

Project Code	Project Title		
HS-14-41	Novel methods for identifying the disease modifying potential of pulmonary rehabilitation in chronic obstructive pulmonary disease		
Applicant	Cost	Institution	Duration
Arwel Wyn Jones	£65,988	Aberystwyth University	36
Lay summary			
<p>Chronic Obstructive Pulmonary Disease (COPD) is a progressive debilitating condition caused mainly by smoking and is now the third largest cause of death worldwide. It is also the second most common reason for hospital admission in the UK, costing the NHS over £1 billion each year in direct costs alone. Pulmonary rehabilitation (PR) is a programme of supervised core aerobic exercise and patient education over 6-12 weeks. It is one of the most effective and cost-effective interventions for COPD by reducing time in hospital, increasing exercise capacity, independence and improving quality of life. However, there are urgent calls from the Welsh Assembly, Lung Charities (British Lung Foundation) and the Welsh and British Thoracic Societies to better understand why not all people with COPD benefit from PR and why and how quickly the positive gains fade over time. As our burden of COPD increases, through an ageing population and limited NHS resources, more work is needed to predict PR responders, provide better support for more vulnerable PR participants, optimise the exercise regimes and determine the optimal duration of PR. Our published studies in the last 5 years, show novel technologies (e.g. Fourier Transform InfraRed Spectroscopy and Mass Spectroscopy) developed in our University can distinguish sputum samples from people with COPD from healthy controls and lung cancer patients. Now we want to apply a greater array of these same technologies to blood biomarkers (metabolites, proteins) of people enrolled in PR and relate these measurements with clinical outcomes. We will better understand why patients respond differently to PR and simultaneously compare responses to two established PR programmes in Wales, of different duration. These results will identify specific biological responses to exercise in those suffering with chronic lung disease and could help tailor PR programmes for maximum and maintained gains in the future.</p>			
Policy Relevance			
Chronic conditions management <input type="checkbox"/>			
Service organisation and delivery			
<p>Wales faces a serious challenge of an increasing older population with greater health inequalities, reduced NHS resources with a higher than UK average prevalence of chronic diseases. Research is required urgently for better management of chronic conditions to achieve sustainable health and social care in Wales.</p> <p>COPD is a preventable and treatable but progressive, chronic inflammatory lung condition affecting many other parts of the body. Population surveys suggest up 3.5 million people have symptoms of COPD but only 1.2 million are registered (the 'Missing Millions' – British Lung Foundation 2010). In 2009, COPD had direct UK healthcare costs of £810-£930M per annum, of which £700M was spent on hospitalisations. Indirect costs of COPD are massive, approximating to 24 million lost working days per annum.</p> <p>Pulmonary rehabilitation (PR) helps to prevent and/or manage many of the debilitating effects of COPD for an individual and saves the NHS around £700 for every patient enrolled (Griffiths, 2000) so is recommended in all National and International Guidelines for COPD. By using new technologies to maximise PR, this</p>			

research aligns with the Integrated Model and Framework for Action for Chronic Conditions in Wales to “improve health interventions and promote holistic management and design of graduated and integrated services involving a multidisciplinary team to provide evidence based care pathways.” The proposed research conforms to the Welsh Government objectives of “Healthy lifestyles/Healthy aging” for better design of services to ultimately limit the progression and maintain quality of life of those members of our community living and dying with one of our most common chronic conditions.

This project adopts the philosophy of the Welsh document ‘Together for Health’ by helping develop “robust evidence on currently available cost effective treatments and optimise the efficacy of these resources to ensure the best outcomes for patients and service users.”

### **Need and impact**

COPD results in a major societal and economic burden. The UK Database of Uncertainties about the Effects of Treatments (UK DUETs) of the National Institute of Health and Care Excellence (NICE) have published specific recommendations (based on systematic reviews of the evidence base, Beauchamp et al., 2011; Kruis et al., 2013) for further research in integrated disease management interventions for COPD1 and an investigation of the optimal duration of PR2 for individuals with COPD.

Current PR programmes are integral for people with COPD as it is based on robust, Grade A evidence. For example, the estimated health care costs per patient decrease by more than 50% following PR. Rising demands in prescriptions and elevations in ineffective treatment options (e.g. steroids or antibiotics in antimicrobial resistance) warrant further use of these proven interventions such as multidisciplinary PR that target the multi-systemic illness of COPD. Despite this strong evidence, PR remains patchy and inconsistent in Wales, often with long waiting lists even where it is offered regularly. This partly reflects some unanswered scientific questions about how best to structure PR for more efficient delivery (e.g. optimise impact, reduce cost of provision).

Personalisation of PR should allow better disease-modifying potential. Using new (and cheap) technologies to identify biomarkers to get better selection of patients, optimise exercise components and duration would make PR much more efficient within a few years.

<http://www.library.nhs.uk/duets/ViewResource.aspx?resID=416711&tabID=297&catID=15581>

<http://www.library.nhs.uk/duets/ViewResource.aspx?resID=411749&tabID=297&catID=15581>