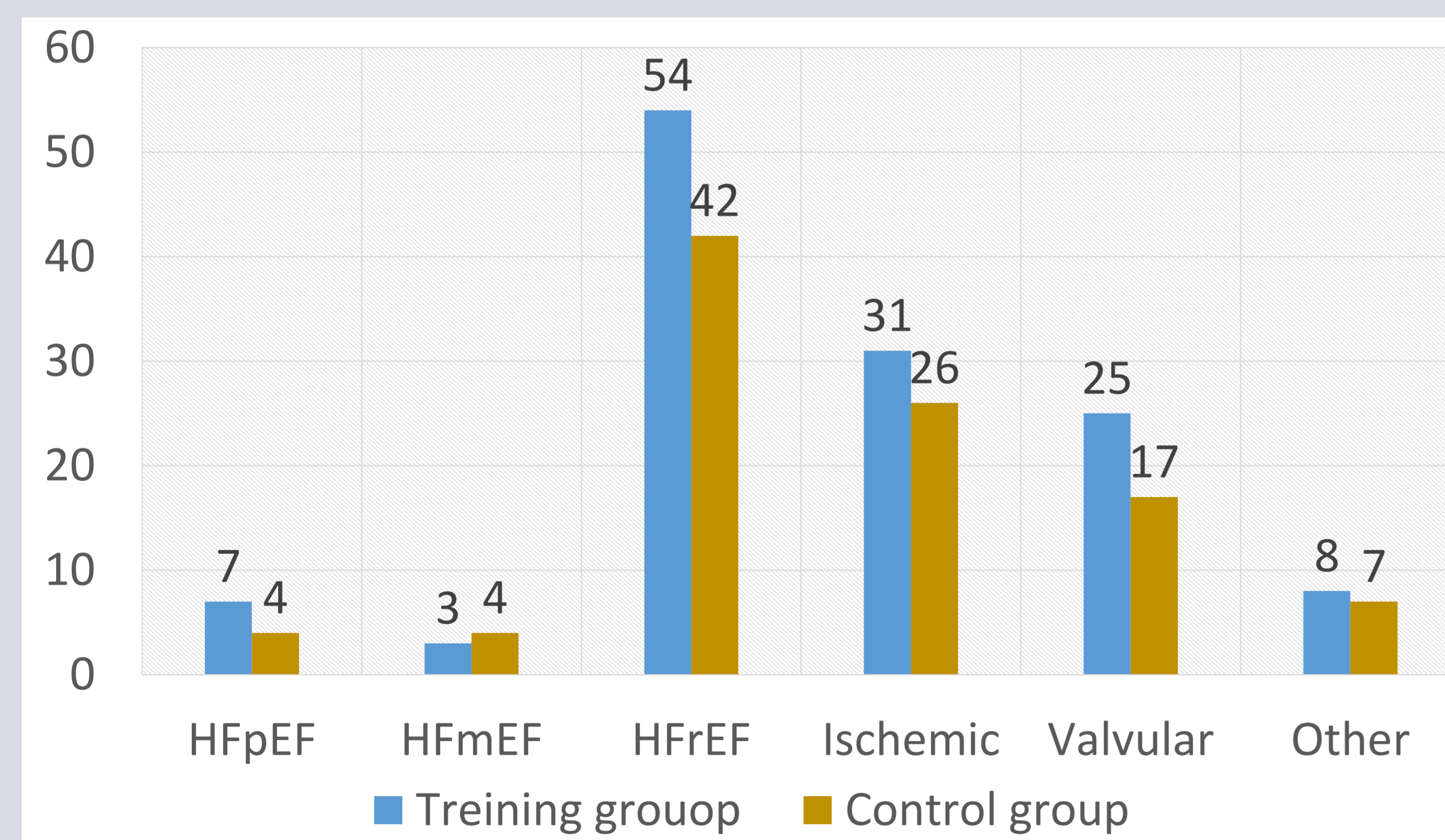
Regarding safety, graph 4 show which and how many events occurred. Those events are related with the performance of ERIC-HF program stages of exercise, and all of them were properly controlled.

Stage	Exercise
I	Respiratory and callisthenic exercises performed in supine or orthostatic position
II	5 to 10 min on cycloergometer
III	5 to 10 min walking
IV	10 to 15 min walking
V	10 to 15 min walking and 5 min climbing stairs (patients may stop for recovery)

