

REVIEW ARTICLE



The future of education in sleep science and medicine in Europe: Report of an ESRS workshop

W. T. McNicholas^{1,2} | E. S. Arnardottir³ | V. V. Vyazovskiy^{4,5,6} |
 D. Pevernagie^{7,26} | T. Penzel⁸ | P. Peigneux⁹ | L. Grote^{10,11} |
 Y. Van Der Werf^{12,13} | F. de Jongh^{14,15} | M. Schmidt^{16,17} | M. Adamantidis¹⁸ |
 S. Sekaran¹⁹ | A. M. Biller^{20,21} | B. Knobl²² | P.-H. Luppi²³ | C. L. Bassetti²⁴ |
 T. Paunio²⁵

¹School of Medicine and the Conway Research Institute, University College Dublin, Dublin, Ireland

²Department of Respiratory and Sleep Medicine, St Vincent's Hospital Group, Dublin, Ireland

³Reykjavik University Sleep Institute, Reykjavik University, Reykjavik, Iceland

⁴Department of Physiology, Anatomy and Genetics, University of Oxford, Oxford, UK

⁵Sleep and Circadian Neuroscience Institute, University of Oxford, Oxford, UK

⁶Kavli Institute for Nanoscience Discovery, University of Oxford, Oxford, UK

⁷Department of Internal Medicine and Pediatrics, Ghent University, Ghent, Belgium

⁸Sleep Medicine Center, Charité – Universitätsmedizin Berlin, Berlin, Germany

⁹UR2NF-Neuropsychology and Functional Neuroimaging Research Unit, CRCN-Centre for Research in Cognition and Neurosciences and UNI-ULB Neuroscience Institute, Université Libre de Bruxelles, Brussels, Belgium

¹⁰Centre for Sleep and Wake Disorders, Sahlgrenska Academy, Gothenburg University, Gothenburg, Sweden

¹¹Sleep Disorders Centre, Pulmonary Medicine, Sahlgrenska University Hospital, Gothenburg, Sweden

¹²Department Anatomy and Neurosciences, Amsterdam UMC, Vrije Universiteit Amsterdam, Amsterdam, the Netherlands

¹³Amsterdam Neuroscience Neurodegeneration, Amsterdam, the Netherlands

¹⁴Department of Neonatology, Amsterdam UMC location University of Amsterdam, Amsterdam, the Netherlands

¹⁵Faculty of Science and Technology, University of Twente, Enschede, the Netherlands

¹⁶Department of Neurology, Inselspital, Bern University Hospital, University of Bern, Bern, Switzerland

¹⁷Interdisciplinary Sleep-Wake-Epilepsy-Center, Inselspital, Bern University Hospital, University of Bern, Bern, Switzerland

¹⁸Center for Experimental Neurology, Sleep-wake Epilepsy Center, NeuroTec, Department of Neurology, Inselspital, University Hospital Bern, University of Bern, Bern, Switzerland

¹⁹Nuffield Department of Clinical Neurosciences, University of Oxford, Oxford, UK

²⁰TUM School of Medicine and Health, Department Health and Sport Sciences, Chronobiology & Health, Technical University of Munich, Munich, Germany

²¹Translational Sensory & Circadian Neuroscience, Max Planck Institute for Biological Cybernetics, Tübingen, Germany

²²Journal of Sleep Research Editorial Office, European Sleep Research Society, Regensburg, Germany

²³INSERM, U1028; CNRS, UMR5292, Lyon Neuroscience Research Center, Team “Physiopathologie des réseaux neuronaux responsables du cycle veille-sommeil”, Lyon, France University Lyon 1, Lyon, France

²⁴Department of Neurology, Inselspital, University of Bern, Bern, Switzerland

²⁵Department of Psychiatry and SleepWell Research Program, Faculty of Medicine, University of Helsinki and Helsinki University Central Hospital, Helsinki, Finland

²⁶Department of Respiratory Diseases, AZ Delta, Roeselare, Belgium

C.L. Bassetti and T. Paunio contributed equally.

Correspondence

T. Paunio, Department of Psychiatry and SleepWell Research Program, Faculty of Medicine, University of Helsinki and Helsinki University Central Hospital, Helsinki, Finland.
Email: tiina.paunio@helsinki.fi

Summary

The European Sleep Research Society (ESRS) is the leading voice for sleep medicine and research in Europe and includes in its mission the objective to promote and develop sleep education. As part of this objective, the Society established a Multidisciplinary Task Force on sleep education, which proposed a workshop on this topic to define the role of ESRS in the future of sleep education in Europe. This includes defining the domains of operation by the ESRS, its most important links and networks, and to recognise areas for development. A concrete goal was to make an action plan with suggestions for eventual Task Forces. Recommendations from the workshop include active collaboration with other Societies and University degree courses in sleep with the objective to position the ESRS as the central focus for sleep education in Europe. Predefined learning objectives and Entrustable Professional Activities were identified as key aspects of future direction. The *ESRS Textbook in Sleep Medicine* provides a valuable educational resource, and the next edition should expand on the traditional format to include digital material and an integrative platform. The workshop also identified the need to develop a more compact publication to inform non-sleep specialists, university students, and interested members of the public with basic information on sleep and sleep disorders.

