Differences in Exercise Capacity of Heart Failure and COPD Patients Undergoing Exercise Rehabilitation

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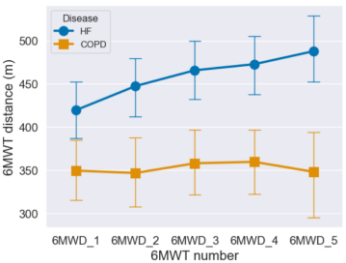
Aim - Prevalence of complex chronic cardiorespiratory diseases such as heart failure (HF) and chronic obstructive pulmonary disease (COPD) has increased due to population aging and lifestyle changes, increasing the load on healthcare systems. To objectively track disease progression of HF and COPD, we hypothesize that changes in disease status can be captured by measuring the changes in exercise capacity of patients. These can be compared with changes in physiological signals to create a score that reflects disease status.

Methods - 35 HF and 25 COPD patients undergoing an exercise rehabilitation program were included in this observational, prospective study. Patients underwent rehabilitation 2x/week for 3 months and performed a six-minute walk test (6MWT) every 3 weeks (5 per patient) to track changes in exercise capacity using the six-minute walking distance (6MWD). Demographic parameters were compared using the t-test and the 6MWD was analyzed using a mixed ANOVA.

Results - Age and BMI did not differ significantly (p_{AGE}=0.44, p_{BMI}=0.15) between the groups. 6MWD was higher in patients with HF than COPD ($p<0.01$) for all 6MWTs. Difference in 6MWD between the five 6MWTs was significant ($p<0.01$). Post-hoc analysis showed that all pairs of 6MWTs except (6MWT_3, 6MWT_4) and (6MWT_4, 6MWT_5) were different. The interaction between the disease and 6MWTs was significant ($F_{(4, 152)}$=4.038, p=0.004).



Plot of the 6MWD (in m)

Table 1 Summary of mixed ANOVA

Source	F	p	η^2
Disease	17.42	< 0.001	0.314
ID_6MWT	13.78	< 0.001	0.266
Interaction	4.04	0.004	0.096

Conclusion - Changes in functional capacity measured using the 6MWT showed a difference between the HF and COPD groups over time. Further analysis of ECG and accelerometer data during the 6MWT sessions will provide insight into actual disease progression (i.e., functional improvement) and can be used to create a score that enables remote monitoring of these diseases.