S81 FUNCTIONAL CAPACITY, PERIPHERAL MUSCLE STRENGTH, AND QUALITY OF LIFE FOLLOWING INTERVAL VERSUS CONTINUOUS REHABILITATIVE EXERCISE TRAINING IN CYSTIC FIBROSIS

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The effects of pulmonary rehabilitation in cystic fibrosis are well documented, but the effectiveness of interval exercise training remains unexplored. The aim of this study was to investigate whether interval exercise (IE) could be as beneficial as continuous exercise (CLE) in terms of improvement in functional capacity, peripheral muscle strength, and quality of life. We studied 24 Caucasian, ambulatory, adult, cystic fibrosis patients. Patients underwent a structured, outpatient, hospital-based pulmonary rehabilitation program for 12 weeks. Patients were randomised either to 30 min high-intensity IE (100% WRmax for 30 s alternated with 40% WRmax for 30 s; n=12) or 30 min moderate intensity CLE (70% WRmax; n=12). Interventions were balanced to provide the same overall training work load. Assessment was performed at baseline and following completion of the rehabilitation program. Functional capacity was assessed by the 6MWT, peripheral muscle strength was measured by the quadriceps isometric force and the Cystic Fibrosis Questionnaire-Revised (CFQ-R) was used to assess patient reported outcomes. The 6MWT was significantly improved equally in the IE Group (by 45 m; pre: 538 ±70, post: 583±83 m; p<0.001) and in CLE Group (by 48 m; pre: 516±57, post: 564±55 m; p=0.001). Improvement in quadriceps muscle strength was significantly greater in the IE group (pre: 37.9±13.1, post: 45.2±14.2 Kg; p=0.024) compared to CLE (pre: 40.0±12.2, post: 45.4±9.3 Kg; p=0.072). The CFQ-R was improved in both groups for the domains of "physical functioning" (IE Group pre: 52.8±14.5, post: 64.6±11.9; CLE Group pre: 60.4±11.2, post: 67.4 ±13.1; p=0.034) and "body image" (IE Group pre: 81.5 ±8.5, post: 88.1±7.3; CLE Group pre: 74.1±10.7, post: 80.7±9.7; p=0.046). Average training arterial oxygen saturation and Borg dyspnoea scores during exercise training indicated that the IE Group compared to the CLE Group exhibited higher oxygen saturation (94±1 vs. 91%±1%; p=0.002) and lower intensity of dyspnoea (3.8±0.7 vs. 5.9 ±0.8; p<0.001).

In conclusion, within the pulmonary rehabilitation setting, IE is equally effective to CLE in improving functional capacity and aspects of quality of life, but is superior to CLE in improving peripheral muscle strength. Furthermore, it can be applied to CF patients with lower dyspnoea sensations and

lower arterial desaturation, thus qualifying as a safer alternative training strategy.

S82 DAILY STEPPING DOES NOT RECOVER AS AN INPATIENT: STANDARDISING THE MEASUREMENT OF PHYSICAL ACTIVITY DURING HOSPITALISATION FOR RESPIRATORY DISEASE

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Introduction and Objectives Hospitalisation for an exacerbation of chronic respiratory disease has a major impact on physical activity (PA). However, criteria to derive reliable inpatient PA data do not exist and current recommendations are unlikely to account for variations in length of hospital stay (LOHS) and the hospital environment. The aims were to identify the minimum wear time and number of days required to obtain reliable inpatient PA data; to use these criteria to determine how PA changes during recovery as an inpatient; and to compare PA across patients stratified by LOHS.

Methods 259 individuals hospitalised with an exacerbation of chronic respiratory disease were recruited as part of an early rehabilitation trial previously reported (Greening et al, BMJ 2014). Participants (mean (SD) age 70.0±9.7 years, 58.3% female) wore a physical activity monitor (SenseWear) during their stay. Daily step count and walking time during waking hours was analysed. Inpatient PA was assessed across a range of minimum wear time criteria (≥1–12 hours). Repeated measures analysis of covariance was used to compare between days and between times of day. Single-day intraclass correlation coefficients (ICCs) were calculated across the range of wear time criteria. The minimum number of days required to obtain an ICC ≥0.80 was estimated using the Spearman-Brown prophecy formula.

Abstract S82 Figure 1 Step count per hour as a proportion of total daily step count across an average 24 hour period. Data are reported as mean (95% CI).

Results A minimum wear time of 11 hours (≥ 1 valid day) allowed 80% of the sample to be retained. All minimum wear time thresholds produced an ICC ≥ 0.80 , resulting in 1 day of wear required to produce representative inpatient PA. Mornings and afternoons were more active than evenings and overnight (32.1% and 32.0% vs. 25.2% and 10.7% of steps/day, respectively, $p < 0.001$) (figure 1). No changes in PA were observed during the hospital stay; ranging 585–707 steps/day and 72–83 min/day of walking. After controlling for wear time, patients admitted for 2–3 days took more steps on average than patients staying 7–14 days (997 ± 125 vs. 597 ± 91 , $p = 0.036$).

Conclusions One full day (24 hours) of monitoring is required at the individual-level to obtain representative inpatient PA. A minimum wear time criteria of ≥ 11 waking hours is recommended for sample-level data. Wear time and LOHS should be accounted for in analyses.

