**ADLs before and after rehabilitation in patients with COPD and CHF**

**Key concept**: dyspnea reduces performances of ADLs. Dyspnea is related with some clinical measurements as peak ventilation during activity, peak aerobic capacity, etc. If we reduce the values of those variables, correlated with dyspnea, we might improve the performances of ADLs.

**Intervention:** Exercise training and energy conservation techniques (ECTs), as part of rehabilitation, can be considered to reduce the task-related dyspnea sensation and improve performance of ADLs in COPD and CHF.

**Measurement points:** Measure the patients before (twice) and after high-intensity interval training in combination with occupational therapy.

**Variable that will be analyzed:** (A=Anouk, G =Gabriele)

* (A) Metabolic load during the performance of ADLs:
  + Oxygen uptake (higher peak oxygen uptake -> worst performances)
  + Peak ventilation (higher peak ventilation -> worst performances)
* (A) Aerobic capacity (reduced aerobic capacity -> worst performances)
* (A) Dynamic hyperinflation (higher dynamic hyperinflation -> worst performances)
* (A) Peak aerobic capacity (higher peak aerobic capacity -> worst performances)
* (A) Dyspnea score (smaller score -> higher performances, dyspnea limits ADLs)
* (A) Energy expenditure (decrease -> better performances)
* (A) Duration of ADL test (?, personally I don’t think it is a measure of ADL performance)
* (G) Number of time that the patient stops the activity because he is breathless (less stops -> better performances, stops limit ADLs)
* (G) Activity intensity after ADL test (requires 30 minutes after and before)
* (G) Respiration timing (higher Ti/Te -> better performances)
* (G) Respiratory recovery time after ADL test (requires 30 minutes after and before)
* (G) Heart rate recovery time after ADL test (requires 30 minutes after and before)
* (G) Heart rate variability during ADL test
* (G) Activity recognition and pattern discovery (full day recordings)

**Primary objective Anouk:**

* What is the metabolic load during ADLs before and after rehabilitation

**Primary objective Gabriele:**

* Develop an algorithm capable of recognizing activities (estimate energy expenditure?) using task related variables (HR, HRV, RR).
* Investigate differences in the variable listed above (including the one selected by Anouk) before and after the rehabilitation during the full day of assessment in free living condition. Compare those differences (improvements in performing activities) with the difference observed in the ADL tests. (full day recordings required)

**Algorithm:**

* Should be able to recognize the activities
  + Investigate on robust methods for multimodal sensor integration (motion, HR, RR) for activity recognition
* Should automatically identify the breaks during an activity
* Should estimate energy expenditure from motion data, respiration data and HR data in sedentary patients using linear regression
  + Investigate on robust methods for multimodal sensor integration (motion, HR, RR) for energy expenditure