KEYWORDS

education, ESRS, sleep

1 | INTRODUCTION

The burden of sleep loss and disorders associated with deficient or disrupted sleep is very high. One fourth of the general population reports short sleep, that is, sleeping less than 6 h per night on average (Kocevska et al., 2021), and sleep disorders (including sleep disordered breathing, insomnia, restless legs syndrome, parasomnias, and narcolepsy) are found in more than 30% of the general population (Kerkhof, 2017). While sufficient/healthy sleep has favourable effects on body, brain, mental, and social health (Vorster et al., 2024) (Lim et al., 2023), sleep loss and sleep disorders decrease performance, creativity, and quality of life, and also increase the risk of accidents, cardiovascular, neurological, psychiatric, and metabolic disorders (Vorster et al., 2024) (Chattu et al., 2018). Furthermore, sleep loss and sleep disorders have a major impact on health costs which was estimated to be as high as 2%–6% of the gross domestic product in Australia and other developed countries (Hillman et al., 2018; Hafner et al., 2017; Golombek et al., 2024).

The European Sleep Research Society (ESRS) was founded in 1972 (Deboer et al., 2022) “to promote the research on sleep and related areas in Europe, to improve the care for patients with sleep disorders and to facilitate the dissemination of information regarding sleep research” (§2.1 of the original bylaws). Under the Presidency of Professor Billiard (1996–2000), the ESRS education committee was created. Under the Presidency of Professor Tobler (2000–2004), educational courses were organised with the support of companies. Under the presidency of Professor Pollmächer (2004–2008), a large

EU-funded educational Marie Curie programme provided intensive 1-week educational courses to 160 students across Europe for 4 years. Under the presidency of Professor Bassetti (2008–2012), the first European Somnologist Examination was held (2012) in Paris and the First Edition of the *European (ESRS) Sleep Medicine Textbook* was published in 2014 under the presidency of Prof. Peigneux (2012–2016). Following the success of the first edition, a second edition of the textbook was published during the Presidency of Professor McNicholas (2016–2020). Currently, more than 1000 sleep specialists from over 50 countries have taken the ESRS examination (Grote et al., 2022). In the past 10 years, some European academic institutions (including the Universities of Oxford and Bern) have launched postgraduate University sleep programmes or degrees.

The workshop was conceptualised as an activity of an ESRS Multidisciplinary Task Force, which was established by the initiative of the Education Committee. The local organisation together with the ESRS board and the Bernese Sleep Team (chaired by Professor Bassetti and Professor Adamantidis) and took place over 2 days in Bern on August 24–24, 2023.

The main aims of the workshop can be summarised as follows:

- Appraisal of current gaps and future needs/opportunities in sleep education.
- Review of the current and future role of the ESRS in promoting education in sleep, taking into consideration clinical and experimental perspectives as well as the possibilities for synergies with academic institutions and other professional societies.

BOX 1 Terminology.

Constructive alignment is a pedagogical framework linking teaching, learning activities, and assessment to ensure that students achieve desired learning outcomes.

Learning objective is a desired outcome of learning.

Actual teaching and learning activities are the methods and experiences designed by educators to help students achieve specific learning outcomes, including lectures, seminars, group work, Case Studies, Problem-Based Learning, Flipped Classroom, and other activities.

A Catalogue of Knowledge and Skills is a systematic list of the key understandings, competencies, and abilities that learners are anticipated to develop within an educational framework.

Entrustable professional activities (EPAs) are tasks that trainees must be able to perform competently upon reaching a certain level of training. They are central activities on competency-based medical education.

Competency-based education focusses on specific competencies that the students are expected to achieve.

Eligibility refers to admission requirements.

Single Best Answer is a specific type of multiple-choice question, with only one correct alternative according to the scenario.

Delphi round is a structured process used for collecting expert opinions and achieving consensus, involving multiple, iterative rounds of questioning and collective feedback.

European Union of Medical Specialist (UEMS) is an organisation that represents medical specialists across Europe. UEMS works towards establishing common standards for medical training and continuing professional development among EU member states.

- In depth analysis of the current ESRS Catalogue of Knowledge and Skills.
- Critical review of current contents and format of the *ESRS Sleep Medicine Textbook* (also in comparison with popular textbooks in English, French, and German) and potential strategies for the preparation of the 3rd Edition.