S83 NEURAL RESPIRATORY DRIVE, RESPIRATORY MECHANICS AND BREATHLESSNESS IN HIGHLY ACTIVE OLDER ADULTS

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Introduction and Objectives Ageing is typically associated with progressive deleterious changes in respiratory mechanics which increase the work of breathing and limit ventilatory reserve. The impact on exercise capacity and exertional breathlessness in healthy ageing remains incompletely understood, in part due to a failure of previous research to control for negative effects of physical inactivity. This study aimed to compare neural respiratory drive (NRD), respiratory mechanics and breathlessness between highly active older adults (AOA) and recreationally active younger adults (YA). We hypothesised that NRD, quantified as diaphragm electromyogram activity (EMGdi) as a percentage of volitional maximum (EMGdi% max), would be higher in AOA than in YA and that this would be associated with increased breathlessness intensity during exercise.

Methods 12 YA (mean ($\pm$ SD) age 26.4 ± 4.7 years) and 12 AOA (cyclists, 59.0 ± 10.1 years), all male, underwent incremental cycle ergometry to their symptom-limited maximum. EMGdi was recorded continuously using an oesophageal multi-pair electrode catheter and quantified as EMGdi%max. Breathlessness intensity was quantified each minute and at end-exercise using the modified Borg scale.

Results Absolute FEV₁, FVC, FEV₁%FVC and IC tended to lower values in AOA than in YA (Table 1), without significant differences in baseline EMGdi%max (AOA $10.6 \pm 5.8\%$ max; YA $7.6 \pm 3.7\%$ max, $p = 0.15$). End-exercise EMGdi%max was significantly higher in AOA than in YA (AOA $61.8 \pm 13.7\%$ max; YA: $51.9 \pm 9.1\%$ max $p = 0.049$), with a trend towards higher end-exercise tidal volume (V_T) relative to IC (AOA: $V_T\%IC = 83.1 \pm 16.7\%$; YA: $V_T\%IC = 73.2 \pm 17.1\%$, $p = 0.17$). There were no significant end-exercise differences in V_T (AOA 2.9 ± 0.8 L; YA 2.8 ± 0.6 L, $p = 0.85$), minute ventilation (V_E) (AOA 116.7 ± 35.8 L/min; YA: 110.4 ± 29.3 L/min, $p = 0.64$) or mBorg breathlessness intensity (median (IQR) AOA 5 (3.25–7.75); YA 5 (5–9), $p = 0.5$).

Conclusions Highly active older adults achieved a similar end-exercise V_E to the younger adults despite age-related respiratory constraints. This required higher levels of NRD, which contrary to our hypothesis, was not perceived as increased breathlessness intensity. The contribution of ageing and/or regular physical activity to this apparent blunted perception of breathlessness requires further study.

Abstract S83 Table 1 Demographics, anthropometrics and lung function data for active older adults (AOA) and younger adults (YA). BMI, body mass index; FEV₁, forced expiratory volume in 1 s; FVC, forced vital capacity; TLC, total lung capacity; RV, residual volume; IC, inspiratory capacity. Values presented are mean $\pm$ SD. * Indicates statistically significant difference between groups, $p < 0.05$

	Younger adults	Active Older Adults	p-value
Age (yrs)	26.4 $\pm$ 4.7	59.0 $\pm$ 10.1	<0.0001*
BMI (kg/m ²)	24.5 $\pm$ 3.5	25.7 $\pm$ 2.4	0.35
FEV ₁ (L)	4.70 $\pm$ 0.80	3.82 $\pm$ 0.86	0.023*
FEV ₁ % pred. (%)	105.0 $\pm$ 17.9	109.1 $\pm$ 12.8	0.53
FVC (L)	5.88 $\pm$ 0.95	5.23 $\pm$ 1.20	0.16
FVC% pred. (%)	105.6 $\pm$ 15.9	112.1 $\pm$ 16.8	0.11
FEV ₁ %FVC (%)	79.5 $\pm$ 5.0	73.1 $\pm$ 6.1	0.01*
IC (L)	3.80 $\pm$ 0.47	3.47 $\pm$ 0.86	0.26
IC pred. (%)	89.4 $\pm$ 17.8	97.6 $\pm$ 21.6	0.40
TLC (L)	7.68 $\pm$ 1.12	7.76 $\pm$ 1.78	0.91
TLC% pred. (%)	105.0 $\pm$ 13.6	106.4 $\pm$ 17.2	0.84
RV (L)	1.95 $\pm$ 0.26	2.41 $\pm$ 0.70	0.09
RV% pred. (%)	110.1 $\pm$ 17.9	97.6 $\pm$ 25.0	0.24
RV% TLC (%)	26.0 $\pm$ 4.2	31.3 $\pm$ 6.0	0.043*

S84 DO PATIENTS GAIN AS MUCH KNOWLEDGE AROUND THEIR CONDITION FROM A WEB-BASED PULMONARY REHABILITATION PROGRAMME?

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Introduction The educational components of Pulmonary Rehabilitation (PR) are fundamental to the format and success of the programme.¹ All patients enrolled onto a PR programme should have access to a structured education programme. However the ideal mode of delivery is unknown and delivery can be varied. It has previously been demonstrated that a web-based programme is feasible.² However the gains in knowledge have not previously been reported for a digital programme compared to face-to-face contact. The Bristol COPD knowledge questionnaire (BCKQ) is a 65 item self-completed questionnaire often used to assess the effectiveness of education delivered.

Methods A single blinded, randomised, controlled feasibility trial comparing a web-based PR programme with a conventional PR programme for 7 weeks was conducted. Patients completed a BCKQ at their initial assessment or online when registering and again at their discharge appointment following completion of the PR programme or online at the end of the web programme.