



ERS International Congress 2023: highlights from the Allied Respiratory Professionals Assembly

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Shareable abstract (@ERSpublications)

This article summarises some of the outstanding sessions that were (co)organised by @ERS_Assembly9 (Allied Respiratory Professionals) during #ERSCongress2023 <https://bit.ly/3RdeEF6>

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Abstract

This article summarises some of the outstanding sessions that were (co)organised by the Allied Respiratory Professionals Assembly during the 2023 European Respiratory Society International Congress. Two sessions from each Assembly group are outlined, covering the following topics: Group 9.01 focuses on respiratory physiology techniques, specifically on predicted values and reference equations, device development and novel applications of cardiopulmonary exercise tests; Group 9.02 presents an overview of the talks given at the mini-symposium on exercise training, physical activity and self-management at home and outlines some of the best abstracts in respiratory physiotherapy; Group 9.03 highlights the nursing role in global respiratory health and presents nursing interventions and outcomes; and Group 9.04 provides an overview of the best abstracts and recent advances in behavioural science and health psychology. This Highlights article provides valuable insight into the latest scientific data and emerging areas affecting the clinical practice of Allied Respiratory Professionals.

Introduction

The European Respiratory Society (ERS) International Congress was held in a hybrid format for the second consecutive year (online and in Milan, Italy), bringing together the world's respiratory experts to

TABLE 1 Presentation of the four groups within Assembly 9

Group number	Group name	Interest
9.01	Respiratory function technologists/scientists	Respiratory function diagnostics and therapeutic monitoring Cardiopulmonary exercise testing and functional assessment Respiratory physiology
9.02	Physiotherapists	Respiratory physiotherapy Exercise training, physical activity and pulmonary rehabilitation Measurement and importance of physical performance
9.03	Nurses	Clinical and scientific nursing skills in different settings Self-care and self-management Pulmonary rehabilitation Nursing and digital health
9.04	Psychologists and behavioural scientists	Prevention, detection and treatment of psychological symptoms Behaviour change techniques, self-management and psychosocial interventions

share their knowledge and the latest advances in the respiratory field. In 2023, the congress returned to a 5-day programme and included a wide range of outstanding sessions directed at (but not limited to) the Allied Respiratory Professionals.

Assembly 9 (Allied Respiratory Professionals) comprises four groups, all with their specific interest. The Assembly therefore provides the perfect opportunity to learn from each other with a common aim of achieving better patient health. Table 1 summarises the specific interests of the Assembly groups.

In this article, as in previous years [1–5], each group of Assembly 9 provides a brief overview of some of the most remarkable sessions of the ERS Congress. Early career members from the groups summarise the latest scientific and clinical insights presented in one mini-symposium, four oral presentation sessions and three thematic poster sessions. The two sessions selected by the Respiratory Function Technologists/Scientists Group (9.01) focus on respiratory physiology techniques, specifically on predicted values and reference equations, device development and novel applications of cardiopulmonary exercise tests. The Physiotherapists Group (9.02) presents an overview of the talks given at the mini-symposium on exercise training, physical activity and self-management at home and outlines some of the best abstracts in respiratory physiotherapy. The Nurses Group (9.03) highlights the nursing role in global respiratory health and summarises nursing interventions and outcomes. Finally, the Psychologists and Behavioural Scientists Group (9.04) presents the best abstracts and recent advances in behavioural science and health psychology.

This Highlights article provides the latest scientific and clinical insights gained from each session, with important take-home messages, targeting delegates who were present in the virtual sessions as well as those unable to attend.

Group 9.01: Respiratory function technologists/scientists

Oral presentation: non-volitional assessment and new predictions in respiratory physiology

This oral presentation session explored exciting and novel ways of using and looking at different techniques in respiratory physiology. The session could be divided into four main topics: 1) differences in bronchodilator response (BDR) and predicted values; 2) cardiopulmonary exercise testing (CPET) evaluation; 3) application of forced oscillometry technique; and 4) reference equations and normative factors for oscillometry and exhaled nitric oxide. Below we provide an overview of the presentations covering these topics.

Differences in bronchodilator response and predicted values

The discordance in BDR in patients with asthma and COPD using spirometry and the imaging technique hyperpolarised xenon magnetic resonance imaging can determine the ventilation defect per cent (VDP). Therefore, the forced expiratory volume in 1 s (FEV₁) and VDP complement each other when assessing BDR. In patients with a significant FEV₁ response to bronchodilation, the changes are more likely to originate in the larger conductive airways. In more advanced disease, a significant change in VDP would reflect changes in lung compliance due to dilation of small airways [6]. The effect of the recent change in the ERS/American Thoracic Society (ATS) criteria for the classification of BDR [7] was evaluated by ROKX *et al.* [8]. The authors showed that the 2021 criteria reduced the number of subjects with a significant BDR, and the main differences were seen in men and in patients with lower baseline FEV₁

values. Concerning the newly published Global Lung Function Initiative (GLI) vital capacity predicted values [9], DONOVAN *et al.* [10] showed that using the GLI 2021 reference values tends to worsen disease severity classification in patients with idiopathic pulmonary fibrosis (IPF) and may affect antifibrotic prescription eligibility compared to the GLI 2012 reference values [11].