2 | FUTURE OF SLEEP EDUCATION**2.1 | Targets and methods of education**

The consensus of the workshop was that the primary educational focus of ESRS consists of health care providers focussing on sleep, sleep researchers, and sleep technologists. Nevertheless, there is a

need to target education for the general population, general health care professionals, university students in different degrees, and patients. The targets and methods of education in sleep medicine should be compliant with contemporary standards in Europe-wide higher education, as stated in the "Bologna Declaration" (European Commission. Bologna Declaration, 1999). These standards emphasise constructive alignment, being the interaction between the learning objectives outlined in the course curriculum, the actual teaching and learning activities (TLA), and the final assessment. All of these should be aligned to each other. The implications of these principles for sleep medicine are elaborated in a recent narrative review (Grote et al., 2022), which emphasised that the Somnologist curriculum must be adapted to meet European educational recommendations.

2.2 | Learning objectives

Defining learning objectives for sleep researchers and clinicians is of central importance (Box 1). To establish learning objectives, the revised version of the Catalogue of Knowledge and Skills (CKS) for sleep medicine published by the ESRS (Penzel et al., 2021) describes subject headings in the different areas of sleep medicine. However, these items were not predefined as learning objectives at the outset. Furthermore, the required theoretical knowledge and practical skills relating to these items were not specified. The knowledge aspects are extensively covered in the Sleep Medicine Textbook, published by the ESRS (*Sleep Medicine Textbook*, 2021). The CKS, however, is not prescriptive regarding the requirements for practical training in sleep medicine, which comprises three-quarters of the total education package (Penzel et al., 2014). To achieve a detailed catalogue for learning objectives in sleep medicine, these gaps should be addressed and synchronised with the content of the next edition of the textbook. The gaps can be identified by a matrix (blueprint) which links the learning objectives and the education available by ESRS to links with other relevant organisations such as universities and other professional societies with an emphasis on sleep.

2.3 | Selection and role of educators

The educational framework and facilities needed for the organisation of the sleep medicine curriculum largely go beyond the mission and capabilities of the ESRS. Both theoretical education and practical training of sleep professionals, researchers, and other groups within sleep additionally require involvement of accredited sleep centres, medical schools, university master's programmes, as well as teaching organised by national sleep societies and inter-university consortia.

Because teaching activities are not exclusively performed by the ESRS, which is also the organiser of the European Somnologist examination, specific efforts need to be undertaken to ensure that the widely accepted concept of constructive alignment may not be significantly compromised. This potential challenge may be mitigated by applying the concept of entrustable professional activities (EPAs). This

method requires us to define a priori what clinical activities the somnology-trained healthcare provider does in practice (ten Cate, 2005). A previous ESRS guideline qualitatively and quantitatively described what activities sleep medicine experts should have performed during their training programmes (Pevernagie et al., 2009). However, a systematic and detailed list of EPAs for the practice of sleep medicine is still to be defined.

To achieve these improvements in the sleep medicine curriculum, we recommend that the ESRS envisages a more structured development towards competence-based education. To this end, a newly developed EPA evaluation system could be incorporated in practical teaching at the level of accredited sleep centres for the training of future sleep specialists. Furthermore, the principle of objective structured clinical examination may be introduced in teaching courses at the national level (Tervo et al., 1997). With this approach, a college of educational authorities could evaluate the intended competences and jointly organise examinations. This method has mainly been applied for the assessment of medical students but may also be appropriate for testing medical professionals in a later stage of specialisation.

A critical point of success is to recruit staff members to provide the necessary educational material. Early career researchers and educational experts need to be recruited, so as to link the theoretical material of the textbook to other, interactive material (quizzes, videos, etc.). Pedagogic expertise should be applied when producing pedagogically challenging tasks and documents. Developing new methods for education and assessment also implies education of the teachers. Another critical aspect is the accreditation of the sleep centres involved in practical training. This will be required when EPAs are introduced to somnologist training.

3 | ROLE OF THE ESRS IN SLEEP EDUCATION

The rapid expansion of clinical sleep medicine has made it essential to establish a robust framework for the education and certification of sleep professionals, researchers, and Sleep Medicine Centres to ensure high standards of practice. In response, the ESRS has entrusted its Education and Sleep Medicine Committees (EduComm and SMC, respectively) with developing a comprehensive plan for professional credentialing, in collaboration with the Assembly of National Sleep Societies (ANSS) in Europe (van der Werf et al., 2022).

EduComm comprises a professional group of ESRS members tasked to develop and implement a framework for advancing sleep education by the ESRS. EduComm's primary mission is to establish and continuously refine a curriculum for sleep education in partnership with European universities and national sleep societies. This curriculum is planned and implemented according to the concept of constructive alignment. Its assessment is conducted through the Somnologist Examination, where EduComm serves an advisory role to the Somnologist Examination Subcommittee.

