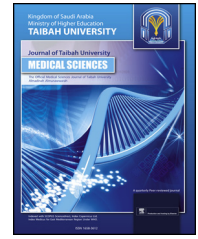




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Original Article

## Curriculum development for the Saudi sleep medicine fellowship program

Ahmed S. BaHammam, FRCP<sup>a,b,\*</sup>, Hamdan H. Al-Jahdali, FRCPC<sup>c,d,e</sup>,  
Meteb H. Alenazi, FRCP<sup>a,f</sup>, Salih A. Aleissi, MD<sup>a</sup> and Siraj O. Wali, FAASM<sup>g</sup>

<sup>a</sup> University Sleep Disorders Center, Department of Medicine, College of Medicine, King Saud University, Riyadh, KSA

<sup>b</sup> Strategic Technologies Program of the National Plan for Sciences and Technology and Innovation in the Kingdom of Saudi Arabia, KSA

<sup>c</sup> College of Medicine, King Saud Bin Abdulaziz University for Health Sciences, Riyadh, KSA

<sup>d</sup> Department of Medicine, Pulmonary Division, Ministry of National Guard-Health Affairs, Riyadh, KSA

<sup>e</sup> King Abdullah International Medical Research Center, Riyadh, KSA

<sup>f</sup> Department of Psychiatry, College of Medicine, King Saud University, Riyadh, KSA

<sup>g</sup> Sleep Medicine Research Group, Sleep Medicine and Research Center, King Abdulaziz University Hospital, Jeddah, KSA

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### المخلص

**أهداف البحث:** تتطور ممارسة طب النوم بشكل متسارع على مستوى العالم، مما يتطلب أطباء طب نوم مؤهلين جيداً لتلبية هذه الخدمة الإكلينيكية. على الرغم من اعتماد طب النوم كتخصص مستقل في المملكة العربية السعودية في عام 2012، تشير البيانات الوطنية إلى أن عدد المتخصصين المبرزين والمعتمدين في طب النوم لا يزال منخفضاً نسبياً. تم إنشاء برنامج زمالة منظم في طب النوم في المملكة العربية السعودية في عام 2009، من قبل جامعات وبدون وجود برنامج تدريب وطني تحت رعاية الهيئة السعودية للتخصصات الصحية. لذلك، كانت هناك خطط لبناء برنامج تدريب وطني متعدد التخصصات لطب النوم لخدمة البلد بأكمله.

**طرق البحث:** في عام 2020، كلفت الهيئة السعودية للتخصصات الصحية لجنة تطوير المناهج التخصصية لبرنامج الزمالة في طب النوم لتطوير برنامج تدريب وطني لطب النوم للبالغين.

**النتائج:** طورت اللجنة منهج ومتطلبات برنامج الزمالة في طب النوم للبالغين والتي تضمن أن يصبح المتدربين مؤهلين في تقييم وتشخيص وإدارة اضطرابات النوم المختلفة. تمت الموافقة على المنهج من قبل رئيس هيئة تحرير المناهج في الهيئة السعودية للتخصصات الصحية.

**الاستنتاجات:** تعرض هذه الورقة المنهج المطور، ومتطلبات القبول لبرنامج الزمالة السعودي في طب النوم.

**الكلمات المفتاحية:** تطوير المناهج؛ التعليم؛ شهادة؛ تمرين؛ طب النوم

### Abstract

**Objectives:** Given the rapid global development of sleep medicine, well-qualified sleep medicine physicians are necessary to meet the demand. Although sleep medicine was accredited as an independent specialty in KSA in 2012, national data suggest that the number of trained and accredited sleep medicine specialists remains comparatively low. A structured sleep medicine fellowship programme was established in KSA in 2009. However, universities issued training and certification without a national training programme under the auspices of the Saudi Commission for Health Specialties (SCFHS). Therefore, plans have been made to establish a national interdisciplinary sleep medicine training programme to serve the whole country.

**Methods:** In 2020, the SCFHS mandated the Specialty Curriculum Development Committee of the Sleep Medicine Fellowship Program to develop the National an adult sleep medicine national program.