Cardiopulmonary exercise testing evaluation

In CPET evaluations, two presentations had different approaches. First, SOUREN *et al.* [12] demonstrated that the accuracy error among 15 popular CPET systems during simulated exercise with a metabolic simulator was generally <5% while differing substantially between systems. JAK [13] assessed the carbon dioxide production per unit body weight (V'_{CO_2}) at peak exercise as a parameter for exemplary effort in exercise testing. He used data from 220 patients and determined a cut-off point of $26 \text{ mL}\cdot\text{kg}^{-1}\cdot\text{min}^{-1}$ in V'_{CO_2} , compared to $1.10 \text{ mL}\cdot\text{kg}^{-1}\cdot\text{min}^{-1}$ in respiratory exchange ratio, to yield a more accurate noninvasive assessment of effort in CPET.

Application of forced oscillometry technique

Forced oscillometry technique measurements were a highlight of this session, starting with TOSSAN *et al.* [14], who demonstrated that oscillometry may be more sensitive than spirometry at detecting changes in lung function in IPF prospectively, followed by ALMEIDA *et al.* [15] who demonstrated that forced oscillometry technique is better tolerated by asthma patients in acute episodes, presenting moderate to strong correlations with spirometry parameters. On a more technical note, HOWLETT-FOSTER *et al.* [16] showed that breathing frequency does not significantly affect total airway resistance and reactance measurements in subjects with normal spirometry. However, more studies are needed in patients with obstructive lung disease.

Reference equations and normative factors for oscillometry and exhaled nitric oxide fraction

Finally, in the field of reference equations and normative factors, VENERONI *et al.* [17] presented the reference equations for within-breath oscillometry parameters in adults using lambda-mu-sigma (LMS) models and JACINTO *et al.* [18] demonstrated that weight seems to associate more closely than standing height with increasing exhaled nitric oxide fraction (F_{ENO}) in adult females. The latter warrants further studies on the potential relationship between type-2 inflammation and increased adipose tissue in females. Finally, the negative association with serum cotinine revealed an influence of passive cigarette smoke exposure on F_{ENO} even in nonsmokers.

Take-home messages

- Changing the criteria of BDR may yield different patient classifications. Healthcare professionals should be aware of this!
- Oscillometry and spirometry measure different properties of lung function. Still, they should be interpreted in conjunction, aiming to increase the knowledge of what is happening in the lungs of patients with obstructive lung disease and IPF.
- There is always work being done and to be done when studying reference values and equations in respiratory physiology.

Poster session: cardiopulmonary exercise testing and pulmonary function assessment in pathology and COVID-19

This thematic poster session highlighted recent advances in cardiopulmonary assessments of respiratory conditions. Here we summarise some of the posters focusing on three main themes: 1) novel application of CPET; 2) quality assurance and device development; and 3) post-COVID-19 lung sequelae.

Novel application of cardiopulmonary exercise testing

SHAKESPEARE *et al.* [19] showed that CPET is a useful diagnostic tool for identifying pulmonary hypertension in patients with persistent symptoms 6 months after a pulmonary embolism. Evidence for inefficient ventilation was observed in these patients, who displayed increased minute ventilation (V'_E)/ V'_{CO_2} at the anaerobic threshold and an increased V'_E/V'_{CO_2} slope. The V'_E/V'_{CO_2} slope was able to discriminate between patients with pulmonary hypertension and those with pulmonary disease resulting from their pulmonary embolism (optimal cut-off ≥ 35 with a sensitivity of 69% and specificity of 73%, AUC=0.809, $p=0.002$) [20]. This research can influence future guidelines about the diagnosis of post-pulmonary embolism lung disease, and it is an excellent reminder that parameters beyond oxygen uptake (V'_{O_2}) should be fully explored for their prognostic and diagnostic potential in the management of respiratory disease. CPET was further used by KNOX-BROWN *et al.* [21] to demonstrate the importance of the often-overlooked spirometry parameters forced expiratory flow at 25–75% forced vital capacity ($FEF_{25-75\%}$) and forced expiratory volume in 3 s (FEV_3)/forced vital capacity (FVC). Both $FEF_{25-75\%}$ and FEV_3/FVC

less than lower limit of normal (LLN), in the presence of a $FEV_1/FVC > LLN$, are thought to represent isolated small airway disease. In this study, these features were associated with a reduced breathing reserve at peak exercise, demonstrating the clinical importance of these subtle abnormalities in resting lung function. JAK and BOERRIGTER [22] used a stepwise incremental load CPET protocol to demonstrate the devastating effect of bilateral diaphragm dysfunction on functional capacity, compared to unilateral dysfunction (maximum workload 31% versus 73% predicted, respectively). Finally, HOLSTAD *et al.* [23] presented data on the utility of a treadmill CPET protocol for patients with COPD, observing that 91% of the patients were able to obtain a maximal test according to the ERS criteria [24]. The finding that exercise testing using a treadmill is feasible in a COPD cohort is especially important for centres that do not have access to cycle ergometry.