To ensure that the curriculum remains relevant and up-to-date, EduComm and ESRS have recently formed a taskforce aimed at

defining the EPAs needed by sleep researchers and clinical practitioners across the various fields of medicine. Along with its contribution to the *ESRS Sleep Medicine Textbook*, EduComm has also established a digital network of E-Sleep Lessons and Sleep Science School lectures in collaboration with other ESRS entities. Together with ESRS Webinars, these resources offer comprehensive information on various aspects of sleep medicine and research, from physiology, pathology, and diagnostic procedures to societal, economic, and organisational aspects of sleep health and disorders (esrs.eu/e-sleep). In future, the on-line education should be expanded and synchronised with the updated CKS.

As described earlier, SMC plays a critical role in defining accreditation standards for Sleep Medicine Centres across Europe. Additionally, it acts as a platform for the development of clinical guidelines, practice parameters, and position papers, for which there is a strong need in the European sleep field.

Given the dynamic nature of sleep medicine and research, it is crucial that educational efforts by various bodies are well coordinated. This coordination requires collaboration among different societies and universities to maximise the expertise available for training sleep medicine professionals. Ideally, this coordination could follow the model used for specialist medical education, as managed by the European Union of Medical Specialists (UEMS) (Union Européenne des Médecins Spécialistes, 2023). UEMS, a non-governmental organisation composed of national associations of medical specialties from across Europe, plays a pivotal role in setting standards and harmonising education across the continent. As sleep medicine is not recognised as a specialty or subspecialty by UEMS, the ESRS, together with other societies interested in sleep medicine, needs to engage actively with UEMS to obtain recognition of sleep as a distinct specialty. For this work, a taskforce is needed.

4 | EDUCATION ON BASIC SLEEP RESEARCH

An important part of the ESRS mission is to provide the platform for interaction and collaboration between basic sleep researchers and clinicians. Basic sleep science can be defined as an interdisciplinary area of knowledge encompassing fundamental physiology and neurobiology of sleep. This includes molecular and genetic mechanisms of sleep, brain circuitry responsible for generating and maintaining sleep–wake states, bodily processes, including cardiovascular and respiratory physiology, as well as metabolism and endocrinology of sleep, circadian control of sleep and mechanisms of sleep regulation. Basic sleep research spans animal models including simple in vitro preparations, as well as human studies, typically entailing electroencephalography monitoring, cognitive testing, or brain imaging, combined with pharmacological or non-pharmacological sleep manipulations.

Basic sleep science has provided a wealth of knowledge and critically important insights that not only form the basis for clinical sleep education, but more generally have been instrumental for

understanding the pathophysiology of sleep disorders and the development of novel treatments. This includes elucidation of the role of orexin deficiency in narcolepsy (Bassetti et al., 2019), discovery of the subcortical circuitry implicated in the loss of muscle atonia in REM behaviour disorder, or our growing understanding of the effects of chronic sleep deprivation and circadian disruption for a wide range of neurodegenerative, neuropsychiatric, or cardiovascular disorders across different populations.

While the curriculum of a typical undergraduate medical programme at European Universities includes a comprehensive scientific foundation for clinical education, including anatomy or applied physiology, very little if any basic sleep education is provided. Likewise, the existing textbooks recommended for medical students often tackle sleep very superficially if at all, and the material provided is often outdated and lacking in-depth and critical appraisal. To address this important omission, the Workshop highlighted the unique role the ESRS should play in promoting basic sleep education for both sleep researchers as well as clinicians and other health care professionals.

5 | SOMNOLOGIST EXAMINATION

The European Somnologist certification programme (esrs.eu/sleep-medicine-examination), developed by the ESRS, represents a significant advancement in the field of sleep medicine (Pevernagie et al., 2009). Its primary aim is to enhance patient care across Europe by providing a rigorous and independent evaluation of mainly theoretical knowledge and to a lesser extent practical skills essential for professionals in this specialised area. The ESRS certification is recognised as one of the three major international certification programmes in sleep medicine, alongside those offered by the American Academy of Sleep Medicine (www.asm.org) and the World Sleep Society (worldsleepsociety.org/examination) (Quan et al., 2012). However, it is important to note that while the programme was predominantly designed and managed by medical experts, the systematic involvement of teaching and pedagogic experts was somewhat limited, which has been recognised as an area for further development (Grote et al., 2022).

The initial objectives of establishing robust principles for education and credentialing of sleep professionals have largely been achieved, and sleep medicine courses are now organised across Europe to prepare candidates for the annual certification examination. Moreover, in many European countries, the European qualification of Somnologist has become a crucial credential for practitioners seeking formal recognition as specialists in sleep medicine. This credential is increasingly seen as a benchmark for excellence in the field, but collaboration with the different NSSs is needed to achieve a legal recognition of the professional title of Somnologist across Europe.

