



Early View

Invited review

ERS International Congress 2023: Highlights from the Allied Respiratory Professionals assembly

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ERS International Congress 2023: Highlights from the Allied Respiratory Professionals assembly

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Take-home message: This article summarises some of the outstanding sessions that were (co)organised by @ERS_Assembly9 during #ERSCongress 2023

Abstract

This paper summarises some of the outstanding sessions that were (co)organised by the Allied Respiratory Professionals Assembly during the 2023 European Respiratory Society (ERS) International Congress. Two sessions from each Assembly group are outlined in the present paper, covering the following topics: Group 9.1 focuses on respiratory physiology techniques, specifically on predicted values and reference equations, device development and novel applications of cardiopulmonary exercise tests; Group 9.2 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 9.3 highlights the nursing role in global respiratory health and presents nursing interventions and outcomes; and Group 9.4 provides an overview of the best abstracts and recent advances in behavioural science and health psychology. This Highlights paper 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 on a hybrid format for the second consecutive year (online and in Milan, Italy), bringing together the world's respiratory experts to share their knowledge and the latest advances in the respiratory field.

This year, the Congress returned to a five-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 Assembly) comprises 4 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 interest of the assembly groups.

In this paper, 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 summarised 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 and scientists group (9.1) focus on respiratory physiology techniques, specifically on predicted values and reference equations, device development and novel applications of cardiopulmonary exercise tests; the Physiotherapists' group (9.2) 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 (9.3) highlights the nursing role in global respiratory health and summarises nursing interventions and outcomes; finally, the Psychologists and behavioural scientists group (9.4) presents the best abstracts and recent advances in behavioural science and health psychology.

This Highlights paper 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.

(please insert table 1 here)

Group 9.01: Respiratory Function Technologists and Scientists

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

This oral presentation session provided 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 and predicted values; 2) cardiopulmonary exercise testing 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 bronchodilator response (BDR) in patients with asthma and chronic obstructive pulmonary disease (COPD) using spirometry and an imaging technique, Hyperpolarised Xenon Magnetic Resonance Imaging, can determine the ventilation defect percent (VDP). Therefore, the Forced expiratory volume in the first second (FEV₁) and VDP complement each other when assessing BDR. In patients with a significant response to bronchodilation in FEV₁, the changes are more likely to originate in the larger conductive airways. In the 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/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 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 impact antifibrotic prescription eligibility compared to the GLI 2012 reference values [11].

Cardiopulmonary exercise testing evaluation

In cardiopulmonary exercise testing (CPET) evaluations, two presentations had different approaches. Firstly, Souren et al. [12] demonstrated that the accuracy error between fifteen popular CPET systems during simulated exercise with a metabolic simulator was generally <5% while differing substantially between systems. In addition, Jak et al. [13] assessed the CO₂-production per unit body weight (V'CO₂) at peak exercise as a parameter for exemplary effort in exercise testing, utilised data from 220 patients and determined a cutoff point of 26 mL/kg⁻¹/min⁻¹ in V'CO₂, compared to 1.10 in RER, yields a more accurate non-invasive assessment of the effort in CPET.

Application of Forced Oscillometry Technique

Forced Oscillometry Technique (FOT) measurements were a highlight of this session, starting with Tossan et al. [14] who demonstrated that oscillometry may be more sensitive than spirometry to detect changes in lung function in IPF prospectively, followed by Almeida et al. [15] who demonstrated that FOT is better tolerated by asthma patients in acute episodes,

presenting moderate to strong correlations with spirometry parameters. Then, on a more technical note, Howlett-Foster et al. [16] showed that breathing frequency does not significantly impact 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 fractional exhaled nitric oxide (FeNO)

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 fractional exhaled nitric oxide (FeNO) 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 FeNO even in non-smokers.

Take-home messages

- Changing the criteria of bronchodilator response 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: CPET and pulmonary function assessment in pathology and COVID-19

This thematic poster session highlighted recent advances in cardio-pulmonary assessments of respiratory conditions. Here we summarise some of the posters focussing 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 six months after a pulmonary embolism. Evidence for inefficient ventilation was observed in this patient group, who displayed increased