**Results:** The committee developed an adult sleep medicine fellowship programme curriculum and requirements to ensure that trainees become competent at assessing,

\* Corresponding address: University Sleep Disorders Center, College of Medicine, King Saud University, P.O. Box 225503, Riyadh, 11324, KSA.

E-mail: [ashammam2@gmail.com](mailto:ashammam2@gmail.com) (A.S. BaHammam)

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diagnosing, and managing various sleep disorders. The curriculum was approved by the head of the Curricula Editorial Board of the SCFHS.

**Conclusions:** This paper presents the curriculum and admission requirements for the newly developed Saudi Sleep Medicine Fellowship Program.

**Keywords:** Certification; Curriculum development; Education; Sleep medicine; Training

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## Introduction

Sleep disorders are prevalent and underdiagnosed in KSA due to a shortage of sleep medicine physicians and sleep medicine resources.<sup>1</sup> The Third Edition of the International Classification of Sleep Disorders (ICSD-3) includes seven major groups of sleep disorders: insomnia, sleep-related breathing disorders, central disorders of hypersomnolence, circadian rhythm sleep–wake disorders, sleep-related movement disorders, parasomnias, and other sleep disorders that comprise more than 87 sleep disorders.<sup>2</sup> As there are numerous sleep disorders with their own classification manual, clinical presentation, diagnostic criteria, and specialty management, there is an urgent need for specialised sleep medicine training programmes.<sup>2</sup> Moreover, specialty care improves patient outcomes in several clinical settings.<sup>3</sup> It has been revealed that certified sleep medicine physicians provide better management and better results in patients with sleep disorders.<sup>4</sup>

Sleep medicine has witnessed major progress in scientific and clinical fields in the past three decades and has become a distinct medical specialty.<sup>5</sup> Further, KSA accredited sleep medicine as an independent specialty in 2012 and published the Saudi regulations for accrediting sleep medicine specialists.<sup>5</sup> However, there is overall low exposure to sleep medicine education among medical students and trainees in different specialties.<sup>6,7</sup> Additionally, there is a lack of trained sleep medicine specialists and technologists to meet the rising demand.<sup>8</sup> In a national survey (2013), the ratio of qualified sleep medicine specialists—according to the Saudi Commission for Health Specialties (SCFHS) accreditation criteria—to people was 0.012/100,000,<sup>9</sup> which is well below the standards in developed countries.<sup>9</sup> Moreover, a few studies have reported that the underdiagnosis of sleep disorders in KSA causes significant delays in initiating treatment.<sup>10–12</sup>

Nevertheless, KSA has had a good experience regarding structured sleep medicine training; two academic centres have begun offering structured sleep medicine training programmes. In Riyadh, King Saud University (KSU) developed the first structured sleep medicine fellowship programme in 2009; it is a two-year programme that

graduated 12 sleep medicine specialists from KSA, Kuwait, Qatar, Oman, and Jordan.<sup>13</sup> In 2016, a sleep medicine diploma programme was introduced at King Abdulaziz University (KAU) in Jeddah.<sup>1</sup>

Moreover, recent evidence has demonstrated that sleep disorders are associated with significantly higher rates of healthcare utilisation and expenditures<sup>14</sup> and that treating sleep disorders reduces healthcare utilisation and hospital admissions.<sup>15,16</sup> Additionally, an earlier study in KSA demonstrated that the availability of specialised sleep medicine physicians and sleep disorder centres might result in significant cost savings, better patient care, and better utilisation of hospital resources.<sup>17</sup> Establishing a national programme will provide a common body and structure for different sleep disorder centres in the country to facilitate the development of partnership with local centres, regular discussions about challenges, advances, and collaboration. It will also help establish affiliations with internationally prominent research centres, which will be reflected positively in the volume and quality of published work.<sup>13</sup>

