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**ERS International congress, Madrid, 2019: Highlights from the General Pneumology Assembly.**

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# ERS International congress, Madrid, 2019: Highlights from the General Pneumology Assembly.

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## Abstract

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This article contains highlights and a selection of the scientific advances from the European Respiratory Society's General Pneumology Assembly that were presented at the 2019 European Respiratory Society International Congress in Madrid, Spain. The most relevant topics from the different groups will be discussed, covering a wide range of areas including rehabilitation and chronic care, general practice and primary care and M-health and E-health. In this review, the newest research and actual data as well as award-winning abstracts and highlight sessions will be discussed.

## Short abstract

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A highlights review of selected presentations from #ERSCongress 2019 by the @ERStalk General Pneumology Assembly.

## Introduction

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The European Respiratory Society International Congress is the world's largest scientific and educational conference in the field of respiratory medicine. For the Madrid 2019 Congress, 4,315 abstracts were accepted for presentation. The General Pneumology Assembly of the European Respiratory Society (ERS) is the largest of the 14 assemblies. In total 317 abstracts were presented in 20 sessions related to this assembly and the 4 groups of which it consists. It is impossible for any delegate to follow all scientific and clinical advances and breakthroughs presented during this conference. This review aims to provide the esteemed reader with an overview of a few of the most interesting presentations of each group, deemed noteworthy by the authors of this manuscript.

## Pulmonary rehabilitation and chronic care

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### Session: Best abstracts in pulmonary rehabilitation and chronic care

The researchers of this session presented works on various important issues in pulmonary rehabilitation (PR), ranging from optimizing and maintaining the effects of exercise training to behavioral changes.

