

Is there any evidence that multi disciplinary pulmonary rehabilitation impacts on quality of life?

Summary of the evidence located:

According to the NICE guideline on Chronic Obstructive Pulmonary Disease pulmonary rehabilitation leads to statistically significant and clinically meaningful improvements in health related quality of life (CRDQ) and reduces dyspnoea.¹

A 2000 systematic review aimed to determine the impact of rehabilitation on health-related quality of life (QoL) and exercise capacity in patients with COPD. Twenty-three RCTs were included in the meta-analysis, and all but one were parallel group trials. Trials were often small, with generally well under 200 patients in any comparison. Pulmonary rehabilitation significantly improved dyspnoea, fatigue, emotional function, and mastery compared with usual care (Chronic Respiratory Disease Questionnaire: dyspnoea: 9 RCTs; 519 people; WMD 1.0, 95% CI 0.8 to 1.2; fatigue: 8 RCTs; 513 people; WMD 0.9, 95% CI 0.7 to 1.1; emotional function: 8 RCTs; 513 people; WMD 0.7, 95% CI 0.4 to 1.0; mastery: 8 RCTs; 513 people; WMD 0.9, 95% CI 0.7 to 1.2. In three important domains of QoL (Chronic Respiratory Questionnaire scores for Dyspnoea, Fatigue and Mastery), the effect was larger than the minimal clinically important difference of 0.5 units using this instrument.²

Another systematic review (search date 2000; 20 RCTs) found that pulmonary rehabilitation significantly improved exercise capacity and shortness of breath compared with control (Chronic Respiratory Disease Questionnaire – shortness of breath: 12 RCTs; 723 people; standard effect size 0.62, 95% CI 0.26 to 0.91).³

A 2003 systematic review looked at the impact of pulmonary rehabilitation on clinical outcomes in patients with COPD. The review found that pulmonary rehabilitation on average improved CRQ scores (dyspnea domain) by 4.1 units and SGRQ (total) scores by 4.4 units (6 RCTS; 491 patients) which is clinically and statistically significant. These gains were maintained over the ensuing 3 to 18 months of follow-up (2 trials reported long term CRQ (dyspnea domain) data

¹ Chronic obstructive pulmonary disease : management of COPD in adults in primary and secondary care, NICE, 2004

² Y Lacasse, L Brosseau, S Milne, S Martin, E Wong, GH Guyatt, RS Goldstein, White J. Pulmonary rehabilitation for chronic obstructive pulmonary disease. *The Cochrane Database of Systematic Reviews* 2001, Issue 4. Art. No.: CD003793. DOI: 10.1002/14651858.CD003793.

<http://www.mrw.interscience.wiley.com/cochrane/clsysrev/articles/CD003793/frame.html>

³ Salman GF, Mosier MC, Beasley BW, et al. Rehabilitation for patients with chronic obstructive pulmonary disease: meta-analysis of randomized controlled trials. *J Gen Intern Med* 2003;18:213–221

1.1 ; 95% CI, 0.31-1.90; and 2 trials reported long-term DGRQ data, -5.55; 95% CI, -8.76 to -2.33).⁴

A 2005 systematic review of 6 RCTS including 230 patients looked at whether respiratory rehabilitation after acute exacerbation improves prognosis and health status compared to usual care. It found that Weighted mean differences on the Chronic Respiratory Questionnaire were 1.37 (95% CI 1.13 to 1.61) for the fatigue domain, 1.36 (0.94 to 1.77) for emotional function and 1.88 (1.67 to 2.09) for mastery. Weighted mean differences for the St. Georges Respiratory Questionnaire total score, impacts and activities domains were -11.1 (95% CI -17.1 to -5.2), -17.1 (95% CI -23.6 to -10.7) and -9.9 (95% CI -18.0 to -1.7). FOR HRQL and exercise capacity the effects were well above the threshold for the minimal important difference for the CRQ (0.5 point difference), St. Georges Respiratory Questionnaire (4 points), SF-36 (5points).⁵

A 1999 meta-analysis evaluating the long-term effects of pulmonary rehabilitation in patients with asthma and chronic obstructive pulmonary disease (COPD) using outcome measures of exercise capacity or health related quality of life (HRQL). It found significant improvements for all outcomes ($p < .001$). Sensitivity analyses for methodological quality of the selected studies did not change summary effect sizes. Effect sizes were significantly heterogeneous for the outcome endurance time ($p < .0001$). Pooling raw mean differences revealed overall effects in 6-minute walking distance (49+/-26 m) and all 4 dimensions of the chronic respiratory questionnaire (range, 0.5+/-0.3 to 0.8+/-0.3 points), indicating substantial improvements in these outcomes.⁶

The 1997 joint ACCP/AACVPR evidence based guidelines found that the results of rehabilitation programmes on quality of life were variable, with uncontrolled trials showing a more consistently favourable result. Two of the three randomised, controlled trials using full rehabilitation programmes found improved quality of life using the Chronic Respiratory Disease Questionnaire. The two RCTs demonstrating an improvement in quality of life included 132 patients. The 1st RCT

⁴ Sin DD, McAlister F A, Man S F , Anthonisen N R. Contemporary management of chronic obstructive pulmonary disease: scientific review. JAMA, 2003, 290, 17, p. 2301-12

⁵ Puhan MA, Scharplatz Madlaina, Troosters Thierry & Steurer Johann. Respiratory rehabilitation after acute exacerbation of COPD may reduce risk for readmission and mortality – a systematic review. Respiratory Research, 2005, 6, 1, p54.