Quality assurance and device development

A hot topic in physiology laboratories is whether mechanical simulators can replace biological controls in the routine quality assurance protocol of a laboratory. BROEKHUIJSEN-GODDING and SIMONS [25] addressed this issue by comparing the intrasubject variability of mechanical and biological controls and CPET. They demonstrated reduced variability of the measured parameters (V'_{O_2} and V'_{CO_2}) using the metabolic simulator, with mean variances of <2% (compared to <11% for the healthy biological control). Future CPET guidelines should explore whether mechanical simulators are a viable alternative to biological controls in laboratory quality assurance programmes. VAN DER HENGEL and VAN AS-JANSSEN [26] explored the variability of reference equations for maximal oxygen uptake using a patient population based in the Netherlands, speculating that there may be a more suitable reference dataset than the commonly used Wasserman equation [27]. They observed large variability in predicted values when different reference equations were applied, with three equations, including the Wasserman equation [27], showing a reasonable fit in their population. This work reinforces the need for improved, contemporary CPET reference equations, an issue which is currently being addressed by a GLI task force (ERS Task Force TF-2021-09). Finally, the late breaking abstract in this session came from SCHAEFER *et al.* [28], who described a simplified version of the rebreathing paradigm, first described at KU Leuven (Belgium) [29, 30]. Showing good agreement with data from the original device, the simplified version is hypothesised to be of use in unexplained breathlessness, especially post-COVID-19, where the authors speculate there is a relationship between breathing and perception.

Post-COVID-19 lung sequelae

Several studies presented data on the chronic effects of COVID-19 infection, showing poor exercise tolerance [31] and impaired diffusing capacity of the lung for carbon monoxide (D_{LCO}) [32]. The largest longitudinal study was conducted by SUPPINI *et al.* [33], who followed 140 patients for 12 months. At 40 days after the acute illness, the authors described deficits in lung function (lung volumes and gas transfer), with the worst deficits seen in individuals with more extensive changes on chest computed tomography (CT). In particular, the presence of fibrotic lesions on chest CT was associated with impaired D_{LCO} ; when expressed as % predicted, D_{LCO} was approximately 30% lower in those with fibrotic lesions than in those without ($p=0.004$). Encouragingly, improvements in gas transfer and lung volumes were observed during the 1-year follow-up period, although the long-term effects of COVID-19 are yet to be fully elucidated.

Take-home messages

- The V'_E/V'_{CO_2} slope shows promise as a marker of pulmonary hypertension in patients with persistent symptoms 6 months after pulmonary embolism.
- Often overlooked spirometric parameters representing isolated small airway disease are associated with ventilatory exercise limitation.
- Exercise guidelines should consider the role of mechanical simulators in quality assurance programmes.
- Clinically relevant deficits in lung function can persist post-COVID infection. These deficits are worst in those with severe acute disease.

Group 9.02: Physiotherapists

Mini-symposium: exercise training, physical activity and self-management at home

This session addressed three key themes: 1) the challenges of assessing patients for home-based pulmonary rehabilitation (PR); 2) the effectiveness of home-based interventions; and 3) the importance of self-management education for patients with COPD.

Patient and outcome assessment for care and rehabilitation at home

N. Cox (Melbourne, Australia) discussed the challenges of assessing outcomes in patients who are referred to home-based PR programmes. These programmes are conducted in the patient's home, including home visits or telephone support from healthcare providers, and use specialised equipment or tele-rehabilitation technology. Essential outcome assessments are exercise capacity, health-related quality of life (HRQoL) and symptoms experience. In addition, endurance and resistance exercise training need to be prescribed individually [34]. Previous research has shown that home-based PR yields results comparable to centre-based PR concerning functional capacity and HRQoL, while boosting a higher programme completion rate [35–39]. Nevertheless, a significant challenge lies in accurately and safely assessing patients at home, especially when centre-based assessments are unfeasible [40], as occurred during the COVID-19 pandemic. Several remote assessment alternatives were explored, including tests like the 6-min walk test (6MWT), 3-min step test, sit-to-stand tests and modified incremental step tests. These, however, may have limitations in accurately estimating exercise capacity in non-standardised settings and may not comprehensively gauge desaturation levels, thus affecting precise exercise prescription [41]. In conclusion, remote assessments might offer greater comfort for patients and provide reliable data on symptoms, disease burden and HRQoL [42] but may have limited accuracy in assessing exercise capacity, whereas centre-based assessments are more reliable for objective exercise prescription.

Exercise training and physical activity intervention at home

M. Spielmanns (Wald, Switzerland) highlighted the effectiveness of PR and physical activity promotion. These interventions have been demonstrated to improve symptoms (*e.g.* dyspnoea, anxiety and depression) and exercise tolerance, boost HRQoL and, importantly, decrease hospitalisation rates [43]. Various home-based and outpatient interventions were discussed, all rooted in the core components recommended by the ATS/ERS [44], encompassing exercise training, education and self-management. These interventions spanned outpatient PR programmes, community-based initiatives, internet-based exercise regimes, mobile health interventions, tele-rehabilitation and combinations thereof. Specific exercise training recommendations were provided, regardless of the setting. Endurance training options included treadmill continuous walking and cycle-based intervals, adjusted according to the patient's symptoms and tolerance. Resistance training featured various modalities, with an emphasis on intensity and sets based on local muscular exhaustion and patient tolerance [45]. Eligibility for home-based interventions depends on several factors, including access to a telephone and reliable internet connection, ability to exercise safely with minimal supervision, proficiency in operating equipment (digital literacy), adherence to instructions and willingness to undertake the programme [46, 47]. Age, ethnicity, socioeconomic status and digital literacy may also affect patient access to tele-PR [48], as well as the availability of specific equipment at home or at the healthcare facilities and patient education on its usage.

