

## Device-measured physical activity changes following early cardiac telerehabilitation: interim results from the Tele-ADHF trial

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**Background:** Hospitalisation for acute decompensated heart failure (ADHF) leads to physical and physiological deconditioning. Cardiac (tele)rehabilitation (CTR) is essential to improve quality of life (QoL), physical functional capacity and reduce the risk for (re)hospitalisation in patients with CHF.

**Purpose:** The purpose of this interim analysis was to evaluate the effect of CTR on step counts measured by a wrist-worn device in recently admitted CHF patients. Secondly, the effects of CTR on QoL, and handgrip strength will be evaluated.

**Methods:** Patients hospitalised for ADHF, meeting study in- and exclusion criteria were asked for study participation. After discharge, participants wore a wrist-worn monitoring device to collect data on HR, and step counts. When reaching stable heart failure (HF) patients were randomised for starting CTR (intervention), or to continue with standard clinical care (control). The 18-weeks CTR programme consisted of exercise training, dietary guidance, and mental health support. All participants continued wearing the wrist-worn device until 26 weeks after randomisation[1]. Four periods of seven days of device-measured data were used in the analysis: [-T1] discharge, [T0] randomisation at stable HF, [T1] 18 and [T2] 26 weeks after randomisation. Participants missing more than 3 days of data in one period (seven days) were excluded from the analysis. Intra- and inter-group comparisons were conducted using paired and independent t-tests.

**Results:** Of the original 62 randomised patients, device-measured data on step counts and heart rate was available for 22 patients (intervention: n = 13; control: n = 9). In both intervention and control groups a significant change in step counts was seen over time (-T1: 2892 ± 2592, T2: 5605 ± 2805, p=.05; -T1: 2277 ± 1181, T2: 3624 ± 1637, p=.001). Between the groups there was only a significant difference between the steps at T2 (Δ 1981 steps, p<0.05). QoL improved significantly over time (-T1 vs. T2) in the intervention group (48.7 vs. 74.8; p<0.05), no significant change was seen in the control group (58.3 vs. 72.0; p=.403). Handgrip strength improved at T1 in the intervention group (Δ left 2.3, p=.045; Δ right 2.7, p=.050), no change was observed in the control group at T1 (Δ left - 0.4, p=.816; Δ right -3.6, p=.082) or at T2 in both groups.

**Conclusion:** Physical activity measured with step counts increased more after CTR as compared to usual care after heart failure hospitalisation. These results indicate a behavioural change towards a more active lifestyle after CTR. Additionally, QoL and handgrip strength improved significantly in the CTR group whereas no change was observed after usual care. Further investigation with larger samples and the final results from this study are needed to determine its impact on physical activity and long-term clinical outcomes.

**Table 1. Baseline characteristics**

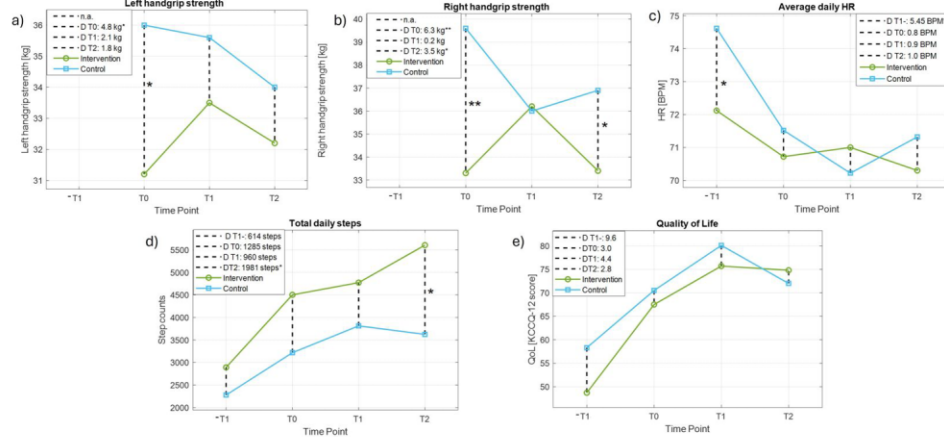
N (%), means ± SD or median (IQR).

LVEF: left ventricular ejection fraction; HFmrEF: heart failure with mildly reduced ejection fraction, HFpEF: heart failure with reduced ejection fraction; HFrEF: heart failure with reduced ejection fraction; IQR: interquartile range.

Variables	Intervention (n = 13)	Control (n = 9)	All (n = 22)
Age, years (IQR)	75.0 (12)	76.0 (12)	75.50 (12)
Age, < 75 years (%)	6 (46.2%)	3 (33.3%)	9 (40.9%)
Gender, male (%)	10 (76.9%)	7 (77.8%)	17 (77.3)
LVEF, %	43.6 ± 16.5	40.8 ± 11.8	42.3 ± 14.4
HFpEF	5 (38.5%)	4 (44.4%)	9 (40.9%)
HFmrEF	2 (15.4%)	0	2 (9.1%)
HFrEF	6 (46.2%)	5 (55.6%)	11 (50.0%)
Frailty (≥ 3 domains Vigorito et al. tool)	7 (53.8%)	7 (77.8%)	14 (63.6%)

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Figure 1. Trends in physical parameters and quality of life over time (intervention vs. control)



Trends in physical parameters (handgrip strength, average heart rate and step counts) and quality of life over time in two groups: CTR (intervention) and usual care (control). (a) Left and (b) right handgrip strength in kilograms, (c) average daily heart rate in beats per minute measured by a wrist-worn device, (d) daily step counts measured by a wrist-worn device and (e) quality of life assessed by KCCQ-12 questionnaire.

BPM: beats per minute; HF: heart failure; HR: heart rate; KCCQ: Kansas City Cardiomyopathy Questionnaire.

-T<sub>1</sub>: discharge; T<sub>0</sub>: randomisation at stable HF; T<sub>1</sub>: 18 weeks after randomisation; T<sub>2</sub>: 26 weeks after randomisation.

\* p < 0.05, \*\* p < 0.01