



Sleep medicine in Europe: 50 years of evolution

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Sleep medicine as a clinical specialty has grown substantially in recent decades, which has been intimately linked to the growing clinical importance of obstructive sleep apnoea (OSA). The reasons for this close linkage relate to the high prevalence of OSA, which is now estimated to affect close to one billion people worldwide [1], and the recognition that the clinical evaluation of patients suspected of OSA requires overnight monitoring, which has traditionally involved the resources of a sleep laboratory [2]. Although many of the developments in sleep medicine over the past half-century have been driven by North American initiatives, the early developments were European based. This aspect is most clearly demonstrated in a special issue of the *Bulletin de Physio-Pathologie Respiratoire* devoted to sleep disordered breathing (SDB) published in 1972. This journal was the official publication of the Société Européenne de Physiopathologie Clinique Respiratoire (SEPCR), which later became the European Respiratory Society (ERS), and thus, the journal can be viewed as the forerunner of the *European Respiratory Journal*. The issue, running to over 200 pages, included 12 papers from European-based research groups that evaluated the clinical manifestations, mechanisms, diagnosis and treatment of SDB, then often referred to as the Pickwickian syndrome [3].

Over the subsequent decade, there was growing clinical and research interest in the disorder, especially in North America, and the first large case series of OSA patients was published in 1976 by Christian Guilleminault and colleagues, who had moved from France to California several years beforehand [4]. This group proposed the diagnosis of OSA based on the objective demonstration of at least 5 apnoeas per hour of sleep, thus establishing the requirement for an overnight sleep study to establish the diagnosis. The fundamental pathophysiology of OSA was described in 1978 as an imbalance between the collapsing forces within the upper airway during inspiration and the counteracting forces generated by the local dilating muscles [5]. This understanding underpinned the subsequent development of continuous positive airway pressure (CPAP) therapy by Colin Sullivan and co-workers in 1981 [6]. CPAP transformed the management of OSA and remains the preferred treatment for moderate and severe cases.

1972 was also an important milestone in the development of sleep medicine and research in Europe, as the European Sleep Research Society (ESRS) was formed in that year, with the society's first congress held in Basel, Switzerland. Previously, sleep as a topic was mainly presented at neurological or psychiatric meetings, and the topic of SDB was still in its infancy. The founding principle of ESRS was to provide exposure to all aspects of sleep research and to involve people in the society who were not directly involved in research. This founding concept facilitated the evolution of ESRS to subsequently becoming the voice of sleep medicine and research throughout Europe.

The ESRS in its earlier years was heavily focused on neurological and psychiatric aspects, but the growing importance of SDB as a highly prevalent and potential cause of morbidity and mortality gradually led to an increasing interest in this topic within the society. This aspect is illustrated by the fact that the largest group of participants attending recent ESRS congresses represented those with a primary clinical and/or research interest in respiratory aspects of sleep.



A key development in the evolution of ESRS was the establishment in 2004 of the Assembly of National Sleep Societies (ANSS) as an affiliated group within the society, which was an initiative of the then President, Irene Tobler. The ANSS, which has a more clinical and political focus, is closely linked to ESRS, with a representative of ANSS participating as a full member of the ESRS board.

The ESRS was initially focused mainly on basic sleep research, but as clinical sleep disorders grew in importance, the society evolved to become increasingly involved in matters relating to sleep medicine. This evolution included the establishment of the Education and Sleep Medicine Committees, which together developed a curriculum and subsequent examination to certify practitioners in sleep medicine as “somnologists”. These developments included the publication of the ESRS *Textbook in Sleep Medicine*, which is now in its second edition and provides the knowledge base that underpins the examination curriculum. The ESRS official journal, the *Journal of Sleep Research*, has become established as one of the leading international sleep journals.

The importance of respiratory sleep disorders was recognised soon after the formation of ERS, by the establishment of the SDB group within the Clinical Physiology Assembly in 1991. This group has been very active over the years, and the importance and success of the group’s activities was recently recognised by ERS in the formation of a separate assembly devoted to SDB.

A major joint initiative by ERS and ESRS was the development of the bi-annual Sleep and Breathing Conference (SBC), with responsibility for the organisation and budget shared equally between the two societies in a formal framework agreement. The first conference was in Prague in 2011 and it has since been held every second year in the gap year between ESRS congresses. Thus, the SBC, which is attended by an average of close to 1000 delegates, has become a core feature in the society calendar over the past decade. The primary purpose of the SBC is to provide a forum for the continuing education and professional development of all healthcare professionals with an interest in sleep disorders. Thus, the focus of the conference is fundamentally different from ERS and ESRS congresses.

The SBC represents the most substantial co-operation between ESRS and ERS, but there have been many other examples of co-operation between the two societies, most notably in the form of joint task forces and other working groups. These joint initiatives have resulted in many official statements and recommendations, which have provided important guidance to clinical sleep practitioners.