⁶ Cambach W, Wagenaar R C, Koelman T W, van Keimpema A R, Kemper H C. The long-term effects of pulmonary rehabilitation in patients with asthma and chronic obstructive pulmonary disease: a research synthesis. Archives of Physical Medicine and Rehabilitation. 1999;**80**(1):103-111. [Links](#)

of 89 patients was followed up after 24 weeks. There were improvements in all four components of CRQ in the rehabilitation group. The 2nd RCT of 43 patients comprised was followed up at 3, 6, 12 and 18 months and improvements in the rehabilitation group were found in fatigue, emotion and mastery⁷

There are several randomised controlled trials that have been conducted and summarised in table 1. Some of the RCTs prior to 2000 will have been included in the Systematic Reviews outlined above.

Table 1

Study	Patients	Intervention/Follow UP	Outcome
Ries-A-L et al, 1995	119 outpatients with chronic obstructive pulmonary disease that was stable while patients received a standard medical regimen	Patients were randomly assigned to either an 8-week comprehensive pulmonary rehabilitation program or to an 8-week education program. Pulmonary rehabilitation consisted of twelve 4-hour sessions that included education, physical and respiratory care instruction, psychosocial support, and supervised exercise training. Monthly reinforcement sessions were held for 1 year. The education group attended four 2-hour sessions that included videotapes, lectures, and discussions but not individual instruction or exercise training. Patients were followed up for 6 years	Compared with education alone, comprehensive pulmonary rehabilitation produced a significantly greater increase in maximal exercise tolerance (+1.5 metabolic equivalents (METS) compared with +0.6 METS (P < 0.001); maximal oxygen uptake, +0.11 L/min compared with +0.03 L/min (P = 0.06)), exercise endurance (+10.5 minutes compared with +1.3 minutes (P < 0.001)), symptoms of perceived breathlessness (score of -1.5 compared with +0.2 (P < 0.001)) and muscle fatigue (score of -1.4 compared with -0.2 (P < 0.01)), shortness of breath (score of -7.0 compared with +0.6 (P < 0.01), and self-efficacy for walking (score of +1.4 compared with +0.1 (P < 0.05)). There were slight but nonsignificant differences in survival (67% compared with 56% (P = 0.32)) and duration of hospital stay (-2.4 days/patient per year compared with +1.3 days/patient per year (P = 0.20)). Measures of

⁷ Ries A L, Carlin B W, Carrieri-Kohlman V, Casaburi R, Celli B R, Emery C F, Hodgkin J E, Mahler D A, Make B, Skolnick J. Pulmonary rehabilitation: joint ACCP/AACVPR evidence-based guidelines. Chest. 1997;**112**(5):1363-1396 <http://www.mrw.interscience.wiley.com/cochrane/cldare/articles/DARE-971397/frame.html>

			lung function, depression, and general quality of life did not differ between groups. Differences tended to diminish after 1 year of follow-up
Troosters-T, 2000	One hundred patients with severe COPD	Patients were randomly assigned to receive either an exercise training program that included cycling, walking, and strength training (n = 50) or usual medical care (n = 50). Thirty-four patients in the training group were evaluated after 6 months (end of training), and 26 were evaluated after 18 months of follow-up. In the control group, 28 patients were evaluated at 6 months and 23 after 18 months	At 6 months, the training group showed improvement in 6-minute walking distance (mean difference (training - control) of 52 m; 95% confidence interval (CI), 15 to 89 m), maximal work load (12 W; 95% CI, 6 to 19 W), maximal oxygen uptake (0.26 liters/min; 95% CI, 0.07 to 0.45 liters/min), quadriceps force (18 Nm; 95% CI, 7 to 29 Nm), inspiratory muscle force (11 cm H ₂ O; 95% CI, 3 to 20 cm H ₂ O), and quality of life (14 points; 95% CI, 6 to 21 points; all P <0.05). At 18 months all these differences persisted (P <0.05), except for inspiratory muscle strength. For 6-minute walking distance and quality of life, the differences between the training group and controls at 18 months exceeded the minimal clinically-important difference.
Cambach-W, 1997	99 patients asthmatic patients and patients with chronic obstructive pulmonary disease (COPD)	3 month rehabilitation programme including drug treatment, and a 3 month control period of drug treatment only. QOL was evaluated by means of the Chronic Respiratory Disease Questionnaire (CRDQ)	After 3 months, the patients who started with rehabilitation showed significant improvements in endurance time (421 s) and cardiac frequency (6 beats.min ⁻¹) during cycling, walking distance (39 m), and total CRDQ score (17 points) compared to the control group. These improvements were still significant after 6 months
Goldstein et al 1994	89 subjects (44 men, 45 women) aged 66 (SD 7) years with severe but stable chronic obstructive	The treatment group were rehabilitated as inpatients for 8 weeks and supervised as outpatients for 16 weeks. Exercise tolerance and quality of life were measured at baseline	There were significant differences in questionnaire assessment of dyspnoea (p=0.0061), emotional function (p=0.0150), mastery (p=0.0002), and dyspnoea index (p=0.0053). Improvements in exercise