The advantages and disadvantages of home-based PR programmes, with and without technology, were explored. While they offer flexibility, safety and cost-effectiveness, they often lack standardisation and display heterogeneity concerning the delivery platforms, included components, timing, duration and eligibility criteria, which can pose barriers to access. Finally, the impact of mobile health was discussed, and an app-based intervention to promote physical activity in people with COPD after PR was reported [49]. This 6-month programme encompassed video-guided exercise and education on promoting physical activity, self-monitoring through an activity tracker, daily reporting and automated personalised goal setting, all delivered *via* a smartphone app. The intervention succeeded in sustaining physical activity after PR, improving symptoms (dyspnoea, fatigue) and disease burden.

Education, self-management and other components of home-based care and rehabilitation

J. Bourbeau (Montreal, QC, Canada) reviewed the goals of self-management education in patients with COPD, which include optimising and maintaining physical capacity, alleviating daily symptoms, improving HRQoL, enhancing emotional and social wellbeing, and establishing effective communication between healthcare professionals, patients and their families. Patients with COPD often report insufficient education about their disease, treatment options, self-management strategies and the prevention of exacerbations [50]. In this context, self-management interventions may be crucial in helping patients live well with their disease given that they have been shown to reduce the risk of rehospitalisation, lower hospitalisation rates [51, 52] and improve health status, while not raising mortality risk [53]. Integrating self-management interventions into PR entails developing strategies tailored to promote healthy behaviours or behaviour change, with an emphasis on addressing individual patient needs. Education is essential for enhancing patient compliance and assessing the impact of tailored educational activities on disease knowledge, self-management behaviours and clinical outcomes [54]. Health information technology and e-health to support self-management in COPD were also discussed [55–58]. Standalone remote monitoring, with or without remote consultation, has not consistently yielded superior outcomes than usual

care [58]. In addition, physiology telemonitoring without monitoring symptoms has proven ineffective in preventing acute exacerbations [59, 60], while home-telemonitoring of symptoms has shown positive effects in reducing exacerbations and hospitalisations [61]. Patients are generally satisfied with these telemonitoring systems, finding them helpful to manage their condition, although some reported challenges in their usage, potentially affecting compliance rates [62]. A meta-analysis comparing computer/mobile technology to face-to-face self-management interventions among patients with moderate to severe COPD showed higher improvements in symptoms and health status up to 6 months post-intervention. However, a high risk of bias and the poor quality of studies were acknowledged [57]. A meta-review of telehealth interventions for self-management in patients with various chronic diseases, including COPD, also found mixed evidence [63]. Some components of self-management interventions delivered *via* telehealth, such as education, monitoring and feedback, exhibited limited benefits. The role of smartphone apps in promoting physical activity among patients with COPD was also addressed. These apps typically offer a limited number of features to encourage physical activity and tend to focus mostly on monitoring, feedback and offering advice [64]. The delivery of self-management through digital technology raises questions about its limits and effectiveness, especially concerning different disease severities and comorbidities [65].

Take-home messages

- Home-based assessments provide reliable data for patient-reported outcome measures, although they come with challenges in accurately assessing exercise capacity.
- Home-based PR models show promise in enhancing the health of patients with COPD, but their applicability to other respiratory diseases remains less clear.
- Home-based interventions have proven feasibility, safety and success comparable to centre-based interventions. However, further research is required to assess their sustainability and the maintenance of results in the long term.
- While there is evidence supporting self-management interventions, the role of e-health in COPD management remains uncertain.

Oral presentation: best abstracts in respiratory physiotherapy

This overview provides insights into potential interventions to consider and promising adaptations to current interventions to optimise the treatment of patients with chronic respiratory diseases, focused on three main topics: 1) symptoms and exercise assessment; 2) novel insights in PR and exercise training; and 3) other treatment modalities for patients with chronic respiratory diseases.

Symptoms and exercise assessment

Fatigue is, after dyspnoea, the second most common symptom in COPD [66]. The nature of fatigue is expected to be multifactorial [67] but an integrative analysis of potential contributing factors is currently lacking [68]. VAN HERCK *et al.* [69] explained 46.5% of the variance in fatigue and identified dyspnoea, sleep quality, pain and fatigue-related catastrophising as contributing factors of fatigue in COPD, providing potential targets for treatment. A thorough patient assessment is crucial before initiating treatment. The 6MWT is often used to guide oxygen prescription in respiratory diseases [70, 71]. It remains unknown whether the 6MWT detects daily life-induced desaturation in fibrotic interstitial lung disease (ILD). HOFFMAN *et al.* [72] confirmed that the 6MWT accurately identifies people with fibrotic ILD who experience exertional desaturation during daily life, but the extent of desaturation is underestimated (6MWT nadir *versus* daily minimum peripheral oxygen saturation, $82\pm 4\%$ *versus* $75\pm 5\%$, $p < 0.001$).

