

Walking towards personalized medicine in pulmonary rehabilitation: Comorbidities and COPD

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Introduction

Chronic obstructive pulmonary disease (COPD) is a complex syndrome defined by the presence of airflow obstruction (forced expiratory volume in 1 second/forced vital capacity < 70% predicted or < lower limit of normal) caused by exposure to noxious particles. The latest international definition acknowledges the influence of co-morbidities on the severity of the disease.¹ These co-morbidities are linked by shared risk factors including older age and smoking, but other extra-pulmonary manifestations such as impaired skeletal muscle function, osteoporosis and cardiovascular disease are associated with physical inactivity and/or systemic inflammation.²

Role of pulmonary rehabilitation

Pulmonary rehabilitation (PR), with aerobic exercise training as an essential component, is known to improve dyspnoea, exercise tolerance and health-related quality of life (HRQOL) by improving the secondary manifestations of the disease such as impaired skeletal muscle function and mood disturbance. Despite the positive effects of PR for individuals with COPD there are still challenges in under referral by clinicians and non-acceptance or dropout by patients. A large recent national audit of PR in COPD in the United Kingdom reported only 42% of patients who attend a PR assessment complete PR.³ Would retention in PR improve if the components were further ‘personalized’?

Co-morbidities and pulmonary rehabilitation

Patients with COPD often have at least one co-morbidity⁴ typically associated with worsening

symptoms, exercise tolerance, quality of life and prognosis. The management of the multi-morbid person is further complicated by the negative effects of polypharmacy.

Despite this, patients with co-morbidities gain benefit from pulmonary rehabilitation.⁵ Vanfleteren et al. described different phenotypes of the COPD population by co-morbidities using cluster analysis⁴ and the response to PR was similar in terms of the standard outcomes from PR (exercise tolerance and HRQOL).⁶

It was established early in the history of PR that the improvement in symptoms occurred without any effect on the primary organ impairment.⁷ However, is it time to explore the effects on cardiovascular risk, obesity and metabolic syndrome for example?

Series outline

This series aims to explore how we can further personalize the process of PR, to learn from other disease areas, to provide some suggestions to the problems commonly faced in clinical practice and to highlight where there are research gaps.

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Should some of the specific components of PR be targeted to specific phenotypes based on co-morbidities, could some of the information and education be adapted or personalized, and are other outcomes such as cardio-metabolic risk needed as outcome measures for certain patients? Should we start to divide the outcome of PR into ‘symptoms and risk reduction’ similar to the new Global Initiative for Obstructive Lung Disease stratification for COPD?

Do the desired outcomes of PR alter across the disease severity spectrum? Cardiovascular risk reduction in early COPD might be more relevant and achievable when symptoms are mild; it is known that cardiovascular disease is a common cause of death in mild to moderate disease.⁸ The first paper in this series by Vanfleteren et al. will cover if there are lessons to be shared from the established model of cardiac rehabilitation.

On the other end of the spectrum, many patients with advanced disease, multi-morbidity and frailty are referred for PR. How can we help assess and support the frail person? Do they still gain benefit? Our second paper by Brooks et al. will provide an overview of this challenging topic.

How do we approach the complex patient with mood disturbance or cognitive impairment? These may be barriers to acceptance of the referral, uptake of the assessment and retention to the programme. How can we personalize the approach for these individuals to improve the experience and outcome? The third paper in this series by Meek et al. will discuss these two difficult but common clinical problems.

Although cachexia is associated with a worse outcome in COPD, over half of a PR population are overweight or obese.⁹ There is a complex interplay between COPD/airflow obstruction, obesity, metabolic syndrome and diabetes. Physical activity programmes have successfully reduced the incidence of diabetes.¹⁰ Our last paper in the series will highlight what we can learn from effective physical activity interventions regarding metabolic risk to inform what we might be able to apply to PR?

By the end of this series, we hope to be ‘walking towards’ a more personalized process of PR, including the assessment, the individual components and outcomes, to improve the uptake, adherence and effectiveness of this valuable therapeutic intervention for more patients with COPD.

Declaration of Conflicting Interests

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Reference

1. Vestbo J, Hurd SS, Agusti AG, et al. Global strategy for the diagnosis, management, and prevention of chronic obstructive pulmonary disease: GOLD executive summary. *Am J Respir Crit Care Med* 2013;187(4): 347–65.
2. Barnes PJ and Celli BR. Systemic manifestations and comorbidities of COPD. *Eur Respir J* 2009 May; 33(5): 1165–1185.
3. National UK COPD audit: Pulmonary Rehabilitation. British Thoracic Society 2016 February 1. Available from: <https://www.rcplondon.ac.uk/projects/outputs/pulmonary-rehabilitation-steps-breathe-better> (accessed 26 April 2016).
4. Vanfleteren LE, Spruit MA, Groenen M, et al. Clusters of comorbidities based on validated objective measurements and systemic inflammation in patients with chronic obstructive pulmonary disease. *Am J Respir Crit Care Med* 2013; 187(7): 728–735.
5. Crisafulli E, Costi S, Luppi F, et al. Role of comorbidities in a cohort of patients with COPD undergoing pulmonary rehabilitation. *Thorax* 2008; 63(6): 487–492.
6. Mesquita R, Vanfleteren LE, Franssen FM, et al. Objectively identified comorbidities in COPD: impact on pulmonary rehabilitation outcomes. *Eur Respir J* 2015; 46(2): 545–548.
7. Goldstein RS, Gort EH, Stubbing D, et al. Randomised controlled trial of respiratory rehabilitation. *Lancet* 1994; 344(8934): 1394–1397.
8. Sin DD, Anthonisen NR, Soriano JB, et al. Mortality in COPD: Role of comorbidities. *Eur Respir J* 2006; 28(6): 1245–1257.
9. Greening NJ, Evans RA, Williams JE, Green RH, Singh SJ and Steiner MC. Does body mass index influence the outcomes of a Waking-based pulmonary rehabilitation programme in COPD? *Chron Respir Dis* 2012; 9(2): 99–106.
10. The Diabetes Prevention Program Research Group. Reduction in the incidence of type 2 diabetes with lifestyle intervention or metformin. *N Engl J Med* 2002; 346: 393–403.