

## Effective pulmonary rehabilitation in primary health care with minimal resources

Marques A<sup>1,2</sup> (amarques@ua.pt), Rebelo P<sup>1,2</sup>, Paixão C<sup>1,2</sup>, Cruz J<sup>1,3</sup>, Jácome C<sup>1,4</sup>, Oliveira A<sup>1,2</sup>, Rua M<sup>5</sup>, Loureiro H<sup>2</sup>, Freitas C<sup>4</sup>

<sup>1</sup> Lab 3R – Respiratory Research and Rehabilitation Laboratory, School of Health Sciences, University of Aveiro (ESSUA), Aveiro, Portugal

<sup>2</sup> iBiMED – Institute of Biomedicine, School of Health Sciences, University of Aveiro (ESSUA), Aveiro, Portugal

<sup>3</sup> Centre for Innovative Care and Health Technology (ciTechCare), Polytechnic Institute of Leiria, Leiria, Portugal

<sup>4</sup> CINTESIS –Center for Health Technology and Services Research, Faculty of Medicine, University of Porto, Porto, Portugal

<sup>5</sup> Research Centre on Didactics and Technology in the Education of Trainers - CIDTFF - Aveiro (Portugal)

**Background:** Pulmonary rehabilitation (PR) is a cornerstone intervention for the management of chronic respiratory diseases (CRD). However, it is underutilised and highly inaccessible to patients as most PR programmes are directed to patients with advanced disease and/or held on a hospital basis. Recognising the urgent need to increase access to this intervention, the Portuguese National Health Service has determined that until the end of 2017, all Agrupamentos de Centros de Saúde should provide access to PR.

**Aims:** To assess the effects of PR conducted in primary health care centres (PHCC), with minimal resources.

**Methods:** A quasi-experimental pre-post study was conducted. Eligible patients with CRD were identified and referred by family doctors. Patients enrolled in a 12-week PR programme implemented with minimal resources (pulse oximeters, blood pressure monitors, modified Borg scales, chairs, stairs, corridors, free weights built with bottles with sand, resistance bands and cushions), composed of exercise training twice a week, and education and psychosocial support once every other week. Outcome measures used to assess effectiveness of the programme were collected pre/post PR. Dyspnoea during activities was collected with the modified medical research council–dyspnoea scale (mMRC); peripheral muscle strength in the upper limbs with a handgrip, in the lower limbs – quadriceps muscle strength (QMS), with the handheld dynamometry and respiratory muscle strength with maximal inspiratory and expiratory pressures (MIP/MEP); functionality with 1-minute sit-to-stand (1-min STS), exercise tolerance with the six-minute walk test (6MWT), functional balance with the Brief-BESTest and health-related quality of life with the Saint George's Respiratory Questionnaire (SGRQ). Pre/post differences and effect sizes (ES) were calculated. For the measures with an established minimal clinical important difference (MCID), an analysis of the number of patients improving above that value was conducted.

**Results:** Eighteen patients (68.6±1.9 years old; 11(61.1%) female; FEV1pp=70.2±4.9), with chronic obstructive pulmonary disease (n=6), asthma (n=8), Asthma-COPD Overlap Syndrome (n=3) and pulmonary fibrosis (n=1) participated. After PR, significant improvements were observed in all measures (Table 1). Concerning the MCID, 10(55.6%) improved above the established 1 point in the mMRC, 14(77.8%) patients above the 3 repetitions in the 1min-STS;

15(83.3%) patients above the 25m in the 6MWT, 7(38.9%) patients above the 4.9 points in the Brief BESTest and 11(61.1%) patients above the 4 points in SGRQ.

**Table 1.** Results from pulmonary rehabilitation (n=18).

Measurements	Pre-PR	Post-PR	p	ES
mMRC M[IQ]	2[1-2]	1[1-2]	0.003	0.81
Handgrip strength(kg)	25±7.7	28.8±7	0.002	0.53
QMS (kgf)	25.9±8	32.4±6	0.0001	0.92
MIP (cmH <sub>2</sub> O)	66.2±26.8	75.3±19	0.036	0.39
MEP (cmH <sub>2</sub> O)	99.4±38.7	107.7±36	0.028	0.39
1-minSTS (repetitions)	24±9	32±12	0.001	0.78
6MWT (m)	360.5±80.6	435.4±89.7	0.0001	0.88
Brief BESTest	16±5.3	20±3.5	0.0001	0.89
SGRQ	48±14.6	38.8±11	0.008	0.71

Values are presented as mean±standard deviation or median [interquartile range].

Legend: maximal inspiratory and expiratory pressures (MIP/MEP); *modified medical research council–dyspnoea* (mMRC); Pulmonary Rehabilitation (PR); quadriceps muscle strength (QMS); Saint George Respiratory Questionnaire (SGRQ); 1-minute sit to stand (1-minSTS), 6 minutes' walk test (6MWT), . Significant values  $p < 0.05$ . Effects sizes (ES) small ( $\geq 0.2$ ), medium ( $\geq 0.5$ ) and large ( $\geq 0.8$ ).

**Conclusions:** Even with minimal resources, PR is feasible and possible to implement in PHCC, providing similar benefits to those well-established for PR programmes carried out in hospital outpatient settings.

**Key-words:** pulmonary rehabilitation; primary health care; minimal resources

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