Tabel1 – ERIC-HF program stages



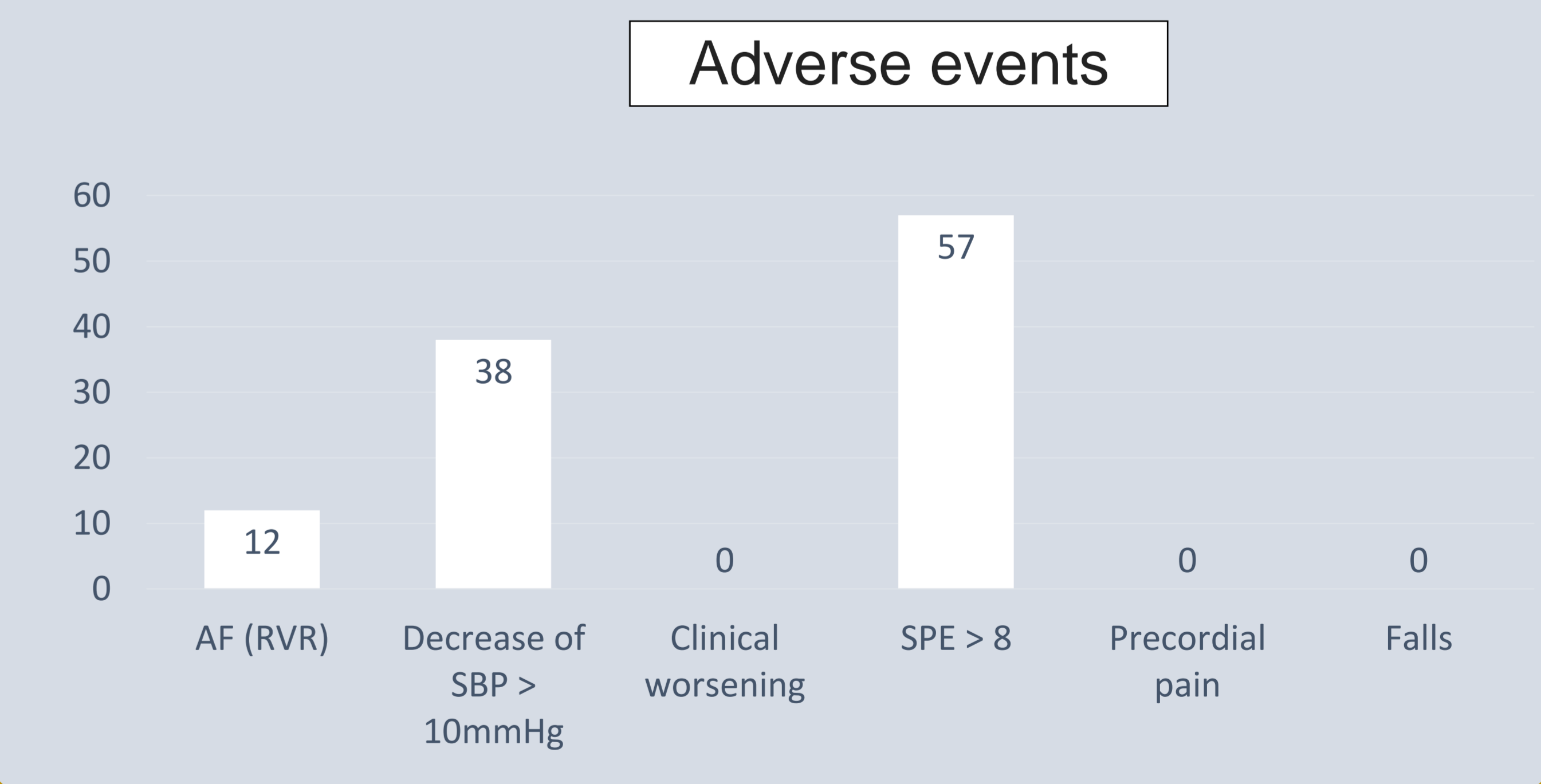
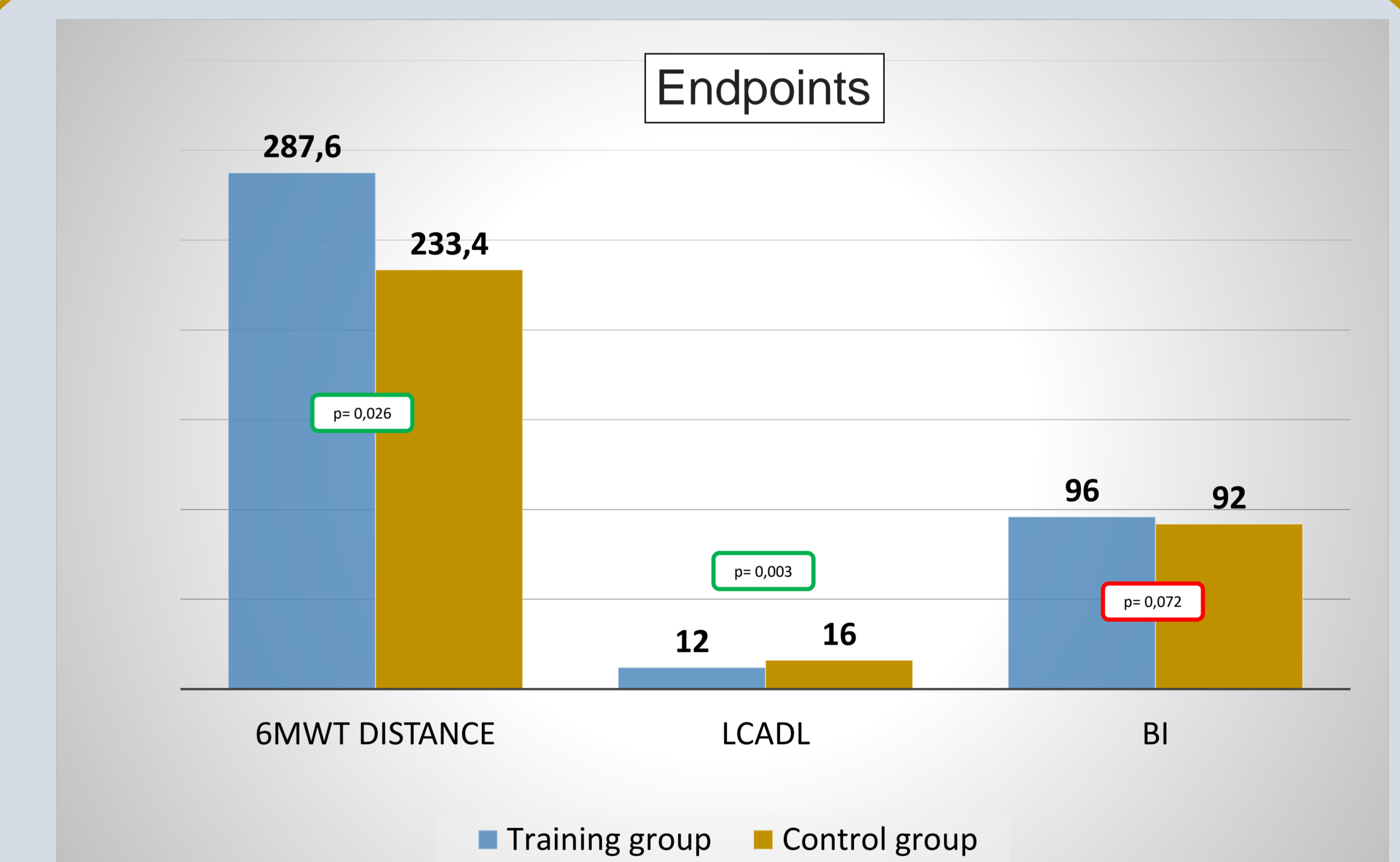
Graph 2 –comparison between 1<sup>st</sup> 6MWT



