

# European Respiratory Society International Congress best abstract preview from the allied respiratory professionals from assembly 9

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## Introduction

The 28<sup>th</sup> European Respiratory Society (ERS) International Congress [2018] in Paris features interesting research findings within the allied respiratory professional assembly (assembly 9). Excellent and high ranked abstracts were selected for this year's ERS International Congress preview of assembly 9 and are put in the spotlights. A summary of the best three abstracts of every group, i.e., lung function technologists, physiotherapists and nurses, within assembly 9 is presented. Session, timing and location of the presentation of the abstract at this year's ERS International Congress is indicated in squared brackets following the authors' name.

### Group 9.1: lung function technologists

#### *Lung clearance index versus spirometry in children with cystic fibrosis taking lumacaftor/ivacaftor*

There are two common pulmonary function tests to measure the lung function of the paediatric population who live with cystic fibrosis (CF); spirometry and multiple breath washout (MBW). MBW is able to present multiple different measures of lung efficiency and disease severity, the lung clearance index (LCI) has become the most used measure derived from MBW (1). The MBW tends to be a preferable measure for the paediatric CF population; tidal volume breathing makes it feasible to perform, the gasses

inhaled are inert, and the gasses used do not participate in any gas exchange within the lungs (2). LCI has been shown in studies to be a more sensitive measurement for paediatric CF than spirometry alone (3). The data being presented by Mulligan *et al.* (Sunday 16 September, 08:30–10:30 AM, Room 7.3P) is consistent with previous studies in sensitivity changes between spirometry and LCI, as seen pre and post lumacaftor/ivacaftor delivery (*Table 1*).

There is a large utility for LCI in the paediatric CF population when combined with spirometry (4). Clinically LCI is important to assess the need for treatment, the severity of disease, and outcomes of therapies. In a research context, LCI should be included in study design for safety, especially in research that involves CF populations. While the importance of forced expiratory volume at one second (FEV<sub>1</sub>) should not be dismissed, LCI is more sensitive and helps to complete the diagnostic picture.

#### *Development and pilot evaluation of a quality grading system for paediatric spirometry*

ATS/ERS has established standard spirometry guidelines for adult populations for years now, but paediatric patients present different challenges that have made this form of standardization slower to progress (5). Understanding the need to start this process, Perrem *et al.* (Tuesday 18 September, 10:45 AM–12:45 PM, Room 7.3B) have set out to independently begin creating a model to grade paediatric

**Table 1** Effect of lumacaftor/ivacaftor intervention

Lumacaftor/ivacaftor intervention	Pre-lumacaftor/ivacaftor	Post-lumacaftor/ivacaftor
LCI, median (range)	11.25 (7.41–14.33)	8.32 (7.73–13.45)
ppFEV <sub>1</sub> (%), median (range)	82.5 (49.5–103.0)	86.8 (48.5–106.5)
LCI, mean ± SD	11.14±2.30	9.41±2.35
ppFEV <sub>1</sub> (%), mean ± SD	79.6±17.4	81.1±21.6

LCI, lung clearance index; pp, percent predicted; FEV<sub>1</sub>, forced expired volume at one second; SD, standard deviation.

spirometry; forced vital capacity (FVC) and FEV<sub>1</sub>.

The creation of a standard grading system is needed and important for the paediatric population. We know this already increases the quality and consistency of testing individually and between technologist, laboratories, and equipment manufacturers (6). Clinically, having standards to adhere to may have a direct impact on the quality interpretation. Without standards to address acceptability and repeatability before interpretation, quality, accuracy, and precision are sacrificed. The same impact should be simulated in research; quality and standardization of testing is paramount to facilitate a consistent evaluation of subject data. Criteria was generated after careful literature review in addition to expert opinion, FEV<sub>1</sub> and FVC were both graded. Perrem *et al.* were able to maintain a high level of repeatability, acceptability, and agreement (91% for FEV<sub>1</sub> and 81% for FVC) in review between pulmonologist, respiratory scientists, and technologists. It is important to note that if disagreement existed between reviewers that the most experienced technologist was used as the “gold standard”. This is a very exciting start for a paediatric spirometry quality grading system and standardization, further research should be encouraged to help continue this important development.