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3 Because exercise intolerance often goes hand-in-hand with hypoxemia in patients with  
4 idiopathic pulmonary fibrosis (IPF), devices allowing a higher O<sub>2</sub> flow are of interest.  
5 *Schneeberger et al.* [1] compared a novel device of supplemental oxygen therapy (SOT), the  
6 Oxymizer<sup>®</sup>, to the conventional nasal cannula (CNC) in 26 IPF patients with SOT indication. 22  
7 patients completed two endurance shuttle walk test using, in a randomized cross-over design,  
8 both Oxymizer or CNC. The use of Oxymizer<sup>®</sup> instead of CNC improved walking capacity and  
9 SpO<sub>2</sub> and was associated with lower heart and breathing rate. Despite these effects, a majority  
10 of patients (64%) still preferred the CNC for daily use. The authors concluded that offering SOT  
11 through Oxymizer<sup>®</sup> could provide clinically relevant benefits for IPF patients.  
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15 Additional prognostic information in COPD patients can be provided with the assessment of  
16 functional and exercise capacity but, this assessment is difficult to implement in care context.  
17 Thus, *Walsh et al.* [2] aimed to test the prognosis value of 4 metre gait speed (4MGS) in a  
18 cohort of 371 patients with COPD attending hospital outpatient clinics. In a multivariate  
19 analysis, they compared the predictive values of 4MGS, Age, FEV<sub>1</sub> and Sex (GAFS) index to the  
20 Age Dyspnoea Obstruction (ADO) index and FEV<sub>1</sub>. GAFS was predictive of 3-years mortality  
21 with a better discrimination than the other indexes, with an area under the curve (AUC) of  
22 0.74. The model was also validated in an independent cohort of 472 patients attending  
23 community COPD clinics. The AUC for this cohort was 0.74. The authors concluded that gait  
24 speed can provide additional prognostic information than ADO or FEV<sub>1</sub> alone in COPD  
25 patients, in a feasible manner.  
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30 *Duarte-Natália et al.* [3] conducted a randomized-controlled trial to investigate whether a  
31 behavioral change intervention can improve asthma control through an increase of physical  
32 activity levels (PAL). Control group (CG) and intervention group (IG) followed the same usual  
33 care intervention, with an addition of 8 weeks of behavioral change intervention focused on  
34 goal-setting and feedback for the IG group. The intervention had significant beneficial effects  
35 compared to CG on asthma clinical control, health related quality of life and PAL. Because  
36 improvement in asthma clinical control and PAL were correlated, the authors suggested that  
37 beneficial effects of the behavioral change intervention on asthma clinical control were  
38 mediated by PAL increase.  
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42 A randomized double-blind, cross-over, study conducted by *Bonnevie et al.* [4] aimed to  
43 investigate whether non-invasive high and/or low frequency lumbar transcutaneous electrical  
44 nerve stimulation (HF or LF TENS) can improve endurance capacity of COPD patients, as  
45 previously shown with intrathecal administration of fentanyl. To meet these objectives, 10  
46 COPD patients performed in a randomized order 3 constant workload exercise associated with  
47 3 modalities of stimulation, a sham TENS, a LF TENS at 4Hz, or a HF TENS at 100 Hz. LF and HF  
48 TENS did not induce differential effects compared to the sham condition on dyspnea, lower  
49 limb fatigue and endurance capacity. However, muscle oxygenation tended to be higher in  
50 both TENS conditions compare to sham, reflecting, according to the authors, a modulation of  
51 the quadriceps muscle activity.  
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55 While muscle dysfunction is well described in COPD patients, evidence regarding temporal  
56 muscle mRNA responses to both aerobic exercise training (AET) and training cessation (TC) are  
57 lacking. *Latimer et al.* [5] conducted a trial in 19 COPD patients and 10 healthy controls (HC)  
58 investigating mRNA response after 1, 4 & 8 weeks of AET and 4 weeks after TC. 94 mRNAs  
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2 involved in the response to AET were quantified with RT-qPCR from muscle biopsies  
3 performed at each time. The authors observed a lack of increase in  $VO_{2PEAK}$  following exercise  
4 training in COPD patient compare to HC. However, the muscle mRNA levels were altered in a  
5 similar manner in COPD patients and HC in response to AET and TC. The authors concluded  
6 that skeletal muscle mRNA responsiveness to AET was not blunted and dissociated from the  
7 whole-body  $VO_{2PEAK}$ .  
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10 A survival advantage has been described before for COPD patients who completed pulmonary  
11 rehabilitation (PR). Extracting the data from the Office for National Statistics concerning Wales  
12 and England from Jan 2015 to Jan 2017, *Evans et al.* [6] aimed to identify whether the case-  
13 mix severity differences or the effects of PR themselves explained this advantage. 7092 COPD  
14 patients were included. 58% of the patients completed PR and these patients differed from  
15 the non-completer group on age, dyspnea, comorbidities occurrence, walking distance, home  
16 oxygen use, smoking status and hospital admission. The mortality rate was lower in the  
17 completer group even with an adjustment on the parameters described above. This study  
18 described a higher cumulative mortality in patients who did not completed PR, HR 1.42 [1.20  
19 to 1.67], after adjustment for confounding factors.  
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23 While the beneficial effects of PR in COPD patients are well described, little is known about  
24 strategies allowing long term maintenance of these benefits. *Blervaque et al.* [7] assessed  
25 the efficiency of a pragmatic maintenance program in COPD patients, with a follow-up of 5  
26 years. This program included weekly supervised exercise training sessions completed with  
27 discussion groups and health education. 144 COPD patients were included. The significant  
28 benefit provided by the PR on 6MWD remain significant up to 48 months after the PR  
29 discharge in the COPD patients involved in the maintenance program. In the same way, the  
30 benefits on dyspnea (MRC scale) and quality of life (VQ11 questionnaire) were maintained up  
31 to 5 years and 4 years respectively.  
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## 36 **General Practice and Primary care**

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### 37 **Session: Diagnosis and assessment of airway diseases in primary care**

