Supplementary material

METHODS

Study design, Participants and Measurements

STAND-UP study

The duration of inpatient pulmonary rehabilitation (PR) in the STAND-UP study was approximately two weeks after which patients are typically referred to an outpatient follow-up programme. The exercise capacity tests were performed in a systematic manner to ensure consistency between and within patients with a 30-minute rest period between tests to allow for recovery. The exercise capacity tests included two 1-minute sit-to-stand (1-min STS) tests and one 5-repetition sit-to-stand tests (5STS) at both admission and discharge, and a 6-minute walk test (6MWT) at each time point conducted separately as part of the standard PR programme. For the additional 1-min STS test, 5STS and 6MWT performed by a subsample of patients using a portable metabolic cart, oxygen consumption (VO_2), carbon dioxide production (VCO_2), ventilation (VE), tidal volume (VT), breathing frequency (BF) were measured breath-by-breath for three minutes before exercise, during exercise and for five minutes after exercise. Heart rate (HR) was continuously measured with a chest belt (Polar®) and SpO_2 at the fingertip (Nonin® Xpod® PureSAT®), both connected to the metabolic cart. In one clinic where it was not possible to connect a pulse oximeter to the metabolic cart, SpO_2 was measured at the fingertip (Konica Minolta Pulsox®-300i) and recorded each minute during rest and every 30 seconds during recovery. Oxygen saturation (SpO_2) was recorded during the 1-min STS test at 0 seconds, 30 seconds and immediately after the test, and during the 5STS and 6MWT at zero seconds and immediately after. Muscle function was assessed by isometric quadriceps maximal voluntary contraction force (QMVC) in only one clinic (Clinic Barmelweid) where equipment was available.

Statistical Analysis

For construct validity, responsiveness and MID analyses for STAND-UP, the higher score of two consecutive 1-min STS tests was used.

For *construct validity*, we assessed both cross-sectional and longitudinal validity with Pearson correlation coefficients (PCCs) at baseline and follow-up (cross-sectional), and of pre- to post-rehab change scores (longitudinal). We defined correlation boundaries *a priori* as >0.6 (strong), 0.4–0.6 (moderate) and <0.4 (weak). With the assumption that the 1-min STS test is a valid measure of exercise capacity, we expected the 1-min STS test to be correlated strongly with other measures of exercise capacity (6MWT and 5STS), moderately with measures of muscle strength and dyspnoea (QMVC, baseline and transitional dyspnoea indexes [BDI/TDI] and Medical Research Council dyspnoea scale [MRC]), and weakly with measures of health-related quality of life (HRQoL) and health status (Chronic Respiratory Questionnaire [CRQ], COPD assessment test [CAT], Hospital Anxiety and Depression Scale [HADS], feeling thermometer [FT], St. George's Respiratory Questionnaire [SGRQ] and Clinical COPD Questionnaire [CCQ]).

For the assessment of *responsiveness to change*, as we expected to see an effect size ≥0.5 due to PR,[1] we defined *a priori* a highly responsive effect size (standardised response mean) as ≥0.8 and a moderate as 0.5–0.8.

Regarding the *minimal important difference (MID),* for the anchor-based approach, we chose anchors as instruments that already have an established MID in COPD patients and that had a change score correlation with the 1-min STS test ≥0.3. For the distributional-approach, the standard error of measurement effect size was not calculated for RIMTCORE as this requires a

test-retest intraclass correlation coefficient (ICC), which was not available from the RIMTCORE data.

For the assessment of the *physiological response*, we plotted individual graphs for the course of VO_2 during rest, exercise and recovery of each exercise capacity test to observe the within-person response and the between-person differences in response. Individual graphs of SpO_2 during the 6MWT and 1-min STS test were plotted to observe differences in desaturation between tests. Desaturation was considered as a drop in SpO_2 ≥4%.[2]

RESULTS

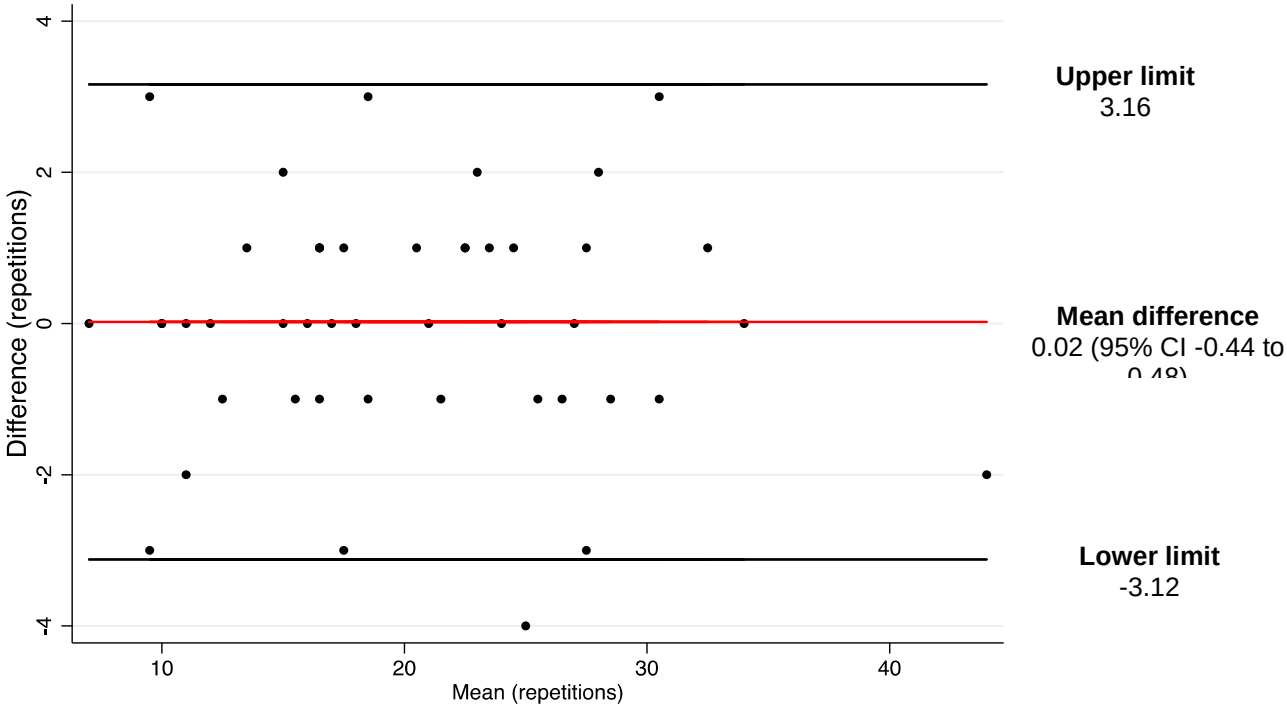

Figure S1 Bland-Altman plot for test-retest reliability of two 1-minute sit-to-stand tests with mean bias and 95% limits of agreement.

REFERENCES

1 McCarthy B, Casey D, Devane D, *et al.* Pulmonary rehabilitation for chronic obstructive pulmonary disease. In: McCarthy B, ed. *Cochrane Database of Systematic Reviews*. Chichester, UK: : John Wiley & Sons, Ltd 2015. doi:10.1002/14651858.CD003793.pub3

2 Poulain M, Durand F, Palomba B, *et al.* 6-Minute walk testing is more sensitive than maximal incremental cycle testing for detecting oxygen desaturation in patients with COPD. *Chest* 2003;**123**:1401–7. doi:10.1378/chest.123.5.1401