	pulmonary disease who received rehabilitation or conventional community care.	and repeated at 12, 18 and 24 weeks	tolerance and quality of life can be achieved and sustained for 6 months in patients undergoing respiratory rehabilitation compared with those receiving conventional care
Finnerty-J-P et al 2001	65 patients with COPD (44 men and 21 women; mean age, 69.5 years (SD, 9.2 years)	The active group (n = 36) took part in a 6-week program of education (2 h weekly) and exercise (1 h weekly). The control group (n = 29) were reviewed routinely as medical outpatients. Patients were assessed using the St. George's Respiratory Questionnaire (SGRQ) which measures health-related quality of life.	The SGRQ in the active group was 59.9 (SE, 2.0) at study entry (n = 36), 47.4 (SE, 2.3) at 12 weeks (n = 32), and 50.6 (SE, 2.5) at 24 weeks (n = 24). The SGRQ in the control group was 59.3 (SE, 2.5) at study entry and did not change significantly over 24 weeks. There was a difference of 10.4 points (confidence interval (CI), 3.6 to 17.3) between the two groups at 12 weeks (p < 0.001) and of 8.1 points (CI, 1.4 to 14.9) at 24 weeks (p = 0.02) in favor of the active group.
Güell-R et al. 2000	Sixty patients with moderate to severe COPD (age 65 +/- 7 years; FEV (1) 35 +/- 14%) were recruited	Thirty patients randomized to rehabilitation received 3 months of outpatient breathing retraining and chest physiotherapy, 3 months of daily supervised exercise, and 6 months of weekly supervised breathing exercises. Thirty patients randomized to the control group received standard care.	We found significant differences between groups in perception of dyspnea (p < 0.0001), in 6-min walking test distance (p < 0.0001), and in day-to-day dyspnea, fatigue, and emotional function measured by the Chronic Respiratory Questionnaire (p < 0. 01) . The improvements were evident at the third month and continued with somewhat diminished magnitude in the second year of follow-up. The PR group experienced a significant (p < 0.0001) reduction in exacerbations, but not the number of hospitalizations. The number of patients needed to treat to achieve significant benefit in health-related quality of life for a 2-year period was approximately three
Engström-C-P. 1999	Fifty patients with severe COPD	Patients were randomized to a rehabilitation group and a control group. The rehabilitation	Quality of life measurements showed minor beneficial effects on the Sickness Impact Profile,

		group took part in an individualized multidisciplinary, outpatient 12-month rehabilitation programme. Exercise training was intensive during the first 6 weeks and was then gradually replaced by an individual home-training programme and booster sessions. Controls received the usual outpatient care.	indicating a higher level of activity. No effect was seen on the St George's Respiratory Questionnaire or the Mood Adjective Check List.
Norweg et al. 2005	43 outpatients with COPD	Patients were randomized to one of three treatment groups: exercise training alone, exercise training plus activity training, and exercise training plus a lecture series. The mean treatment period was 10 weeks	Benefits of activity training combined with exercise included less dyspnea ($p < \text{or} = 0.04$) and fatigue ($p < \text{or} = 0.01$), and increased activity involvement ($p < \text{or} = 0.02$) and total functional status ($p < \text{or} = 0.02$) in the short term compared to comparison treatment groups for comparatively older participants. Compared to the lecture series adjunct, the activity training adjunct resulted in significantly higher gains in total quality of life ($p = 0.04$) maintained at 24 weeks. Significantly worse emotional function and functional status resulted from the lecture series adjunct in the oldest participants ($p < \text{or} = 0.03$). Treatment groups did not differ significantly on exercise tolerance or self-efficacy
Man-W-D-C 2004	42 patients admitted with an acute exacerbation of COPD	An eight week, pulmonary rehabilitation programme for outpatients, started within 10 days of hospital discharge, or usual care	Early pulmonary rehabilitation, compared with usual care, led to significant improvements in median incremental shuttle walk distance (60 metres, 95% confidence interval 26.6 metres to 93.4 metres, $P = 0.0002$), mean SGRQ total score (-12.7, -5.0 to -20.3, $P = 0.002$), all four domains of the CRQ (dyspnoea 5.5, 2.0 to 9.0, $P = 0.003$; fatigue 5.3, 1.9 to 8.8, $P = 0.004$; emotion 8.7, 2.4 to 15.0, $P = 0.008$; and

			mastery 7.5, 4.2 to 10.7, P < 0.001), and the mental component score of the SF-36 (20.1, 3.3 to 36.8, P = 0.02). Improvements in the physical component score of the SF-36 did not reach significance (10.6, -0.3 to 21.6, P = 0.057)
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