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42 There was a wide range of primary care content at the 2019 ERS Congress. The Primary Care  
43 Day focussed on infections, vaccinations, and case studies with excellent speakers on day-to-  
44 day respiratory cases. Our highlights this year come from the primary care oral presentations  
45 on Sunday 29<sup>th</sup> September, showcasing research into the diagnosis and assessment of airway  
46 diseases.  
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49 *Benítez Pérez et al.*, [8] explained that spirometry training in Mexico is optional, and rarely  
50 performed in primary care. Addressing this, an education programme was delivered to 439  
51 primary care clinicians. Initial testing identified 33% of participants did not know how to  
52 perform spirometry, and 37% had no equipment. The education programme demonstrated a  
53 great improvement in participant knowledge. A second phase of training including  
54 certification of spirometry was delivered 10 months later, however, due to high staff turn-  
55 over, only 70 of the original participants attended. Future research will consider condensing  
56 education and certification into one instalment and increasing spirometry availability.  
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3 In the Netherlands, spirometry is straightforward to achieve, but the quality compared to  
4 American Thoracic Society (ATS)/European Respiratory Society (ERS) standards [9] is unclear.  
5 To investigate, van de Hei *et al.*, [10] assessed usefulness and quality of spirometry from 149  
6 primary care patients. 88% of spirometry readings were considered 'clinically useful' by  
7 clinicians (two pneumonologists, 15 GPs), meaning they felt able to make a diagnosis from  
8 spirometry and available clinical data. However, when compared to the ATS/ERS standards  
9 only 13% of readings met the full criteria. Furthermore, when clinician diagnoses were  
10 compared, there was little agreement between the pulmonologists ( $\kappa=0.38$  95%CI 0.27  
11 to 0.50), or between general practitioners and pulmonologists (vs pulmonologist 1  $\kappa=0.39$   
12 95%CI 0.22 to 0.44; vs pulmonologist 2;  $\kappa=0.44$  95%CI 0.32 to 0.55). These data suggest  
13 that meeting the ATS/ERS criteria was not necessary for clinicians to feel confident in making  
14 a diagnosis, though agreement between pulmonologists and between pulmonologists and  
15 GPs was poor.  
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20 Even if spirometry quality is sufficient, demonstrating expiratory airflow limitation in asthma  
21 can be difficult. Bronchial provocation can be useful in the diagnostic assessment of asthma  
22 [11] but is traditionally performed in hospitals [12]. Therefore, Bins *et al.*, [13] investigated  
23 the safety and usefulness of community performed bronchial provocation in a Dutch primary  
24 care diagnostic centre. 998 patients underwent histamine bronchial provocation with no  
25 adverse events. The authors concluded bronchial provocation of adults in the community was  
26 safe and feasible, could reduce the number of referrals to secondary care and that under- and  
27 over-diagnosis of asthma occurred if bronchial provocation was not used.  
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31 Objective tests are also used to monitor asthma control. To monitor children, guidelines  
32 recommend measuring lung function routinely and, in some circumstances, Fractional exhaled  
33 Nitric Oxide (FeNO) [14,15]. Spirometry and FeNO are used regularly in hospitals but less  
34 commonly in primary care. To investigate the value of spirometry and FeNO for monitoring  
35 asthma in primary care children, Lo *et al.*, [16] trained staff in 10 general practices to perform  
36 the tests in the United Kingdom. Of the 612 children recruited with 'GP diagnosed asthma' or  
37 'suspected asthma', 575 achieved spirometry and 472 completed FeNO. 46% of children with  
38 available FeNO and spirometry reported good control (Asthma Control Test (ACT)/Children's  
39 Asthma Control Test (CACT) >19) but had at least one abnormality identified by objective tests.  
40 Interestingly, 49% of the 191 reporting poor control (ACT/CACT  $\leq 19$ ), had normal spirometry  
41 and FeNO <35. These data suggest that assessing asthma in primary care using symptoms, or  
42 objective tests in isolation will not provide a full picture of the child.  
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47 Two studies considered how to optimise management of adults with COPD. Firstly, Baron *et*  
48 *al.*, [17] investigated asthmatic traits in 3532 individuals with pulmonologist-diagnosed COPD  
49 or Asthma COPD Overlap (ACO). Over 60% had at least one 'asthma sign'. 7% had a history of  
50 asthma, 13% had reversibility of  $\geq 12\%$  and 16% had atopy. They concluded that asthma traits  
51 could help primary care clinicians consider which individuals with COPD are most likely to  
52 benefit from inhaled corticosteroids [18]. Secondly, Jordan *et al.* [19] presented a prediction  
53 model to identify COPD patients at risk of hospitalisation. Age, COPD Assessment Test score,  
54 percentage of predicted Forced Expiratory Volume in 1 second, respiratory admissions in the  
55 past year, BMI and diabetes were valuable predictors for an individual being admitted within  
56 2 years. The model performed well (c-statistic 0.75, 95%CI 0.72 to 0.79) and will be externally  
57 validated.  
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3 The final abstract investigated the value of the STOP-BANG questionnaire (SBQ) [20] in  
4 identifying individuals with Obstructive Sleep Apnoea (OSA). *Plana Pes et al.*, [21] recruited  
5 565 primary care adults (30-70 years). 38% scored  $\geq 3$  on the SBQ and underwent home  
6 polysomnography. Of these, 93% were diagnosed with OSA. The team concluded an SBQ  $\geq 3$   
7 could be an adequate threshold to screen for OSA in primary care.  
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10 Overall, the session highlighted the breadth of research topics and methods used to  
11 investigate clinical questions arising from primary care. Learning from researchers across  
12 different countries helped address shared goals and challenges arising from efforts to  
13 maximise the value of new and existing questionnaires, models and tests to improve the  
14 diagnosis and management of respiratory disease.  
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## 20 M-health/E-health