Moreover, the SCFHS accreditation of sleep medicine specialists in 2012 allowed for the development of local guidelines on the required competencies to practice sleep medicine, which paved the way for the establishment of local sleep medicine training programmes.<sup>5</sup> The Saudi accreditation guidelines clearly state that ‘a physician is accredited as a sleep physician if he/she is a medical doctor and is trained in the subspecialty of sleep medicine by an accredited program, and has competency in the clinical assessment, physiological testing, diagnosis, management, and prevention of sleep and circadian rhythm disorders’.<sup>5,13</sup>

Sleep medicine has emerged in recent years from multidisciplinary roots and is a highly multidisciplinary field. A unique feature of sleep medicine, as a medical specialty, is that it is interdisciplinary and combines both basic and applied clinical, multidisciplinary practice emphasising long-term clinical care.<sup>18</sup> Another distinguishing feature of sleep medicine is that it is ideally suited to creating a vertical medical education composition.<sup>19,20</sup> This implies that there should be a continuum of training at several levels and progress from basic knowledge to specialty training and several other related specialties, such as pulmonary medicine, psychiatry, neurology, otolaryngology, dentistry, and others.<sup>20</sup>

Therefore, to bring all previous efforts and experience to fruition and meet the increasing demands on the specialty, it is essential to establish a national interdisciplinary training programme to serve the entire country under the umbrella of the SCFHS.

## Method for curriculum development

*Taskforce: the curriculum development committee of the sleep medicine fellowship program*

The SCFHS assigned the Specialty Curriculum Development Committee of the Sleep Medicine Fellowship Program in preparation for this task. The committee comprised adult sleep medicine physicians; three had more than 20 years of experience teaching and training physicians, and two

physicians had recently completed their sleep medicine training and had two years of teaching experience. The members had pulmonary and psychiatric medical backgrounds.

This curriculum aims to ensure that trainees become competent at assessing, diagnosing, and managing various sleep disorders, which requires significant effort and coordination from all stakeholders involved in postgraduate training. The proposed curriculum aims to produce trainees that demonstrate a thorough understanding of the learning objectives as well as self-directed learning and problem-solving.

The committee's goals were to develop a comprehensive, structured sleep medicine training programme that would facilitate competent sleep medicine physicians to assess, diagnose, and manage various sleep disorders, which requires significant effort and coordination from all stakeholders involved in postgraduate training.

The proposed curriculum aims to produce trainees that demonstrate a thorough understanding of learning objectives, self-directed learning, and problem-solving while abiding by the SCFHS policies and regulations to develop the following:

1. Programme entry requirements
2. Learning outcomes and competency-based education
3. Programme duration, structure, and rotations
4. Teaching methods
5. Assessment of learning
6. Evaluation methods to be used in the programme and its component courses

#### *Literature and document review*

To achieve the above objectives, two authors, ASB and SAA, conducted a literature search of English-language papers published between January 2010 and January 2021 using PubMed and Google Scholar with the keywords 'sleep medicine' and 'certification'. The initial literature search found 60 reports, which were narrowed to 20 relevant reports after screening the details of the papers and removing commentary and reports that do not address training and certification in sleep medicine. The reviewers summarised the findings and presented them to the committee members.

Additionally, the Specialty Curriculum Development Committee reviewed the local and international sleep medicine fellowship programme curricula in countries that already provide training and certification in sleep medicine.<sup>20–26</sup> Moreover, the committee contacted experts in sleep medicine training locally and in other countries to obtain information when needed.

#### *Consensus process and curriculum development*

In the context of sleep medicine training, educational content intended to impart medical knowledge and skills is created according to the usual pillars of medical education, which are related to physiological background knowledge, diagnostic procedures, and clinical topics related to sleep medicine.

The committee members held five virtual interactive meetings in the course of developing the curriculum. The attendees of these meetings included invited members who had completed structured local and international sleep medicine training programmes. Feedback was collected from selected experts in sleep medicine training locally and in different countries. Following the SCFHS policies for developing structured training programmes, it was decided that the comments and feedback of the committee members and the selected experts were satisfactory for developing this new programme without the need for a Delphi round.