Graph 1– ventricular function and etiology of HF

Parameter	Training group (n=64)	Control group (n=50)	p value
Age (years)	69.3±9.5	70.3±10.5	0.642
Gender	40 M (62.5%) 24 F (37.5%);	30 M (60%) 20 F (40%);	0,402 0,701
Inhospital stay (days)	19±18.7	18±13.5	0.713
LCADL <sup>1</sup> admission	32±8.5	31.7±7.6	0.874
Barthel admission	73.3±19.9	72.6±16.4	0.839
NYHA <sup>2</sup> III	50 (78.1%)	39 (78%)	0.712
NYHA <sup>2</sup> IV	14 (21.9%)	11 (22%)	0.796

Table 2 – baseline characteristics



**Feasibility & Safety**

## 5. LIMITATIONS

The main limitations of this study were: 1) patients did not performed the same number of sessions; 2) the absence of a 6MWT at admission; 3) the relatively small study sample; and 4) the inability to perform subgroup analysis for important characteristics, particularly left ventricular ejection fraction

## 6. CONCLUSIONS

The ERIC-HF program demonstrated to be effective and feasible. Regarding safety, we can infer that the few adverse events registered aren't major, and does not represent that exercise can be deleterious for decompensated HF patients, however more research should be done. No other study of our knowledge has demonstrated this findings.

## REFERENCES

- Gary RA, Cress ME, Higgins MK, Smith AL, Dunbar SB. A combined aerobic and resistance exercise program improves physical functional performance in patients with heart failure: a pilot study. *J Cardiovasc Nurs.* 2012;27(5):418-30
- Ponikvar P, Voors AA, Anker SD, et al. 2016 ESC Guidelines for the Diagnosis and Treatment of Acute and Chronic Heart Failure. *Rev Esp Cardiol (Engl Ed).* 2016;69(12):1167.
- ACSM. Guidelines for Exercise Testing and Prescription. In: Agostolitis S, Baruth M, Raynard T, Beck, Darren T, Brawner CA, editors. Tenth Edition ed2016.
- Mezzani A, Cacciatore F, Catanzaro R, et al. Early-start Exercise training after acute hemodynamic decompensation in patients with chronic heart failure (RE-START). *Monaldi Arch Chest Dis.* 2014;82(1):20-
- Ivarez P, B. Hannawi and A. Guha (2016). "Exercise And Heart Failure: Advancing Knowledge And Improving Care." *Methodist Debakey Cardiovasc J* 12(2): 110-115.
- Cattadori G, C. Segurini, A. Picozzi, L. Padelloni and C. Anzà (2018). "Exercise and heart failure: an update." *ESC Heart Fail* 5(2): 222-232.
- Delgado, B. M., Lopes, I., Gomes, B., & Novo, A. (2020). Early rehabilitation in cardiology - heart failure: The ERIC-HF protocol, a novel intervention to decompensated heart failure patients rehabilitation. *Eur J Cardiovasc Nurs*, 1474515120913806.