Planning, organising, and evaluation of the examination is under the responsibility of the Somnologist Examination Subcommittee. The process for evaluation of the eligibility of candidates is a critical component of the examination. To be eligible, candidates must meet specific theoretical and practical training requirements, as detailed in CKS

(Penzel et al., 2021) and in the European guidelines for the accreditation of Sleep Medicine Centres (Pevernagie, 2006). The certification process for the technologists places a stronger emphasis on the practical aspects of sleep medicine, particularly in diagnosing sleep disorders and managing sleep-disordered breathing with ventilatory support devices. The stringent criteria ensure that only those with adequate preparation and experience can participate in the certification process. Over the years, 88% of applicants within the physician/psychologist/scientist group and 93% of technologists have successfully met these eligibility criteria.

The current examination format consists of multiple-choice questions (single-best answer type), meticulously designed according to a blueprint based on the CKS and with the basic concept that all questions are backed up by statements written in the ESRS textbook. Additionally, a practical component has been introduced to better assess candidates' hands-on capabilities. In future, EPAs are expected to be integrated into the curriculum, ensuring that candidates not only possess the knowledge but also the practical competencies to perform critical tasks independently and effectively. In the past 12 years, the programme has certified more than 1000 somnologists and sleep technologists from over 50 countries, underscoring its global reach and impact (Grote et al., 2022). The overall failure rate for certification has been relatively low, with 7% for somnologists and 11% for sleep technologists. Among those who have successfully passed the examination by 2024, 78% are physicians, psychologists, or researchers with at least a master's degree, while 22% are sleep technologists or nurses. Recognising the challenges that some candidates face with the English-language examination, ESRS has initiated a pilot project to offer a simultaneous translation of the sleep technologist examination into Spanish. If this initiative proves successful, it may be expanded to include other European languages, further broadening access to the certification.

There is currently no recertification process for the Somnologist certification. Implementing such a process would be essential to ensure that certified practitioners maintain their competencies and stay up to date with the latest advances in the field. However, significant challenges arise from the diversity of national regulations and healthcare systems. It is crucial to find a balance between the need for standardised recertification processes, adherence to national standards, and the flexibility required to accommodate the diverse healthcare environments and professional cultures across the continent.

6 | CATALOGUE OF KNOWLEDGE AND SKILLS (CKS)—CONSIDERATION FOR 3RD REVISION

Training and education in sleep medicine and research is a major priority for the future. To achieve this, different educational tracks have been developed. To provide these educational tracks with sleep medicine and sleep research content, a content-driven curriculum is required. For this purpose, a CKS for sleep medicine was developed. In its first edition, the catalogue served as a blueprint for the

examination to become a sleep expert in Europe. All the necessary knowledge and skills were collected by initiating a Delphi round among sleep centres in Europe. In this way, it was ensured that the newly developed catalogue would meet the requirements of these centres. This Delphi round was performed back in 2012. The CKS was compiled, agreed upon by SMC, and published in parallel with the development of an ESRS Textbook on sleep research and sleep medicine (Penzel et al., 2014). The CKS matched the table of contents for this ESRS textbook. More recently, new guidelines were developed and new technologies such as telemedicine were introduced to sleep medicine practice and became important. In addition, the overall management of sleep disorders in medical practice changed. Sleep disorders became more recognised in other medical disciplines and therefore “sleep medicine for neurologists”, “sleep medicine for cardiologists” and other fields needed to be addressed specifically. It became clear that the ESRS Textbook's table of contents should reflect these growing expectations from the field for learning sleep medicine. Accordingly, CKS followed these requirements, and an updated revision was published in 2021 (Penzel et al., 2021). Again, this version reflected the table of contents for the textbook and the CKS continues to serve as a blueprint for the Somnologist examination.

A new updated revision of the CKS, version 3, is needed and is under development. That will include new medical education methods and clear statements of learning objectives. New guidelines and technologies that have been developed since version 2 was published need to be included, for example, related to telemedicine in diagnosing and managing sleep disorders (American Academy of Sleep Medicine, 2023). Also, the medical education methodology has changed, learning objectives need to be defined clearly and terminology updates need to be considered. For example, the 11th Revision of the International Classification of Diseases (ICD-11) (icd.who.int) now includes a section on sleep disorders, and this needs to be reflected.

Finally, a CKS for different university degrees—medical doctors, specialists, psychologists, biologists, and other degrees with connection to sleep health such as biomedical engineering (artificial intelligence, sensor developments) or public health (epidemiology, preventive medicine) needs to be developed. This CKS would then include the learning outcomes, EPAs, and connection to educational material provided by the ESRS.

7 | STRATEGY FOR 3RD TEXTBOOK EDITION

As discussed earlier, the *Sleep Medicine Textbook* provides the central focus for theoretical education by the ESRS and is the primary knowledge base for study towards the Somnologist examination that has been developed and administered by the Society. The consensus of the workshop was that the next edition should be designed to appeal to those taking other postgraduate courses in sleep medicine such as those provided in universities such as Oxford and Bern, and other initiatives in the field. This will require interaction with the leaders of

such courses and a pro-active approach to these courses was recommended to explore priorities for inclusion in the next edition of the textbook. Also, existing collaborations with other European societies such as the European Respiratory Society, the European Academy of Neurology, and the European Psychiatric Association should be leveraged to maximise the opportunity for the revised textbook to link with the educational needs of these societies. This aspect is facilitated by the existence of memorandums of understanding (MoU) between the ESRS and these societies.

