Rationale Indacaterol/glycopyrronium (IND/GLY, QVA149) is a combination of a long-acting beta-2 agonist and a muscarinic receptor antagonist for the once-daily treatment of COPD. Here we assessed the effects of indacaterol/glycopyrronium on lung function and physical activity compared with placebo.
Methods We performed a randomised, two-period, cross-over study (21 days of treatment separated by a wash-out period of 14 days) with IND/GLY 110 µg/50 µg or matching placebo. Lung function was measured by slow and forced spirometry. Physical activity was measured by an activity monitor (Bodymedia SenseWear Armband) over the last week of each treatment period. The primary endpoint was peak inspiratory capacity (IC) at the end of each treatment period (i.e., on Day 21). The co-primary endpoint was physical activity level as defined by daily activity-related energy expenditure (kcal/day). Secondary endpoints included number of steps per day, duration of at least moderate activity per day, peak IC and FEV_1 on Day 1, trough IC on Day 1, and trough IC and FEV_1 on Day 21.
Results 194 patients (mean age 63 years; mean postbronchodilator FEV_1 61.6% predicted), were randomised; 183 patients completed the study. Peak IC on Day 21 was 0.202 L greater with IND/GLY compared to placebo ($p < 0.001$; Table 1). In addition, superiority of indacaterol/glycopyrronium over placebo with regard to other parameters of lung function was demonstrated (Table 1). Compared with placebo, indacaterol/glycopyrronium significantly increased the change from baseline in average physical activity level with a difference of 36.7 kcal/day. Further, IND/GLY -treated patients completed significantly more steps per day with a difference between the two treatment groups of 358.0 steps per day (Table 1).
Conclusion Compared with placebo, IND/GLY improved lung function and physical activity in patients with moderate to severe COPD.

Abstract P140 Table 1

		IND/GLY vs PBO
IC (Day 21)	peak (primary)	0.202L
		p < 0.001; 95% CI: 0.158–0.246
	trough	0.198L
		p < 0.001; 95% CI: 0.151–0.245
IC (Day 1)	peak	0.260L
		p < 0.001; 95% CI: 0.219–0.297
FEV_1 (Day 1)	peak	0.220L
		p < 0.001; 95% CI: 0.189–0.251
FEV_1 (Day 21)	peak	0.136L
		p < 0.001; 95% CI: 0.102–0.170
	trough	0.277L
		p < 0.001; 95% CI: 0.244–0.311
Activity related energy expenditure (kcal/day)		36.713
(co-primary)		p = 0.0399; 95% CI: 1.724–71.701
Average physical activity level (PAL)		0.0237
		p = 0.0191; 95% CI: 0.004–0.043
Change from baseline in average number of steps		358.0
(Friedman's test)		p = 0.0288; (SD = 2457.95)
Duration of at least moderate activity per day		4.382
(min/day)		p = 0.2637; 95% CI: -3.333 – 12.098

P141 AN EVALUATION OF THE ACCEPTABILITY OF SUPERVISED WARD-BASED EXERCISE FOR PATIENTS ADMITTED TO HOSPITAL FOR ACUTE EXACERBATION OF COPD

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10.1136/thoraxjnl-2015-207770.278

Introduction Patients with COPD demonstrate peripheral muscle dysfunction and reduced physical activity. Both are compounded by admission for acute exacerbation (AECOPD). Supervised exercise during AECOPD has been shown to be safe and may ameliorate these deleterious physical effects. Debate remains as to the acceptability of exercise for patients admitted with AECOPD.
Objective To evaluate the acceptability of supervised exercise for patients admitted with AECOPD.
Methods Patients admitted with AECOPD between December 2013 and August 2014 were included if medically stable, had no other limiting factor to exercise and consented to participate. Physiotherapists prescribed a standardised progressive exercise programme comprising daily upper/lower limb strengthening exercises and walking, supervised by a physiotherapy assistant. Patients completed a self-reported Likert scale questionnaire on discharge. Data collection included MRC Dyspnoea score, COPD Assessment Test (CAT), Timed Up and Go (TUAG) and 4-metre gait speed (4MGS).
Results 150 patients were screened, 78 (52%) participated. Mean (SD) age 70(10) years, 50% female, median (IQR) length of stay 7(5 -12) days, median number of exercise sessions 2(1–3). Median MRC 4(4–5) (n = 60); mean CAT at baseline 26 with a mean change of -3.7 (n = 50).

71 patients completed the questionnaire. 89% felt happy to participate in exercise when approached by a physiotherapist. 93% reported being able to undertake the exercises taught, 80% felt very or fairly confident to continue at home. 82% felt the exercise improved their ability to carry out functional tasks. 34% recalled previously completing Pulmonary Rehabilitation.

Analysis of those who completed TUAG and 4MGS pre and post intervention (n = 15) showed mean baseline values of 23.7 (10.7) secs and 0.44(0.21) mps respectively; mean changes of -6.8(9.45) secs and +0.08(0.16) mps respectively.
Conclusions Supervised exercise is acceptable to patients admitted with AECOPD, even in those demonstrating significant frailty. However, the non-participation rate was high, reasons for which are unknown. It is unclear whether the improvement in health status and functional mobility during admission was due to exercise participation or natural recovery. Further work is required exploring the impact of initiating exercise during admission on physical activity behaviours post discharge as well as reasons for non-participation during admission.