Novel insights in pulmonary rehabilitation and exercise training

PR has proven its effects after a severe acute exacerbation of COPD [73]. However, the majority of exacerbations do not require hospitalisation. In a randomised controlled trial (RCT), MACHADO *et al.* [74] compared a 3-week home-based PR programme with standard care after a moderate acute exacerbation of COPD, and showed that PR is safe and effective in improving symptoms, muscle strength and functional capacity. Exercise is a crucial component of PR [74]. People with COPD have an altered and slower recovery immediately after aerobic exercise [75]. Baseline data of NYBERG *et al.* [76] in patients with Global Initiative for Chronic Obstructive Lung Disease (GOLD) 3 and 4 showed an altered and slower heart rate and oxygen uptake (V_{O_2}) recovery 1-min post-resistance training, compared with age- and sex-matched controls. After an 8-week low load–high repetitions resistance training programme, patients with COPD showed an improved heart rate and V_{O_2} recovery profile. However, the heart rate recovery kinetics were still not comparable to controls at baseline.

Other treatment modalities for patients with chronic respiratory diseases

Besides PR, other interventions and modalities should be considered in treating patients with chronic respiratory diseases because the referral and access to PR is limited [77, 78]. Core stabilisation might

have positive effects on respiratory parameters [79]. In a pilot RCT in children with cystic fibrosis, KILIÇ *et al.* [80] compared an 8-week core stability programme with physical activity recommendations. Significant improvements in the sniff nasal inspiratory and maximal expiratory pressure were found. Furthermore, PHILIPSEN [81] found a significant positive effect after 1 year on both quality of life and oxygen uptake in adolescents with cystic fibrosis who took the tri-drug treatment elexacaftor/tezacaftor/ivacaftor. Hov *et al.* [82] explored different mechanical insufflation–exsufflation therapy strategies in children with neurodisability. An asymmetric (+ pressure: 25–30 cmH₂O; – pressure: 40 cmH₂O) and personalised strategy resulted in higher comfort scores but lower peak cough flows than a symmetric (+ and – pressure: 50 cmH₂O) strategy. However, all three strategies generated a cough flow above the suggested efficacy threshold (160 L·min⁻¹).

Intrapulmonary percussive ventilation (IPV) is seen as a promising airway clearance technique. Nevertheless, the current evidence to support this treatment is weak [83, 84]. HASSAN *et al.* [85] conducted an RCT comparing IPV (10–15 min, pressure of 10–15 cmH₂O, twice a day) with standard care (respiratory physiotherapy twice a day) in 100 non-ventilated critical care patients. A mean difference of 1.5 days in intensive care unit length of stay in favour of the IPV group was observed.

Dyspnoea is a cardinal symptom in various disease conditions [86]. SCHAEFFER *et al.* [87] explored the effect of a 6-month inspiratory muscle training (IMT) programme in unilateral diaphragm dysfunction, which is an important underdiagnosed cause of dyspnoea [88]. In this RCT, the IMT group (30 breaths at 50% maximal inspiratory pressure, twice per day, monthly progression) showed meaningful improvements in dyspnoea (between-group difference of –3.0 points, 95% CI –5.1– –0.9 points, on the Transitional Dyspnoea Index), exercise endurance time (between-group difference of 6.0 min, 95% CI 0.4–11.5 min) and respiratory muscle function (between-group difference of maximal inspiratory mouth pressure and diaphragm sniff pressure: 28 cmH₂O, 95% CI 13–43 cmH₂O and 12 cmH₂O, 95% CI 0–23 cmH₂O, respectively) compared to the control group. Furthermore, TOPCUOĞLU *et al.* [89] found that diaphragm and accessory respiratory muscle activation measured using surface electromyography was associated with the perception of dyspnoea in people with COPD. The highest respiratory muscle activation was observed in a supine position, while a seated position and a leaning forward position (at a table) presented the lowest values.

Take-home messages

- Dyspnoea, sleep quality, pain and fatigue-related catastrophising are contributing factors of fatigue in patients with COPD.
- 6MWT accurately detects desaturation in daily life but underestimates the extent in fibrotic ILD.
- Home-based PR in COPD patients with moderate exacerbation is safe and effective.
- 60 s of recovery might be suboptimal between sets of resistance training in patients with GOLD 3–4 COPD.
- People with unilateral diaphragm dysfunction benefit from IMT to improve dyspnoea and exercise tolerance.

Group 9.03: Nurses

Oral presentation: nursing role in global respiratory health

In the oral session, “Nursing role in global respiratory health”, aspects were discussed relating to 1) the early recognition of respiratory diseases to access adequate healthcare; 2) advanced interventions and symptom management; and 3) professional communication.

Early recognition of respiratory diseases to access adequate healthcare

Underdiagnosis of COPD is a concerning problem that affects access to proper care. Based on a Swedish epidemiological study, AXELSSON *et al.* [90] suggested that, even though COPD patients often use healthcare services due to respiratory symptoms, case-finding strategies should be based on characteristics associated with underdiagnosis because early recognition of COPD is vital to initiate patient education and treatment to prevent exacerbations and improve health status. The International Coalition of Respiratory Nurses (ICRN) recognises the significant burden of asthma and COPD across all sectors and supports the need to make asthma and COPD a public health priority. ICRN supports the aim of global equity with access to appropriate asthma and COPD diagnosis and care, as presented by SAJNIC *et al.* [91].