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### 23 Session: M-health/E-health poster discussion session

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25 This year the ERS experienced the birth of the special interest Group M-Health/e-health, in  
26 the General Pneumology Assembly. This new group actively invites respiratory researchers,  
27 scientists, patient organisations, industry representatives, technicians and statisticians with  
28 experience in digital technologies to become a part of this movement and to contribute with  
29 their specific knowledge. At the M-Health/e-health poster discussion session, we got a  
30 marvellous first glimpse of the future of respiratory medicine and were provided with a  
31 selected sample of current initiatives.  
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#### 36 *Telemedicine*

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38 Telemedicine is a very promising field of medicine, especially for hospitals caring for rural  
39 areas, because it provides a way to overcome travelling distances. Additionally, it allows for  
40 further communication and checks, which would not be convenient in a regular setting. During  
41 the session *de las Heras et al.* presented the results of a randomized controlled trial in patients  
42 with idiopathic pulmonary fibrosis (IPF) comparing usual care to Tele-rehabilitation with a  
43 Virtual Autonomous Physiotherapist Agent (VAPA), on exercise capacity and quality of life  
44 [22]. They showed that Tele-rehabilitation with VAPA is feasible for IPF and found a significant  
45 difference in the 6-minute walking distance. *Vilarinho et al.* presented the results of the  
46 introduction of continuous telemonitoring in home-mechanical ventilation. In 8% of patients,  
47 they found a clinically relevant situation to act, which could be solved with just a phone call in  
48 87% of cases [23]. This telemedicine troubleshooting could enhance the compliance of long-  
49 term therapy in Home Respiratory Therapies.  
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#### 56 *Health apps*