VE/VCO₂ at the anaerobic threshold and an increased VE/VCO₂ slope. The VE/VCO₂ slope was able to discriminate between patients with pulmonary hypertension and those with pulmonary disease resulting from their pulmonary embolism (optimal cutoff ≥ 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 VO₂ should be fully explored for their prognostic and diagnostic potential in the management of respiratory disease. CPET was further utilised by Knox-Brown et al. [21] to demonstrate the importance of the often-overlooked spirometry parameters FEF₂₅₋₇₅ and FEV₃/FVC. Both FEF₂₅₋₇₅ and FEV₃/FVC < LLN, in the presence of an FEV₁/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 et al. [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% vs 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]. This 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. Broekhuysen & 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 (VO₂ and VCO₂) 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 & Van As-Janssen [26] explored the variability of reference equations for VO₂max using a patient population based The Netherlands, speculating that there may be a more suitable reference data set than the commonly used Wasserman equations [27]. They observed a 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 the 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 (DLCO) [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 CT. In particular, the presence of fibrotic lesions on chest CT was associated with impaired DLCO; when expressed as a percent of the predicted value, DLCO was approximately 30% lower in those with fibrotic lesions, compared to those without ($p=0.004$). Encouragingly, improvements in gas transfer and lung volumes were observed during the one-year follow-up period, although the long-term effects of COVID-19 are yet to be fully elucidated.

Take-home messages

- The VE/CO₂ slope shows promise as a marker of pulmonary hypertension in patients with persistent symptoms six months after pulmonary embolism.
- Often overlooked spirometric parameters representing isolated small airways 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; 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

Prof. Dr. Narelle Cox (Australia) discussed the challenges of assessing outcomes in patients that are referred to home-based pulmonary rehabilitation (PR) programmes. These programmes are conducted in the patient's home, including home visits or telephone support from healthcare providers, and using 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 showed 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-minute walk test (6MWT), 3-minute 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]. However, they may have limitations in accurately assessing exercise capacity, whereas centre-based assessments are more reliable for objective exercise prescription.

Exercise training and physical activity intervention at home

Prof. Dr. Marc Spielmans (Switzerland) highlighted the effectiveness of PR and physical activity promotion. These interventions have been demonstrated to improve symptoms (such as 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 ERS/American Thoracic Society [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's 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 to operate equipment (digital literacy), adherence to instructions, and willingness to undertake the programme [46, 47]. Age, ethnicity, socioeconomic status, and digital literacy may also affect patients' 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. This six-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 application. The intervention succeeded in sustaining physical activity after PR, improving symptoms (dyspnoea, fatigue) and disease burden [49].

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

Prof. Dr. Jean Bourbeau (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 well-being, 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 as 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 was 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 symptoms have 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 moderate to severe patients with COPD showed higher improvements in symptoms and health status up to six 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 and limits on its 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 (CRD), focused on 3 main topics: 1) symptoms and exercise assessment; 2) novel insights in pulmonary rehabilitation and exercise training; and 3) other treatment modalities for patients with chronic respiratory diseases.

Symptoms and exercise assessment

Fatigue is next to 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 (fILD). Hofmann et al. [72] confirmed that the 6MWT accurately identifies people with fILD who experience exertional desaturation during daily life, but the extent of desaturation is underestimated (6MWT nadir vs. daily minimum oxygen saturation (SpO₂), 82±4% vs. 75±5%, p<0.001).

Novel insights in pulmonary rehabilitation and exercise training

PR has proven its effects after a severe acute exacerbation of COPD (AE-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 AE-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] showed an altered and slower heart rate (HR) and oxygen consumption (VO₂) recovery in patients with COPD GOLD 3 and 4 1-minute 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 HR and VO₂ recovery profile. However, the HR 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 as 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 (CF), 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 CF who took the tridrug treatment lexacaftor-Tezacaftor-Ivacaftor. Hov et al. [82] explored different mechanical

insufflation-exsufflation (MI-E) therapy strategies in children with neurodisability. An asymmetric (+ and - pressure: 25-30 and 40 cmH₂O, respectively) 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).