Advanced interventions and symptom management

Advanced nursing interventions have been shown to be important in different outcomes for people with respiratory diseases. BROWN *et al.* [92] studied the impact of specialised nursing interventions for 12 months and concluded that adding an ILD advanced nurse practitioner to a busy ILD referral centre facilitated the accommodation of an increased number of referrals and improved patient care and service

metrics. ZRNIĆ *et al.* [93] showed that a specialised asthma nursing team contributed to better asthma control, highlighting interventions on adherence, knowledge and skills. SILVA *et al.* [94], through an RCT of a maintenance PR programme, demonstrated the importance of creating awareness in the patient of the necessary behaviour change and treatment adherence. HESLOP-MARSHALL *et al.* [95] reported that there is no correlation between anxiety symptoms and lung function (FEV₁) or age in patients with COPD, based on a RCT. These findings highlight the need for all patients to be screened and treated for anxiety-related symptoms, regardless of disease severity, because anxiety can negatively impact treatment adherence.

Dyspnoea is a multifactorial and limiting symptom that can be addressed through noninvasive ventilation, which can be used for patients with COPD as a palliative measure, according to a scoping review addressed by STEINDAL *et al.* [96].

Regarding the development and tailoring of interventions for populations experiencing disparities related to low income and racial and ethnic diversity, GEORGE *et al.* [97] presented data that can provide comprehensive implementation metrics to consider when planning trials in safety-net primary care sites. It is essential to develop advanced nursing interventions and research to continue the work that MURRAY *et al.* [98] have been doing by constructing a respiratory nursing curriculum. A scoping review highlights the need for more research to develop an international framework for respiratory nursing education.

Professional communication

Standardised language is key in healthcare professions to assure continuity of care, legal issues, education and research. Recurring to qualitative research, ARRANZ ALONSO *et al.* [99] explored nurses' opinions on standardised language in respiratory nurses in Spain. Their findings reveal that respiratory nurses consider standardising language as an essential element of their profession in the near future.

Take-home messages

- Specialised nursing interventions and efficient communication contribute to optimised self-management of respiratory diseases.
- Disease underdiagnosis is a concerning problem that affects respiratory patients' access to proper care.
- The construction of a respiratory nursing curriculum remains essential to enhance the quality and safety of healthcare for respiratory patients worldwide.

Poster session: nursing interventions and outcomes

This thematic poster session showed multiple studies highlighting nursing interventions and related outcomes, focused on 1) symptom monitoring and nurses' practices; and 2) disease management, service use and patient adherence.

Symptom monitoring and nurses' practices

Respiratory distress is difficult to assess in the paediatric population, with the ODO respiratory scale being a useful tool for patient monitoring [100]. This scale assesses the work of breathing and heart rate, as associated with fatigue and different breathing patterns.

In adults, self-reported outcomes and objective measures evaluating psychological and physical symptoms are important to assess health problems in daily practice and for a real understanding of the patients' perspectives about living with a chronic respiratory disease [101–108].

Lung injury, along with other factors, may predict disability related to longer hospital stays in rib fracture patients [109]. Nurses can have an important role in ensuring a successful hospital discharge. In their qualitative study exploring nurses' efforts and strategies when patients with COPD are discharged from a pulmonary ward, GREGERSEN and SØRENSEN [110] found that “to be co-creating” was the most all-encompassing typology used by nurses and the discharge approach that encourages patient involvement, incorporating a biopsychosocial process [110]. In addition, a partnership-based nursing practice framework [111] may reduce the use of costly healthcare resources [112].

Disease management, service use and patient adherence

Self-management education, discharge planning and effective home-based team management are key factors in enhancing outcomes in patients with chronic respiratory diseases [109–114].

Home-based disease management can reduce readmissions by 52% and 26% in adults, depending on the programme components [113]. In one study, a lung team offered patients with COPD information and

additional attention *via* telephone calls in case of worsening symptoms, acute home visits and supervised home treatment, thereby improving patients' ability to live with the disease [114].

The survival rates of respiratory patients have increased in recent decades due to the use of respiratory devices, such as noninvasive ventilation. Despite this, respiratory devices have certain complications (*e.g.* injuries, discomfort and poor compliance leading to lengthened oxygen therapy) that may affect patients' quality of life, wellbeing and adherence to treatment. Enhancing healthcare professionals' awareness is necessary to implement systematic measures to reduce these complications [115, 116].

In the study of SILVA *et al.* [117], limited availability of PR programmes and the lack of patient adherence to PR were identified by general practitioners as the main barriers for patient referral to PR [117]. A PR programme plus a 9-month home-based maintenance programme that includes a set of behaviour change tools and techniques may contribute to patient motivation and satisfaction, thus supporting patient adherence to long-term behavioural change [118]. Furthermore, to increase access to PR, home-based programmes show encouraging results in functional capacity and long-term physical activity maintenance after 52 weeks when driven by theory [119].

Take-home messages

- To prevent complications and improve the quality of life of respiratory patients, it is important to use self-reported and objective measures.
- Nurses play a significant role in successfully navigating patients through healthcare systems.
- Patient home-based management, in selected patients, may enhance outcomes and produce sustained behavioural change.

Group 9.04: Psychologists and behavioural scientists

Oral presentation: best abstracts in behavioural science and health psychology

This session featured recent discoveries in neural, behavioural and emotional processes involved in symptom management, as well as approaches to treatment for individuals with chronic respiratory diseases. These discoveries have the potential to significantly enhance the care and quality of life of the individuals while also providing valuable insights for ongoing research and healthcare policy development. This section will describe 1) how to deal with dyspnoea; 2) the role of psychosocial factors in treatment management; and 3) integrating personality, affectivity and change using insights from recent studies.