Defining learning objectives for sleep researchers and clinicians is of central importance in the textbook development, which are synchronised with the CKS. These learning objectives should be identified at the outset of the process rather than created to fit what was already written. As EPAs are designed to test a person's ability to perform particular clinical activities rather than theoretical knowledge (ten Cate & Schumacher, 2022), these would not be directly incorporated into the textbook. However, the textbook could be developed with specific EPAs in mind by providing the theoretical knowledge to develop the relevant EPA-related skills. Further, the Section Editors of the revised textbook may be appropriate experts to provide the relevant links between the textbook and EPAs.

The first and second editions of the Textbook are stand-alone paper editions, but the third edition should ideally incorporate digital material and an integrative platform. The traditional book format is less appealing to younger readers who are well skilled in information technology and a combined format that includes the traditional textbook with digital and interactive solutions is desirable. Such solutions may include on-site and hands-on courses, webinars, on-line courses, teaching videos, and other teaching materials that are designed to complement the textbook. There is a shortage of hands-on courses on sleep and the ESRS should work to correct this shortage.

Feedback regarding earlier editions of the Textbook have commented on redundancy and lack of uniformity, which should be addressed in the 3rd Edition. Also, synopses of each section covered in the textbook should be included, ideally written by the Section Editors. Better uniformity between chapters may be achieved by the development of standard chapter templates that could subsequently be adjusted to suit individual chapter requirements. Efforts should also be made to cross-link chapters with related content.

A deficit in earlier editions of the textbook is the relative lack of the basic science of sleep, including the physiological basis and theories on sleep regulation and function, which should be corrected in the next edition. An expanded coverage of basic science in the general textbook was regarded by the workshop as preferable to a separate textbook focussed on basic science aspects of sleep. The expansion of basic science in the next edition should include separate sections devoted to basic science together with an expanded discussion of basic science aspects in other sections of the textbook where appropriate. However, to limit the overall length of the revised textbook, the revision of existing chapters will need to be reduced in length to limit the overall length of the next edition. This can be achieved by careful attention to overlapping content between chapters and limiting references to high impact original research of high quality, and review papers.

A new publisher will be sought for the next edition and potential publishers will be contacted at an early stage in the development. A suitable publisher would be one with the resources to also develop the digital, integrative platform.

8 | REVIEW OF COMPETITIVE TEXTBOOKS IN SLEEP MEDICINE

The development of a third edition of the ESRS textbook should be considered in the context of other similar products. Among major comprehensive textbooks, probably the most widely known is *Principles and Practice of Sleep Medicine* (7th edition, 2021), which is published independent of a sleep society. Although highly comprehensive (1700 pages) both in basic and clinical sleep domains, its size makes it impracticable to be used as reference material for an examination. This prompted the production of the shorter (322 pages) companion textbook *Kryger's Sleep Medicine Review—A Problem-Oriented Approach* (3rd edition, 2019), which is designed to help in preparing for the (US) Sleep Medicine Board Examination. With the same editor-in-chief, the illustrated *Atlas of Clinical Sleep Medicine* (3rd Edition, 2023; 511 pages) is an additional educational resource to aid in the diagnosis and treatment of adult and paediatric sleep disorders. Other non-society-linked textbooks with international multi-authorship are the *Oxford Textbook of Sleep Disorders* (2017, 608 pages), the *Oxford Handbook of Sleep Medicine* (2022, 352 pages), and *Sleep Medicine* (2016, 584 pages), which are promoted as a practical guide for clinical practice and an introduction to specialist training in clinical sleep medicine. At the initiative of the Belgian and Dutch Sleep Societies, the book *Sleep and Sleep Disorders: A Practical Handbook* (2020; 862 pages) is broadly similar to the ESRS textbook in offering an in-depth overview of the fundamental aspects of sleep and important sleep disorders.

Regarding sub-specialty textbooks, the *European Respiratory Society Handbook of Respiratory Sleep Medicine* (2nd edition, 2023; 440 pages) is a clinically focussed textbook that emphasises clinical practice and the latest guidelines for sleep specialists, trainees, and nurses, with a special emphasis on respiratory sleep aspects. Similarly, *Essentials of Sleep Medicine* (2021; 523 pages) is an American Thoracic Society (ATS)-sponsored publication that offers an overview of sleep and sleep disorders for practising clinicians, also with an emphasis on respiratory sleep disorders. Other respiratory-related textbooks are *Management of Obstructive Sleep Apnea* (2022; 646 pages) and *The Clinician's Handbook for Dental Sleep Medicine* (2019; 240 pages). Besides the well-represented respiratory domain, in line with the wide prevalence of respiratory sleep disorders, other sub-specialty textbooks include *Fundamentals of Sleep Technology* (3rd edition, 2019; 630 pages), which was endorsed by the American Association of Sleep Technologists (AASST). Other relevant specialty textbooks are *Sleep Disorders in Psychiatric Patients A Practical Guide* (2018; 299 pages) and the *Oxford Textbook of Clinical Neurophysiology* (2016; 512 pages).