#### *The impact of a new reference value set for diffusing capacity for patients with idiopathic pulmonary fibrosis*

The Global Lung Function Initiative (GLI) has created new reference values (7). The change of reference values from the 1993 coal reference values (8) to the GLI reference values cannot be taken lightly, as this impacts interpretation of new results and comparison to historical values. Wapenaar-De Korver *et al.* (Tuesday 18 September, 10:45 AM –12.45 PM, Room 7.3B) have taken an important step for us to understand how this change can impact TLCO interpretation and research inclusion in idiopathic pulmonary fibrosis (IPF) patients. GLI reference values

for TLCO are new and aim to provide a better reference set to be used in clinical practice, with data inclusion from 19 centres across 14 countries it seems that there is an all-age reference set (7). Lung function is a critical part of evaluating the respiratory system, thus having a standard set of reference values will aid in diagnosis of disease and health. Results show a slight increase in TLCO across 145 patients, based on using the GLI reference values for TLCO the researchers noted 96 patients would be eligible using European Community for Steel and Coal (ECSC) reference values and 104 using GLI. While slight, the increase should be noted in both clinical and research environments. Clinically pulmonary groups should be careful not to make decisions on small improvements for the IPF patient, a change in reference value can be the only reason an improvement is seen versus an improvement in condition. Special care should be taken to communicate these important changes to physician groups to avoid miss interpretation. IPF has no current cure, creating opportunity for research and inclusion. When selecting reference values researchers should take note of the slight potential increase in inclusion if a DLCO ≥30% is used as criteria. While a slight increase in patients may be seen as small in a pharmaceutical study, it may actually be a very significant improvement when considering the severity and cost of researching new treatments for IPF.

#### **Group 9.2: physiotherapists**

##### *Effects of a home-based rehabilitation programme in patients at active treatment for inoperable lung cancer*

Lung cancer is among the most prevalent cancers and a major cause of cancer mortality worldwide (9). Non-small cell lung cancer (NSCLC) accounts for 80% of all lung cancers (10) and due to a lack of early specific symptoms, patients are often diagnosed at an advanced stage and present with inoperable disease (11). Therefore, prolonging

life and/or improving health-related quality of life (HRQoL) of these patients are the main goals of cancer treatment. Exercise interventions have been shown to prevent deterioration in physical status, improve exercise capacity and muscle strength, reduce fatigue and enhance HRQoL in patients with advanced cancer (12). In advanced NSCLC, there is still a limited number of randomised controlled trials (RCT) assessing the impact of exercise interventions and most of them are hospital-based (12). Although the ideal setting to implement exercise interventions in NSCLC is still under debate (13), home-based interventions have the potential to reduce patient burden associated with travel, improve patients' adherence to the intervention and promote long-term behaviour change (14). Edbrooke *et al.* (Wednesday 19 September, 08:30–10:30 AM, Room 7.30) conducted a multicentre RCT which investigated the efficacy of a home-based multidisciplinary exercise and supportive care intervention versus standard care in patients starting active treatment for inoperable NSCLC. Patients in the experimental group (EG, n=45) received 8 weeks of aerobic and resistance exercise, behaviour change and symptom management telephone support, in addition to standard care. The control group (CG, n=47) received standard care only which did not include any form of exercise training. The study protocol is described in detail elsewhere (15). Patients were assessed at 9 weeks (post-intervention) and 6 months (follow-up). No significant between-group differences were found in physical function outcomes [6MWD (primary outcome), muscle strength and PA], which suggests that a home-based exercise intervention does not provide additional benefit to physical status compared to usual care in patients starting active treatment for inoperable NSCLC. While this is a disappointing finding, significant improvements were found in HRQoL ( $P=0.005$ ), symptom severity ( $P=0.001$ ) and exercise motivation ( $P=0.04$ ) in the EG at 6-month follow-up. The fact that the intervention led to a decrease in symptom severity and an increase in HRQoL is an important outcome, since the usual pattern seen in patients living with advanced cancer is an increase in symptom burden which greatly interferes with patients' HRQoL (11). Moreover, exercise motivation was significantly improved in the EG at follow-up. High exercise motivation was recently identified as one of the most prominent predictors of adherence to exercise-based interventions in patients with cancer (14). This finding suggests that the home-based exercise intervention implemented by Edbrooke *et al.* may help patients being more physically active in

the long-term.