How to deal with dyspnoea

Reducing dyspnoea has become a primary goal emphasised in guidelines for various respiratory disorders, given the well-documented effects of "spiralling dyspnoea" [120]. Effective symptom management requires a better understanding of the processes underlying dyspnoea and how these can be therapeutically modulated to benefit patients. This vital goal is often difficult to achieve. VANDEN BOSSCHE *et al.* [121] aimed to validate a novel paradigm for studying neural gating of respiratory sensations (NGRS) during exercise-induced dyspnoea and observed that dyspnoea intensity and unpleasantness increased with exercise intensity, while NGRS did not exhibit a statistically significant decrease ($p=0.42$). This innovative approach offers enhanced ecological validity to investigate dyspnoea during exercise and can be employed in further research to explore dyspnoea mechanisms in respiratory conditions.

On the same track, recent studies suggest that inhalation of menthol can relieve dyspnoea in patients with COPD [122, 123]. SCHAEFFER *et al.* [124] explored the connection between the relief of dyspnoea with menthol and alterations in the neural processing of respiratory sensations in healthy individuals. Their findings indicated that inhaling menthol may reduce the unpleasantness of dyspnoea in healthy individuals. Specifically, menthol resulted in lower unpleasantness ratings compared to placebo (strawberry) (3.0 ± 1.6 points *versus* 4.4 ± 2.3 points, respectively; $p=0.03$) during loaded breathing trials, exceeding the minimal clinically importance difference of one point between conditions (menthol *versus* placebo).

DENUITE *et al.* [125] demonstrated that patients with COPD display a heightened awareness of errors in a computerised behavioural task compared to healthy controls, as indicated by stronger error positivity amplitudes in their electroencephalogram. However, this increased error awareness did not significantly correlate with their experiences of dyspnoea. This study underscores the need for further research with a larger sample size to validate these findings and draw more comprehensive conclusions.

There is also the question of what physiological circumstances and processes are affected by placebos [126]. In their randomised crossover study involving patients with COPD receiving oxygen therapy or placebo treatment, VOLPATO *et al.* [127] identified the placebo effect because patients who believed they were

receiving oxygen therapy, even when they were not, experienced improved symptoms during the 6MWT. This finding highlights the influential role of patient beliefs and expectations on their healthcare process, although actual oxygen therapy remains crucial for maintaining adequate oxygen levels.

The role of psychosocial factors in treatment management

Psychosocial factors play a key role in the management of several health conditions including COPD [128, 129] and obstructive sleep apnoea (OSA) [130, 131]. GRONHAUG *et al.* [132] demonstrated that using patient-reported outcome measures, like a generic version of the European Organization for Research and Treatment of Cancer-Quality of Life Questionnaire Palliative (EORTC-PAL) questionnaire, in the care of patients with moderate-severe COPD not only improved symptom management and quality of life but also enhanced the identification of individual needs, particularly related to psychosocial issues, fostering open conversations between patients and healthcare professionals. Similarly, the study of KAYE *et al.* [133] investigated the relationship between psychosocial characteristics and the use of continuous positive airway pressure (CPAP) therapy in OSA patients, revealing that greater confidence (OR 2.8, 95% CI 1.6–4.9, *versus* OR 2.1, 95% CI 1.0–4.0); motivation, specifically self-motivation (OR 1.6, 95% CI 1.1–2.2) and the presence of a motivator in females (OR 2.5, 95% CI 1.2–5.1); and symptom improvement (snoring: OR 1.7, 95% CI 1.1–2.5, *versus* OR 1.7, 95% CI 1.2–2.6) are positively associated with short-term CPAP use, with some gender-related variations.

Integrating personality, affectivity and change: insights from recent studies

Although little is known about COPD-related stigma, it can harm patients' quality of life and self-management [134–136]. For this reason, the study of LUNDELL *et al.* [137] investigated the role of varying levels of stigma-related emotions, such as shame and guilt, in patients with COPD. Factors like gender, smoking history, physical activity and GOLD group classification were identified as determinants of these emotions, underscoring the need for tailored healthcare interventions addressing stigma across diverse subgroups.

Given that the impact of various treatments, including PR, can be influenced by both emotional states and personality traits [138], it becomes crucial to investigate the interplay of these factors with the lifestyle choices made by patients. Findings from the study of KUSS *et al.* [139] indicate that a physically inactive lifestyle in individuals with chronic respiratory disease is linked to a more pronounced decline in extraversion and agreeableness within their personality traits. This suggests that interventions promoting physical activity hold promise in preventing non-normative personality changes in individuals with chronic respiratory disease.

Finally, it becomes crucial to structure treatments that contemplate techniques and strategies for patients to better cope with their emotional distress, anxiety and depression. In a study by SINGH *et al.* [140], a virtual group intervention integrating cognitive behavioural, acceptance, commitment and compassion-focused therapy was administered to patients with ILD. The results demonstrated substantial improvements in anxiety/depression scores, EuroQoL-5D activity and overall health status. Patients indicated positive qualitative reactions, strong applicability (8.57 out of 10, with 10 being extremely useful) of the material, and high acceptability of the online format (9.86 out of 10, with 10 being very accessible). This research highlights the feasibility and effectiveness of virtual group psychological interventions for ILD patients while emphasising the importance of follow-up data collection compliance for future studies.