Finally, problem-oriented books are the *Case Book of Sleep Medicine* (3rd edition, 2019) published by the American Academy of Sleep

Medicine (AASM) with 90 adult and paediatric sleep cases as a companion to the disorders outlined in the AASM International Classification of Sleep Disorders (3rd edition), and the *Review of Sleep Medicine* (4th Edition, 2017; 931 pages) with 1400 interactive questions and answers online using figures, polysomnography tracings, actigraphy and sleep diaries, which mimic the American Board of Sleep Medicine (ABSM) examination style and format.

Considering the publications summarised above, the *ESRS Sleep Medicine Textbook* has distinctive features in that it is the only comprehensive textbook in sleep medicine that is published by an international scientific society, based on an expert consensus (CKS) and envisioned as preparatory study material for a recognised certification in sleep medicine at the European level. Regarding the latter aspect, the growing size from the 1st to the 2nd edition (from 532 to 1100 pages) raises the concern that a possible further increase in size of the 3rd edition could make the textbook, like *Principles and Practice of Sleep Medicine*, difficult to use as study material for an examination. In addition to making the Textbook more concise, practical solutions could include identifying specific chapters as study material and/or developing smaller, focussed companion handbooks, and casebooks.

9 | ESSENTIALS OF SLEEP

The workshop identified a potential role for a smaller book on sleep and related disorders that would be aimed at a much wider audience that has no detailed knowledge of this subject. To address this deficit, the “*Essentials of Sleep*” will be published as a paperback with a maximum of 200 pages and including attractive illustrations. The plan is to have the book also available as an e-book and audiobook. The target audience includes a wide range of newcomers in the field of sleep, with two major target groups:

- University students: students working towards diverse degrees aimed to improve public health and healthcare, including different science, technology, engineering and mathematics (STEM), education and social science degrees. The book can serve as reading material for introductory undergraduate and graduate courses on sleep.
- Health care providers interested in sleep: this includes medical doctors with different specialties, psychologists, nurses, and other health care professionals.

A potential secondary target audience could include healthcare policy makers, the general public interested in sleep, and patients with sleep disorders wishing to better understand their condition.

The goal of this book is to attract individuals with no background in the sleep field, which represents a very different target group to the ESRS textbook. This book will not serve as a condensed version of the textbook. Rather, the content and style will be less technical and detailed, and will be designed to appeal to those with minimal knowledge of sleep medicine and science who seek an introduction to the subject.

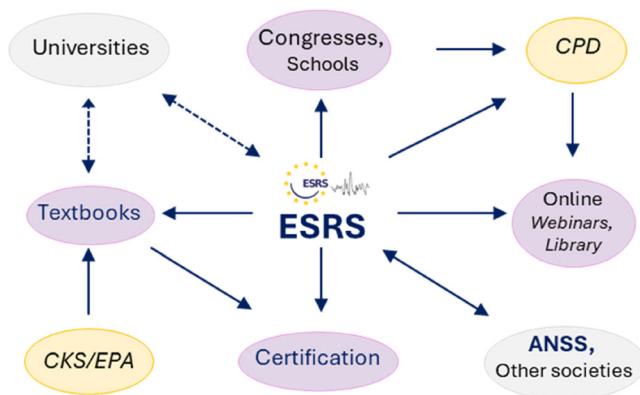


FIGURE 1 Proposed role of the ESRS in European Sleep Education. CKS, Catalogue of Knowledge and Skills; CPD, Continuing Professional Development EPA, Entrustable Professional Activity; ESRS, European Sleep Research Society.

The text will be peer-reviewed and based on published literature. However, references will be placed at the end of each chapter for further reading, not behind individual statements and care will be taken to facilitate easy reading and understanding of major concepts throughout the text from an introductory point of view.

10 | WORKSHOP CONCLUSIONS AND FUTURE ACTION PLANS

While the ESRS has achieved major successes in its objectives of being the voice of sleep medicine and science in Europe (Figure 1), much more remains to be achieved in the field of sleep education. Several priorities for action were identified by the workshop participants.