***Impact of a web-based physical activity enhancing intervention during pulmonary rehabilitation in COPD***

Physical activity, which includes physical exercise, is reduced in patients with chronic obstructive pulmonary disease (COPD) when compared to healthy individuals (16). Low levels of PA have been associated with poor outcomes, including increased risk of exacerbations (17), hospital admissions and mortality (18). Thus, increasing patients' PA levels has been identified as a priority for researchers and clinicians worldwide (19,20). Pulmonary rehabilitation (PR) is the cornerstone of COPD management with worldwide known benefits on patients' exercise capacity and HRQoL (21). As such, and because it includes components of exercise training, education and behaviour change, it would be expected to have a positive effect on patients' PA behaviour (19,21). However, studies assessing the impact of PR on PA have shown that an increase in exercise capacity does not necessarily translate into meaningful improvements in patients' PA (22). Alternative methods to produce PA behaviour change are therefore needed. A recent systematic review on interventions aiming at increasing PA in patients with COPD has found that interventions including PA counselling and coaching, especially if combined with exercise training, are promising and should be further explored (22). Mantoani *et al.* (Monday 17 September, 08:30–10:30 AM, Terminal 7) investigated the impact of a web-based PA enhancing intervention on PA levels of patients attending a 12-week PR programme. Patients with COPD were randomised to either receive a PA enhancing intervention during PR (experimental group, EG=22) or PR alone (control group, CG=22). The PA enhancing intervention consisted of a web-based PA human coaching with weekly individualised targets and objective feedback on patients' PA measured by an activity monitor (TracmorD, Philips). Patients were assessed at baseline and after 3 months. Findings suggest that the web-based PA enhancing intervention is effective in enhancing patients' PA levels during PR when compared to PR alone ( $1,251\pm 2,408$  vs.  $-410\pm 1,118$  steps/day, respectively). The authors also found significant improvements (favouring the EG) in patients' exercise capacity, quadriceps muscle strength, symptoms of anxiety and depression, and HRQoL, which further supports the idea that a more active lifestyle may translate into health benefits for these patients. These are exciting findings which may guide future interventions on PA promotion in COPD.

Since information and communication technologies are embedded in people's everyday lives, the use of e-health interventions (e.g., websites) for PA promotion offer the opportunity to deliver personalised coaching to patients with limited healthcare resource use, facilitate self-management and reach a large proportion of people thereby reducing access disparities (23). Further research with follow-up assessments is needed to support these findings and assess the long-term impact of this web-based PA enhancing intervention in COPD, since maintenance of PA behaviour is a major challenge (24).

### ***Predictors of patients' completion or response to a 12-month physical activity intervention in COPD***

Previous research has shown that, as a complex behaviour, PA is influenced by a combination of factors including individual characteristics, disease-specific factors, psychosocial and environmental factors (19,20,25,26), that may act as barriers or facilitators. However, the extent to which these factors determine long-term maintenance of PA behaviour [which may be different from those involved in behaviour initiation (27)] remains understudied. The study of Koreny *et al.* (Monday 17 September, 08:30–10:30 AM, Terminal 7) aimed to identify baseline predictors of 12-month completion or response to a PA enhancing intervention in patients with COPD, using logistic multivariable regressions. The authors identified 'completers' (i.e., patients attending the final visit) and 'responders' (i.e., patients who increased  $\geq 600$  steps/day after 12 months when compared to baseline, measured by an accelerometer) of the intervention arm of the Urban Training study (NCT01897298) and investigated the factors that predicted patients' completion or response to the intervention. The authors found that 'completers' (n=132/202) were more likely to live with a partner, live in less disadvantaged neighbourhoods and be already physically active at baseline ( $\geq 10,000$  steps/day) than 'non-completers'. From those who completed the study, 36% (n=47) were classified as 'responders'. The odds of being a 'responder' were 2.7 times higher in patients currently working and those with an endocrino-metabolic disease than in 'non-responders'. These findings suggest that although the decline in patients' PA levels over time can be determined, in part, by COPD-related factors [e.g., exercise capacity (28)], they do not seem to play a role in maintaining PA behaviour during a 12-month intervention. Instead, factors related to patients' living

context and comorbidities may be associated with long-term maintenance of active lifestyles. It is important to note that, despite the factors identified in the study of Koreny *et al.* may be regarded as nonmodifiable, they could be used to identify patients with low probability of engaging in and/or maintaining PA behaviour and develop additional strategies to reinforce this behaviour (24). Given the public health importance of promoting the adoption and maintenance of PA by patients with COPD, further research is needed to confirm these findings and identify other factors that may influence patients' PA behaviour in the long-term.

### **Group 9.3: nurses**

#### ***Effectiveness of a hand-held fan for managing dyspnoea in patients with interstitial lung disease***

Interstitial lung disease (ILD) is a diverse group of diseases that cause fibrosis or inflammation of the pulmonary parenchyma. Treatment and prognosis of ILD typically depends on the underlying ILD subtype, highlighting the importance of accurate classification and diagnosis (29). Breathlessness is a debilitating feature of ILD (30). Patients with chronic pulmonary disease are often limited in their activities by respiratory discomfort. Reductions in functional status, quality of life, and disability are frequent consequences of this symptom. Dyspnoea is a term used to characterize a subjective experience of breathing discomfort that consists of qualitatively distinct sensations that vary in intensity. The experience derives from interactions among multiple physiological, psychological, social, and environmental factors, and may induce secondary physiological and behavioural responses (31). Research from Galbraith *et al.* suggests that a hand-held fan that generates airflow over the face can reduce the sensation of breathlessness in patients with advanced respiratory diseases (30). The movement of cool air with a fan has been observed clinically to reduce dyspnoea in respiratory patients. Stimulation of mechanoreceptors of the face or a decrease in the temperature of the facial skin, both of which are mediated through the trigeminal nerve, may alter afferent feedback to the brain and modify the perception of dyspnoea (32). Data from Cassidy *et al.* (Monday 17 September, 8.30–10.30 AM, Room 7.3J) confirms previous findings. A hand-held fan was provided to 30 patients, mean age 68 years, median time from diagnosis was 4 years and feedback was given via a 4-point Likert-scale