Take-home messages

- New insights into neurological, behavioural and emotional mechanisms may improve the treatment and quality of life of those with chronic respiratory diseases.
- Menthol inhalation and novel paradigms for exercise-induced dyspnoea research offer the potential for better respiratory distress management.
- Identifying patients' beliefs regarding the effects of actual therapy may be important in COPD management.
- Addressing psychosocial factors and tailoring interventions can enhance symptom management and encourage patient–professional communication.
- Promoting physical activity may prevent non-normative personality changes in individuals with chronic respiratory diseases.

Poster session: recent advances in behavioural science in chronic respiratory disease

This poster session focused on recent advances in behavioural science in chronic respiratory diseases, highlighting the crucial role of behavioural factors in understanding and managing chronic respiratory conditions. Four main topics were discussed: 1) psychological insights for personalised interventions;

2) medication adherence among patients with COPD and asthma; 3) smoking cessation challenges; and 4) ongoing impact of COVID-19 on mental health.

Psychological insights for personalised interventions

The psychological wellbeing of individuals with chronic respiratory conditions is crucial for their overall health. FISCHER CHRISTIANSEN *et al.* [141] reviewed 36 qualitative studies, identifying four key themes associated with COPD-related anxiety: 1) initial events, 2) internal factors, 3) external factors and 4) behavioural maintaining factors. They developed a patient-centred model that can potentially improve identification and management of COPD-related anxiety. ARISMENDI *et al.* [142] investigated the differences in the emotional impact of chronic cough between patients with refractory and unexplained chronic cough, finding significantly more negative emotions associated with cough episodes, particularly anger, anxiety and disgust in patients with refractory chronic cough. KWIECIEŃ and DOMAGAŁA-KULAWIK [143] showed differences in relationships between personality traits between obese patients with and without OSA. BENZO *et al.* [144] reanalysed results from a RCT on COPD patients with symptoms of depression, showing promising results for reducing depressive symptoms and improving HRQoL after a home-based rehabilitation programme containing elements of mindfulness-based movement and health coaching.

Medication adherence among patients with COPD and asthma

Medication adherence is a challenge for patients living with COPD and asthma. MUNNS *et al.* [145] revealed that 51% of patients with asthma exhibited suboptimal adherence, with motivation and capability identified as significant barriers to treatment adherence. ACHTERBOSCHM *et al.* [146] found no significant correlation between shared decision-making and medication adherence in patients with COPD and asthma. However, the extent to which collaborative decision-making was implemented remained unclear.

Smoking cessation challenges

Quitting smoking is vital for respiratory health. FARVER-VESTERGAARD *et al.* [147] found that one in every five patients with suspected lung cancer continued to smoke. This underscores the need to offer guidance and support for smoking cessation. HANSEN *et al.* [148] reviewed several brief referral methods for smoking cessation and found that the “Very Brief Advice” method was effective in referral to smoking cessation services, yet its effectiveness on smoking cessation rates remained uncertain. MRASSI *et al.* [149] found that 38% of Tunisian physicians were smoking, and only 41% thought that tobacco control is one of the practice’s priorities while 75% were in favour of banning smoking in public places. Despite a downward trend in smoking habits, there is still much work to be done to educate doctors on their role in tobacco control.

Ongoing impact of COVID-19 on mental health

The COVID-19 pandemic has had a global impact on mental health. VOLPATO *et al.* [150] found increased fear and anxiety in severe COVID-19 inpatients undergoing noninvasive ventilation. CASARIN-LÓPEZ *et al.* [151] found higher rates of anxiety, depression and post-traumatic stress syndrome symptoms among hospitalised patients not receiving invasive mechanical ventilation, compared to sedated patients with mechanical ventilation, probably due to their conscious experience.

NTINOPOULOU *et al.* [152] found common emotional distress and depressive symptoms in patients with long-COVID, with 39% experiencing cognitive impairments on three or more neuropsychological subtests. DAMANT *et al.* [153] found a relationship between high levels of stigma and the prognosis for job loss, reduced self-esteem, reduced functionality and lower quality of life in patients with long-COVID. CASTAÑEDA ORDÓÑEZ *et al.* [154] found significant differences in the percentages of patients with none, mild, or moderate to severe fear levels for insomnia, sleep apnoea, sleep paralysis and bruxism in COVID-19 survivors. BADAWY *et al.* [155] reassessed the mental health and burnout symptoms of hospital staff in March 2021 and found poor or fairly poor overall mental health ratings in one third of the participants, a 2.5-fold increase when compared to February 2020.

Take-home messages

- Understanding mental health is crucial in chronic respiratory care, emphasising the need for personalised approaches.
- Barriers to medication adherence in patients with COPD and asthma highlight the need for improved patient–provider collaboration.
- Smoking cessation is essential for respiratory health: early intervention and optimised referral methods are needed.
- Recognising and addressing the impact of COVID-19 on patients’ mental wellbeing is vital when providing comprehensive holistic support during and after hospitalisation.

Final remarks

This article provides an overview of some of the outstanding sessions presented at the ERS Congress 2023, with the latest scientific data and emerging areas affecting clinical practice of Allied Respiratory Professionals. For those who wish to learn more about the work presented in the oral presentation and poster sessions, you can find the abstracts presented at the ERS Congress at: https://erj.ersjournals.com/content/62/suppl_67.

We hope to meet you in Vienna in 2024 for another successful ERS Congress!

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