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58 In recent years, taking into account the growing number of smartphone users, we have seen  
59 apps rapidly taking on a central role in people's lives. They can be used to promote self-  
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2 management, follow-up disease outcomes, early detect deterioration and provide  
3 information on a variety of issues. At our session, *Rijssenbeek-Nouwens et al.* showed that  
4 quality of life and asthma control remained at a higher level in asthma patients after  
5 pulmonary rehabilitation if they used an e-health support platform compared to those who  
6 received usual care. Interestingly, this was particularly so for high engagers of the e-health  
7 system, suggesting that this is an important parameter to measure [24]. *Amaral et al.*  
8 displayed a beautifully created app for children, making use of gamification to increase  
9 adherence [25]. Children had to perform a forced expiratory manoeuvre that was registered  
10 by their smartphone's microphone. This resulted, if performed properly, in a dragon creating  
11 a huge fireball, which blew away a structure and interestingly, if performed sub-optimally, in  
12 smaller fireballs. The use of the app meant children performed spirometry unknowingly, and  
13 optimal performance was incentivised, in an intuitive and fun way. *Puig Sanchez et al.*  
14 presented trial results comparing a newly developed stop smoking app to usual care [26]. It  
15 included motivational texts upon request and mini-games, which patients could start when  
16 they felt the need for a smoke. They showed significantly increased cessation rates, which was  
17 all the more impressive considering most patients in the intervention group hardly used the  
18 app. A low uptake in app usage was a common feature across different presentations. Future  
19 research should focus on user-engagement from the start, for example by incorporating end-  
20 users in the design phase of the app.

### 29 *Devices*

31 The stethoscope is one of the defining features of the doctor, featuring prominently around  
32 the neck in movies or television series that include doctor. But, what if this stethoscope  
33 doesn't actually need the doctor anymore? This is the central question that *Grzywalski et al.*  
34 sought to answer by assessing multiple respiratory sounds with plug-in stethoscopes with  
35 automatic sound detection and analysis [27]. This automated device was significantly better  
36 at detecting different respiratory sounds than doctors. Fortunately, health professionals are  
37 still required to interpret the plug-in stethoscope in the context of medical history and other  
38 tests. However, it does paint a future whereby the actual presence of the patient inside the  
39 hospital might no longer be required for all diagnostics. Another important area of innovation  
40 is the emergence of Quantified Self and the use of all sorts of wearable. *Mannée et al.*  
41 presented the first model of an easy to use smart shirt, specifically designed to assess tidal  
42 volumes during different types of daily activity [28]. This could be used at home instead of  
43 having to come to the clinic for exercise testing.

### 51 *Artificial Intelligence (AI)/Big data*

53 Artificial Intelligence and machine learning techniques are of great interest for many involved  
54 in mhealth. Of course, it presents a very promising new field of medicine, with hopeful reports  
55 of earlier detection and more personalised treatment of all sorts of diseases. *Demchuk et al.*  
56 showed an automated decision support system providing personalised treatment advice for  
57 pneumonia, taking into account all comorbidities and interactions with other medication [29].  
58 This resulted in significantly fewer medication errors. However, the use of AI in medicine is  
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1  
2 certainly not a field without controversy. AI provokes interest as it is potentially superior to  
3 existing methods of analysis but also uncertainty as data analysis by neural networking is not  
4 well understood. This poses the question: “Should we follow the advice of a system if we do  
5 not understand how the system came to that advice?” Interestingly, *Das et al.* presented a  
6 new type of pulmonary function interpretation algorithm that shed some light on which  
7 determinants played a role in AI decision making and provided a new score that gives an  
8 indication of whether AI is right or not [30]. Hopefully, with further development, we can get  
9 more of a grip on how to use AI in the future and understand it better.  
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14 The ERS Congress 2019 has been of great interest for those engaged in digital medicine. As  
15 well as presentations, the new Group M-Health/E-Health had their first meeting and shared  
16 ideas for next years’ conference, to present in the digital health sessions.  
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## 19 Concluding remarks

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23 The authors of this article hope that this short summary of the impressive amount of lung  
24 research and advances in pulmonary care presented through the General Pneumology  
25 Assembly of the ERS creates curiosity to follow up on topics of interest to each individual  
26 reader.  
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29 It was our goal to stimulate discussion and exchange of scientific novelties and clinical  
30 developments. We also hope to have encouraged the readership to attend the ERS  
31 International Congress 2020 in Vienna.  
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