

Do you know if your patient can cross the traffic light during the green period? – a prospective observational study

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BACKGROUND

In many countries, a minimum speed of 1.2 m/sec is necessary to cross a traffic light during the green period. Patients with chronic obstructive pulmonary disease (COPD) or interstitial lung diseases (ILD) frequently suffer from severe exercise-induced breathlessness and impaired exercise capacity, which result in a reduced gait speed. In a retrospective analysis, only 10.7% of COPD patients reached the target speed of 1.2m/sec¹ and by implication, 89.3% of these patients were not able to cross a traffic light during the green period, safely.

Therefore, the primary aim of our study was to investigate the effects of pulmonary rehabilitation (PR) on walking speed in patients who initially do not reach the critical threshold of 1.2 m/sec.

METHODS

46 subjects with severe COPD or interstitial lung disease (ILD) who participated in a 3-week inpatient comprehensive PR program were consecutively included in this prospective observational trial. Only patients with a walking speed <1.2 m/sec (measured during 4m gait speed test) performed post PR assessments and were considered for final analysis (n=40).

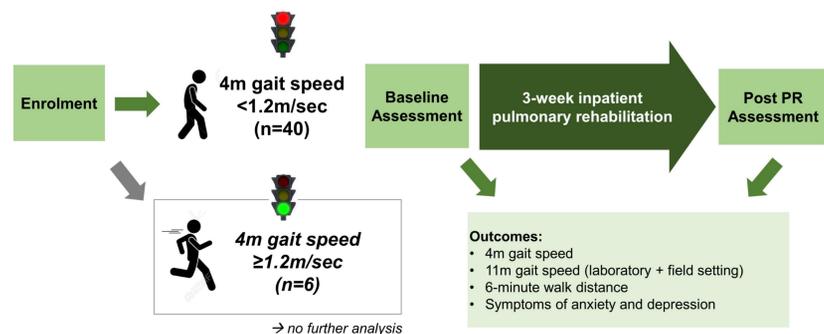


Figure 1: Study flow chart

Primary outcome was the change in 4m gait speed assessed from pre to post PR.

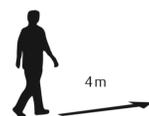


Figure 2: 4m gait speed test

As **secondary outcomes**, walking speed was measured via 3 different tests:



Figure 3: 11m gait speed tests (laboratory + field setting)

RESULTS

In 40 out of 46 patients, the walking speed was below 1.2m/sec (87%).

Primary outcome:

- Walking speed significantly increased by +0.16m/sec (p<0.001) in the 4m gait speed test.

Secondary outcomes:

- Interestingly, the baseline speed was comparable in 11m_{trafficlight} and 11m_{normal} but significantly slower compared to 11m_{fast}.
- Speed was improved following PR in all three 11m gait speed tests, however, the change in 11m_{trafficlight} speed did not reach statistical significance (p=0.057)(Fig. 4).

Table 1: Baseline Characteristics. Values are mean (SD) unless otherwise noted.

	n=40
Disease aetiology (ratio COPD:ILD)	25:15
Age	67 (7)
BMI, kg/m ²	25.4 (5.6)
FEV ₁ , %pred.	40.0 (15.5)
FVC, %pred.	54.1 (16.2)
DLCO, %pred.	27.6 (4.7)
paO ₂ , mmHg	64.9 (10.2)
paCO ₂ , mmHg	38.3 (3.9)
LTOT, n (%)	34 (78.6)
Lung-related hospitalizations during the previous year, n of patients (%)	27 (67.5)
Falls during the previous year, n of patients (%)	7 (17.5)
6-minute walk distance, m	297 (111)
SpO ₂ min during the 6MWT, %	84 (7)
HADS anxiety score, pts.	6.6 (4.4)
HADS depression score, pts.	6.6 (4.3)

Abbreviations: COPD: chronic obstructive pulmonary disease; ILD: interstitial lung disease; BMI: Body-Mass-Index; FEV₁: forced expiratory volume in one second; FVC: forced vital capacity; DLCO: diffusion capacity of the lung for carbon monoxide; paO₂: partial pressure of oxygen; PaCO₂: partial pressure of carbon dioxide; LTOT: long-term oxygen therapy; NIV: non-invasive ventilation; SpO₂: oxygen saturation; 6MWT: 6-minute walk test.