questionnaire to rate the frequency of their breathlessness during activities of daily living. All patients agreed/strongly agreed that the fan was effective (100%) and easy-to-use (96.2%), helped improve breathlessness (92%) and relaxation (78.3%), and enabled them to concentrate more on their breathing (91.3%). The authors concluded that healthcare professionals should consider hand-held fans as a practical non-pharmacological option for the management of dyspnoea in ILD patients. From experience in clinical practice, chronic pulmonary patients experiencing an exacerbation often have the need to open windows and for a consistent flow of air in the room. At their homes, patients often use a hand-held fan, ventilation or air conditioner to self-manage their dyspnoea. Breathlessness, however, impedes the performance of daily activities and patients struggle with self-preservation. Instinctively, without suggestion of health care professionals patients use this kind of methods in management of dyspnoea.

#### *The development of an instrument to assess the needs of people with COPD: a Delphi study*

The complexity of COPD can negatively impact the lives of people and compromises their capacity to take care of their needs. Unmet needs can lead to significant morbidity, unpleasant emotional experiences and a poor quality of life (33). Self-management educational interventions are carried out to improve the level of respiratory function and therapeutic adherence, and to reduce the occurrence of exacerbations (34). The complexity of COPD, which results from differences in the evolution of the disease, the various therapeutic approaches, frequent exacerbations, the lack of home-based management of symptoms, and reduced social and family relationships, can have a negative impact on the everyday lives of people with the disease and compromise their capacity to take care of their needs (35). These needs can be defined as being the condition of a person being in demand of some necessary, desirable or valuable action or support to achieve optimal well-being (36). The identification of these needs through qualitative evidence can facilitate the creation of interventions aimed at identifying specific needs and personalising patient care (33). Clari *et al.* (Monday 17 September, 8.30–10.30 AM, Room 7.3J) pointed out that COPD patient-centred self-management interventions firstly have to identify patients' needs to effectively support the patients to positively adapt their health behaviours and develop skills to manage their disease better. To our

knowledge, no tools to measure the needs of people with COPD are present in the literature. The aim was to develop an instrument to assess the needs of people with COPD. Clari *et al.* used a three-round modified Delphi method to develop an instrument to assess the needs of people with COPD. After three rounds, a consensus was reached on a questionnaire consisting of 25 items distributed across four domains: information needs, needs relating to the symptoms of the disease, needs of family and social support, and needs related to the access to care. The authors concluded that the Needs in COPD Assessment questionnaire could be a useful tool to detect the needs of people with COPD. This tool, which covers a variety of domains, could be an easy to use instrument, but a further study is necessary to validate its psychometric properties before it can be implemented in the clinical context.

#### *Health status among adult asthmatics—a population-based study*

Asthma in women is reported to be more severe and associated with higher health care use (37,38). Understanding and using strategies that target this gender-specific difference in disease response and symptom profiles may result in improved asthma-related quality of life and health of asthmatic women (39). However, other factors associated to health have rarely been studied in population-based samples. Data from Stridsman *et al.* (Monday 17 September, 8.30–10.30 AM, Room 7.3J) determined factors associated with generic health in a population-based adult asthma cohort (the OLIN-studies) in 2012–2014, where n=1,425 subjects were invited to a clinical follow-up. N=1,006 subjects participated, of which n=830 had current asthma. Stridsman *et al.* described an association between worse physical and mental health in adult asthmatics and female gender, a higher BMI and health care visits due to respiratory symptoms. Eczema was only associated with worse mental health, and increasing age and blood neutrophils  $\geq 5 \times 10^9/L$  with physical health. In addition, subjects with allergic asthma seem to have a better physical health than those with non-allergic asthma. An important reason to monitor health status is that it predicts health care utilization among patients who have asthma and for this reason it may be a useful method of identifying patients who are at risk of exacerbation (40,41). The results of the present study indeed confirm that female gender is associated with worse asthma control and health status in adult asthmatics. Furthermore, to improve the patient's health status and

prognosis BMI and health care visits due to respiratory symptoms in the last 12 months should also be taken into consideration. The latter factors should be included in clinical assessment of health status. In assessment of mental health consider the presence of eczema and in physical health increasing age and blood neutrophils  $\geq 5 \times 10^9/L$ .

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### Footnote

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