1. **The Society should continue to enhance its position as the central focus for sleep education in Europe.** This objective requires action in the following areas:
 - a. **Continuous development of the sleep curriculum and education** for basic sleep researchers, clinicians, and other professional groups involved in sleep medicine and research. This activity also includes continued development of the Somnologist examination and accreditation of sleep centres to promote optimum standards of patient care and to provide a focus for education.
 - b. Developing a framework to establish **collaboration with universities offering postgraduate degree/diploma courses in sleep and with other societies that provide educational resources** in sleep-related aspects of their specialty such as the ERS HERMES project.
 - c. Further increase in **online educational resources** on the society website such as webinars and stored lectures from meetings and congresses.
 - d. An increased focus on educational content at the bi-annual congress of the Society, **Sleep Europe**. The pre-congress

educational courses need to be improved, and educational sessions should be considered during the congress.

2. **The role of ANSS needs to be emphasised within the ESRS.** Educational activities developed or endorsed by the ESRS should be systematically implemented through the ANSS member societies. This includes all EPA activities, which need to be performed in the sleep centres within the ANSS network.
3. **ESRS should enhance links with other societies such as European Respiratory Society, the European Academy of Neurology, the European Psychiatric Association and the federation of European Neuroscience Societies to promote collaboration in sleep-related activities.** An example of success in this aspect is the bi-annual Sleep and Breathing conference organised jointly by the ESRS and ERS, which is primarily focussed on education and continuing professional development. Additional possibilities include the development of inter-society courses, both online and in-person, joint symposia, networking, and satellite events.
4. **The development of Entrustable Professional Activities (EPA) relating to sleep** is necessary and a Task Force devoted to this objective has recently been established.
5. **The third edition the Sleep Medicine Textbook should improve on the previous edition in several aspects:**
 - a. The product should be interactive and include web-based materials.
 - b. The textbook should be developed in conjunction with a revised catalogue of knowledge and skills (CKS) that incorporates EPAs.
 - c. The textbook should increase the content relating to basic science in preference to developing a separate basic science textbook.
 - d. The textbook should seek to address the needs of universities providing courses in sleep regarding content with a view to these courses accepting the SMT as a recommended educational resource.
6. **The society should broaden its target in sleep education to include non-sleep specialists.** An important objective in this context is the development of a smaller non-specialist book that provides the basic knowledge of sleep and sleep disorders. The workshop established a group to develop this project, which was given the provisional title “Essentials of Sleep”.

AUTHOR CONTRIBUTIONS

W. T. McNicholas: Conceptualization; visualization; writing – original draft. **E. S. Arnardottir:** Writing – original draft; conceptualization. **V. V. Vyazovskiy:** Writing – original draft; conceptualization. **D. Pevernagie:** Conceptualization; writing – original draft. **T. Penzel:** Conceptualization; writing – original draft. **P. Peigneux:** Conceptualization; writing – original draft. **L. Grote:** Conceptualization; writing – review and editing. **Y. van der Werf:** Writing – review and editing; conceptualization. **F. de Jongh:** Conceptualization; writing – review and editing. **M. Schmidt:** Conceptualization; writing – review and editing. **M. Adamantidis:** Conceptualization;

writing – review and editing. **S. Sekaran:** Conceptualization; writing – review and editing. **A. M. Biller:** Conceptualization; writing – review and editing. **B. Knobl:** Writing – review and editing; project administration. **P.-H. Luppi:** Conceptualization; writing – review and editing. **C. L. Bassetti:** Conceptualization; writing – review and editing. **T. Paunio:** Conceptualization; writing – original draft. **T. Paunio:** Conceptualization; visualization; writing – original draft.

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CONFLICTS OF INTERESTS

LG has not COI related to the content of the current manuscript. Outside the work, LG has received unrestricted institutional grants for the ESADA collaboration from RESMED; RESPIRONICS and BAYER AG. LG has lectured for Itamar, Lundbeck, Astra Zeneca, Resmed, and Respiroics. LG owns shares of a company which has licensed a patent for pharmacological OSA therapy to Desitin GMBH. TP has not COI related to the content of the current manuscript. Outside this work, TP has received honoraria for lectures given at Idorsia Pharmaceuticals Ltd Masterclass 2023 and Biogen Workshop 2023.

DATA AVAILABILITY STATEMENT

Data sharing not applicable to this article as no datasets were generated or analysed during the current study.

ORCID

W. T. McNicholas  <https://orcid.org/0000-0001-5927-2738>

E. S. Arnardottir  <https://orcid.org/0000-0003-0877-3529>

V. V. Vyazovskiy  <https://orcid.org/0000-0002-4336-6681>

D. Pevernagie  <https://orcid.org/0000-0002-7372-8583>

T. Penzel  <https://orcid.org/0000-0002-4304-0112>

P. Peigneux  <https://orcid.org/0000-0003-4745-1434>

L. Grote  <https://orcid.org/0000-0002-7405-1682>

Y. Van Der Werf  <https://orcid.org/0000-0003-2370-9584>

A. M. Biller  <https://orcid.org/0000-0002-3673-8838>

T. Paunio  <https://orcid.org/0000-0002-5560-0666>

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