Both ERS and ESRS are active in promoting the importance of sleep medicine and science at European governmental level. An important demonstration of success in this aspect was the approval in 2005 by the European Cooperation in Science and Technology (COST) agency, which is funded by the European Union (EU), of a COST Action on OSA (B26) to be especially focused on links between OSA and cardiovascular disease. This action produced several important and highly cited publications on this topic [7] and, most notably, provided the framework that led to the establishment of the European Sleep Apnoea Database (ESADA). This prospective cohort study, which is based on sleep clinic patients assessed in multiple academic sleep centres throughout Europe [8], has evolved to become the largest cohort study of OSA worldwide, with over 30 000 patients (figure 1). ESADA has produced many original reports on the relationship of OSA with other comorbidities, including cardiometabolic, neuropsychiatric and cancer. The ESADA study was the first to demonstrate the primacy of oxygen desaturation over apnoea/hypopnoea frequency in the independent relationship between OSA and cardiovascular comorbidity [9]. The importance of ESADA was further demonstrated by the award in 2015 by the ERS of a Clinical Research Collaboration grant that provided funding to support the activities of ESADA over a 6-year period [10].

The importance of OSA as a risk factor for motor vehicle accidents has long been recognised and European experts have been at the forefront in advocating controls on sleepy drivers who suffer from the disorder. Initial efforts in this area were supported by an ERS task force, which reported in 2002 [11]. Further work on this topic was supported by COST Action B26 and ultimately led to the establishment of a working group by the Transport Directorate of the European Commission to examine the driving risk associated with OSA. This group produced an official report for the commission [12], which ultimately led to formal guidelines on the certification of driver licensing that are now mandatory throughout the EU [13].

A major achievement for sleep medicine and research was the award in 2020 of a grant of EUR 15 million by the EU Horizon Programme for a European multicentre study of new approaches to the evaluation of patients suspected of SDB. The project, “Sleep Revolution”, aims to develop machine learning tools to better estimate OSA severity and provide personalised treatment options including patient participation [14]. These tools will be implemented in high-end wearables to alleviate the costs and increase the availability



FIGURE 1 Centres participating in the European Sleep Apnoea Database (ESADA) network.

of polysomnography. The project involves extensive collaboration between 39 centres, including expertise from sleep medicine, computer science and industry, and utilises tens of thousands of retrospectively and prospectively collected sleep recordings. With the active involvement of ESRS and ANSS in the project, and supported by ERS, the Sleep Revolution has the unique possibility to create new standardised guidelines for sleep medicine.

European sleep medicine has come a long way over the past 50 years. European centres provided the initial clinical and basic research on sleep disorders, especially SDB, and more recent developments such as the active collaboration between ERS and ESRS, in addition to major research projects such as the Horizon-funded Sleep Revolution project, indicate a bright future for the field.

Conflict of interest: W.T. McNicholas has nothing to disclose.

References

- 1 Benjafield AV, Ayas NT, Eastwood PR, *et al.* Estimation of the global prevalence and burden of obstructive sleep apnoea: a literature-based analysis. *Lancet Respir Med* 2019; 7: 687–698.
- 2 Sleep-related breathing disorders in adults: recommendations for syndrome definition and measurement techniques in clinical research. The report of an American Academy of Sleep Medicine task force. *Sleep* 1999; 22: 667–689.
- 3 Lugaresi E, Coccagna G, Mantovani M, *et al.* Hypersomnia with periodic breathing: periodic apneas and alveolar hypoventilation during sleep. *Bull Physiopathol Respir* 1972; 8: 1103–1113.
- 4 Guilleminault C, Tilkian A, Dement WC. The sleep apnea syndromes. *Annu Rev Med* 1976; 27: 465–484.

- 5 Remmers JE, deGroot WJ, Sauerland EK, *et al.* Pathogenesis of upper airway occlusion during sleep. *J Appl Physiol Respir Environ Exerc Physiol* 1978; 44: 931–938.
- 6 Sullivan CE, Issa FG, Berthon-Jones M, *et al.* Reversal of obstructive sleep apnoea by continuous positive airway pressure applied through the nares. *Lancet* 1981; 1: 862–865.
- 7 McNicholas WT, Bonsignore MR. Sleep apnoea as an independent risk factor for cardiovascular disease: current evidence, basic mechanisms and research priorities. *Eur Respir J* 2007; 29: 156–178.
- 8 Hedner J, Grote L, Bonsignore M, *et al.* The European Sleep Apnoea Database (ESADA): report from 22 European sleep laboratories. *Eur Respir J* 2011; 38: 635–642.
- 9 Tkacova R, McNicholas WT, Javorsky M, *et al.* Nocturnal intermittent hypoxia predicts prevalent hypertension in the European Sleep Apnoea Database cohort study. *Eur Respir J* 2014; 44: 931–941.
- 10 Bonsignore MR, Hedner J. The European Sleep Apnoea Database (ESADA) ERS Clinical Research Collaboration: past, present and future. *Eur Respir J* 2018; 52: 1801666.
- 11 Krieger J, McNicholas WT, Levy P, *et al.* Public health and medicolegal implications of sleep apnoea. *Eur Respir J* 2002; 20: 1594–1609.
- 12 McNicholas WT, Bencs Z, De Valck E, *et al.* New Standards and Guidelines for Drivers with Obstructive Sleep Apnoea Syndrome. Brussels, European Commission, 2013. https://road-safety.transport.ec.europa.eu/system/files/2021-07/sleep_apnoea_0.pdf
- 13 Bonsignore MR, Randerath W, Riha R, *et al.* New rules on driver licensing for patients with obstructive sleep apnea: European Union Directive 2014/85/EU. *J Sleep Res* 2016; 25: 3–4.
- 14 Arnardottir ES, Islind AS, Óskarsdóttir M, *et al.* The Sleep Revolution project: the concept and objectives. *J Sleep Res* 2022; 31: e13630.