P142 REDUCED ALL CAUSE HEALTHCARE UTILISATION AFTER BREATHING RETRAINING FOR DYSFUNCTIONAL BREATHING

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10.1136/thoraxjnl-2015-207770.279

Introduction There are few controlled studies to prove the effectiveness of breathing retraining in the management of

dysfunctional breathing (Cochrane 2013) and only one observational study which shows a reduction in Emergency Room attendance (Hagman 2011) as a measure of the efficacy widely reported in clinical practice.

Method Using all consecutive unselected patients referred to a single Respiratory Physiotherapy Unit with 2 experienced practitioners between April 2012 – April 2013, a historical control was used to examine the healthcare utilisation of this group. The incidence of all cause new Out Patient referrals, A+E visits, and admissions in the six month period prior to treatment was compared to the six months after the study period. Extraction of data was by review of notes and computerised search of hospital events with anonymised patient data. In addition to this information on baseline characteristics, response to treatment, and comorbidities were also examined.

Results 67 patients were recorded, 2 were duplicate referrals and excluded from further analysis. The majority were referred by the Respiratory Service, but 27 by General Practice and senior nurses. Mean age was 58 (SD 15.6) and male to female ratio 30 to 37 respectively. 93% had one or more comorbidities, the most frequent being asthma in 49%. 58 patients attended for breathing retraining with an average Nijmegen score of 26.31 (SD 10.28).

In the 6 months after physiotherapy, new outpatient referrals fell by 56% (from 70 to 31), A+E visits fell by 17% (30 to 25) but admissions rose by 35% (20 to 27). The overall reduction of secondary care visits was 31% (120 to 83). Exploratory analysis using Wilcoxon matched-pairs signed rank test showed statistical significance in the outpatient referral group only ($p < 0.01$).

Conclusion While this is crude data based on limited numbers in a single site, the size of effect is noteworthy, suggesting efficacy of intervention. Healthcare utilisationwasnot restricted to Respiratory presentation, in keeping with the multi-symptomatic nature of this condition. The rise in admissions is in contrast but did not relate to respiratory symptoms in this ageing population over a 24 month period. Further study is warranted.

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P143 ASSOCIATIONS BETWEEN QUADRICEPS ISOKINETIC ENDURANCE AND EXERCISE TEST PARAMETERS IN COPD PATIENTS

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10.1136/thoraxjnl-2015-207770.280

Background Skeletal muscle dysfunction is a clinically relevant extra-pulmonary manifestation of COPD.[1] While muscle strength is undoubtedly important in functional performance, the ability to perform extended physical activity is also dependent upon muscular endurance. While previous studies have shown a correlation between quadriceps endurance and exercise test performance,[2] we wished to investigate the same correlation across a wider range of functional outcomes. In addition, we have previously explored the clinical meaning of a "distance-desaturation product" in field tests and data have indicated increased clinical value of the measure. We hypothesised, therefore, that measures of skeletal muscle isokinetic endurance might add clinical value to measures of strength, especially in day-to-day or submaximal activities.

Methods A prospective cohort of 11 patients with COPD (age median 66, range 58–79; FEV_1 median 0.81 L, range 0.68–1.41 L) was studied. We compared all 11 patients' performance in functional tests (6-minute walk test (6MWT), incremental CPET, endurance CPET, and activity data) with the following measures of isokinetic quadriceps function:

- Endurance (the peak torque of voluntary quadriceps contraction after 40 maximal reps, as a fraction of initial peak torque).
- A putative "strength-endurance product" (SEP), as a novel measure to better reflect the overall functional performance of the musculature.

Results Somewhat surprisingly, isokinetic quadriceps endurance was not significantly associated with any parameter across all 4 exercise tests. Furthermore, combining strength and endurance in the SEP yielded only a minor improvement: only resting energy expenditure was significantly correlated ($p < 0.05$).

Discussion Understandably it appears that quadriceps endurance is a poor predictor of performance in exercise tests, however

Abstract P143 Table 1 Table showing the strength of the relationship between quadriceps function (endurance and SEP) and parameters across a number functional tests

		Isokinetic Endurance				Strength-Endurance Product			
Functional parameter		r	r^2	p > 0.05	p < 0.05	r	r^2	p > 0.05	p < 0.05
6MWT	Distance	-0.185	0.034			0.507	0.257		
	Minimum SpO_2	-0.519	0.269			-0.185	0.034		
	Desaturation	0.470	0.221			0.447	0.200		
	Maximum perceived breathlessness	0.558	0.312			-0.099	0.010		
	Distance-saturation product	-0.285	0.081			0.156	0.024		
Incremental CPET	Peak VO_2 (L)	-0.217	0.047			0.544	0.296		
	Peak VO_2 (ml/kg)	-0.364	0.133			0.049	0.002		
	VO_2 @ anaerobic threshold (L)	-0.064	0.004			-0.075	0.006		
	VO_2 @ anaerobic threshold (ml/kg)	-0.563	0.317			-0.069	0.005		
Endurance CPET	Peak VO_2 (ml)	-0.275	0.075			0.407	0.166		
Activity data	Physical activity level	-0.312	0.097			-0.356	0.127		
	Total energy expenditure	-0.179	0.032			0.289	0.084		
	Resting energy expenditure	0.189	0.036			0.610	0.373		
	Active energy expenditure	-0.336	0.113			-0.178	0.032		