Effects of PR on 11m gait speed

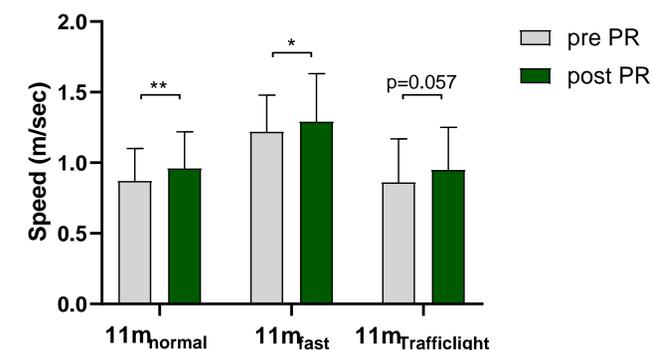


Figure 4: Effects of PR on 11m gait speed (11m_{normal}, 11m_{fast}, 11m_{trafficlight})

Table 2: Physiological parameters at the end of the walk tests 11m_{normal} and 11m_{trafficlight} at discharge

	11m _{normal}	11m _{trafficlight}	Mean difference (95%CI)	p value
Borg dyspnea, pts.	2.8 (1.2)	3.9 (1.2)	+1.1 (0.3 to 2.0)	0.012
SpO ₂ , %	94 (4)	90 (7)	-3.2 (-0.6 to -6.9)	0.089
Heart rate, b/min	92 (14)	106 (15)	+14.1 (6.3 to 21.9)	0.002

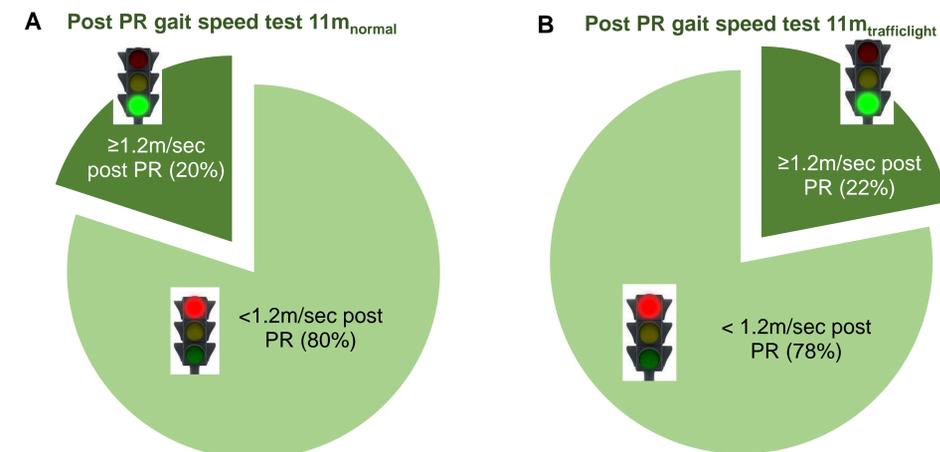


Figure 2: Post PR speed measured by gait speed tests 11m_{normal} (A) and 11m_{trafficlight} (B), categorized according to the cut-off (1.2m/sec).

CONCLUSIONS

- PR improves walking speed in patients with severe COPD or ILD.
- Patients seem to choose their individual normal but not fast speed to cross a traffic light. However, post-exercise physiological parameter may indicate higher exertion levels during real life setting compared to a laboratory test.
- Post PR, 20-22% of patients gained the skill to cross the traffic light during the green period which might reduce an important barrier in patients daily life activity.