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 (10-15min, 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 six-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, 2x/day, monthly progression) showed meaningful improvements in dyspnoea (between-group difference of -3.0 points, 95% CI [-5.1;-0.9] on Transitional Dyspnoea Index), exercise endurance time (between-group difference of 6.0 min, 95% CI [0.4;11.5]), and respiratory muscle function (between-group difference of maximal inspiratory mouth pressure and diaphragm sniff pressure; 28 cmH₂O, 95% CI [13;43] and 12 cmH₂O 95% CI [0;23], respectively) compared to the control group. Furthermore, Topcuoğlu et al. [89] found that diaphragm and accessory respiratory muscle activation measured using surface electromyography is 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 FiLD.
- Home-based PR in COPD patients with moderate exacerbation is safe and effective.
- 60 seconds of recovery might be suboptimal between sets of resistance training in patients with COPD GOLD 3-4.
- 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 related 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, Axelsson et al. [90] concluded based on a Swedish epidemiological study that, even though COPD patients often use healthcare services due to respiratory symptoms, case-finding strategies based on characteristics associated with underdiagnosis is suggested as 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 support 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 for 12 months the impact of nursing specialised interventions and concluded that adding an ILD advanced nurse practitioner at a busy ILD referral centre has facilitated an increased number of referrals to be adequately accommodated and improved patient care and service metrics. While Zrnić et al. [93] showed the effect of a specialised asthma nursing team contribution, highlighting the intervention on adherence, knowledge and skills, enhancing better asthma control, Silva et al. [94], through an RCT of a maintenance pulmonary rehabilitation programme, is creating evidence of the importance of creating awareness in the patient of the necessary behaviour change and treatment adherence. Heslop-Marshall et al. [95] also stated that people with COPD should be screened and treated for co-morbid symptoms of anxiety, regardless of looking for FEV₁, once there is no correlation found in an RCT between these two variables, and anxiety can negatively impact adherence to the treatment.

Dyspnoea is a multifactorial and limiting symptom that can be addressed through non-invasive 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 directed to populations experiencing disparities related to low-income, 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 Alonzo et al. [99] explored the nurse's opinion 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 an optimised self-management of respiratory diseases.
- Disease underdiagnosis is a concerning problem that affects respiratory patient's access to proper care.
- The construction of a respiratory nursing curriculum remains essential to enhance the quality and safety of healthcare care for respiratory patients worldwide.

Poster session: Nursing interventions & 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, being the ODO respiratory scale of utmost importance for patient monitoring [100]. It assesses the work of breathing and heart rate, associated with fatigue and different breathing patterns.

Regarding 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 et al. [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]. Besides, a partnership-based nursing practice framework [111] may reduce costly healthcare resources [112].

Disease management, service use and patient adherence

Self-management education, discharge planification and an effective home-based team management showed to be key factors in enhancing outcomes in patients with chronic respiratory diseases [109-114].

Home-based disease management can reduce readmissions by 52% and 26% adults, depending on the programme components [113]. The lung team offered patients with COPD information and additional attention via telephone calls in case of worsening symptoms, acute home visits, and home treatment supervised, 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 non-invasive ventilation. Despite this, respiratory devices have certain complications (e.g., injuries, discomfort, less compliance in oxygen therapy lengthened) that may affect patients' quality of life, well-being and adherence to treatment. Enhancing healthcare professionals' awareness is necessary [115, 116] to implement systematic measures to reduce these complications [115, 116].

In the study of Silva et al. [117], limited offer 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]. To increase patient adherence to long-term behaviour change, 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, which is relevant to support sustained behaviour change [118]. Furthermore, to increase access to PR, home-based programmes showed encouraging results on 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 ensuring a successful patient navigation in 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. The 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 – 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 vs. 4.4 ± 2.3 , respectively; $p=0.03$) during loaded breathing trials, with a $>MCID$ of 1 between conditions (menthol vs. placebo).

Denutte et al. [125] demonstrated that patients with COPD displayed 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 exhibit a significant correlation 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 as 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 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 usage of continuous positive airway pressure (CPAP) therapy in OSA patients, revealing that greater confidence (OR 2.8 95%CI [1.6, 4.9] vs. 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 (in snoring: OR 1.7 95%CI [1.1, 2.5] vs. 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 this line, in a study by Sing et al. [140], a virtual group intervention integrating Cognitive Behavioural, Acceptance and Commitment (CBAC), and Compassion-focused Therapy was administered to patients with Interstitial Lung Disease (ILD). The results demonstrated substantial improvements in anxiety/depression scores, EuroQoL-5D (EQ-5D) activity, and overall health status. Positive qualitative reactions, strong applicability (8.57/10 with 10 being extremely useful) of the material, and high acceptability of the online format (9.86/10 with 10 being very accessible) were indicated by patients. 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 diseases

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

Psychological well-being 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. Kwiecien & Domagala-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 on 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. Achterbosch 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' 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 was 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 non-invasive ventilation. Casarin López et al. [151] found higher rates of anxiety, depression and PTSD 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 3 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 on insomnia, sleep apnoea, sleep paralysis, bruxism in COVID-19 survivors. Badaway 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 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 well-being 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 the 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 available 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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Table 1: Presentation of the four groups within Assembly 9.

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

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