During the sessions, the following were conducted:

- Presentation of research findings
- Assigning specific tasks to committee members
- Discussion of committee members' findings and recommendations based on the tasks assigned to them
- Development of a proposed curriculum based on research findings and group discussion
- During the final two meetings, the committee members discussed the areas of disagreement, modified the draft as needed, and reached a consensus; all members recorded and approved the meeting minutes

Subsequently, several virtual meetings were held with the SCFHS Curriculum Review Committee to finalise the Saudi Sleep Medicine Fellowship Program and ensure compliance with the SCFHS regulations for medical training.

#### **Results**

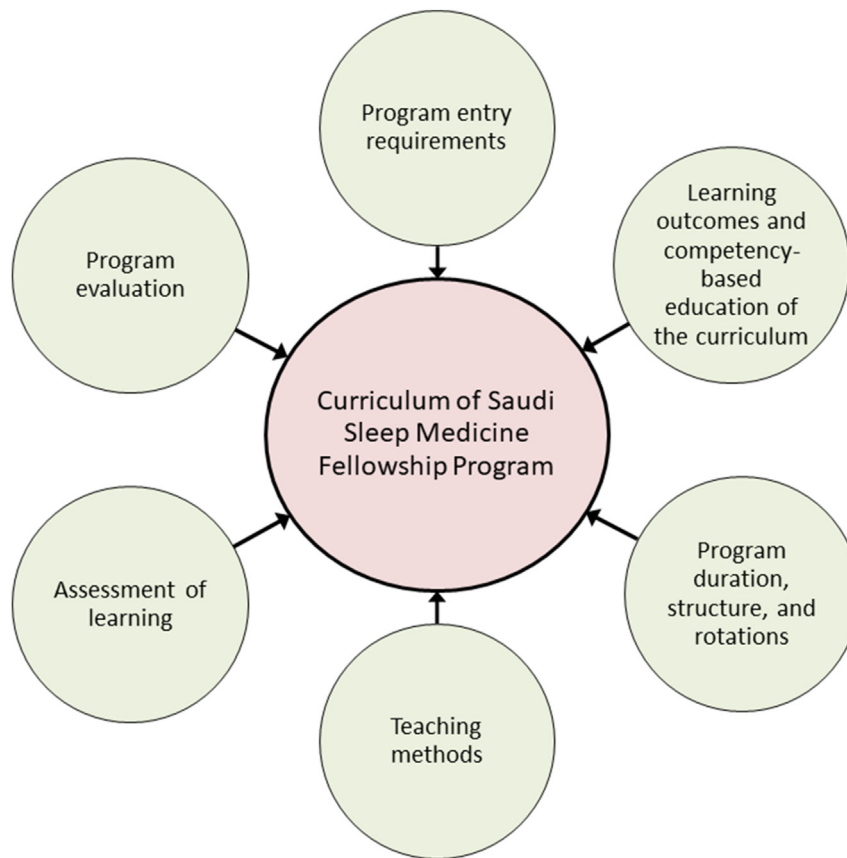
Curriculum development began in December 2020, and the head of the Curricula Editorial Board of the SCFHS approved the final draft of the curriculum in September 2021. Unfortunately, little information is available globally about structured training fellowship programmes for sleep medicine. Nevertheless, the task force committee utilised the available data and local and international experiences with sleep medicine training to develop the curriculum. The task force committee developed detailed programme entry requirements, defined the curriculum's learning outcomes and competency-based educational content, and developed two tracks for training, including programme duration, structure, and rotations. The curriculum also includes descriptions of methods for teaching, assessment, and programme evaluation (Figure 1).

Figure 2 outlines the structure and duration of the sleep medicine fellowship programme.

##### *A. Programme entry requirements*

In general, the entry requirements shall comply with the Executive Policy of the SCFHS on Admission and Registration. According to the SCFHS rules and regulations, candidates can be admitted to the programme only if the following qualifications have been met:

- The applicant must possess a certificate from the Saudi Board (or an equivalent certificate approved by the SCFHS) in a core programme in intensive care medicine, adult pulmonary medicine, family medicine, internal



**Figure 1:** Components of the Saudi sleep medicine fellowship program.

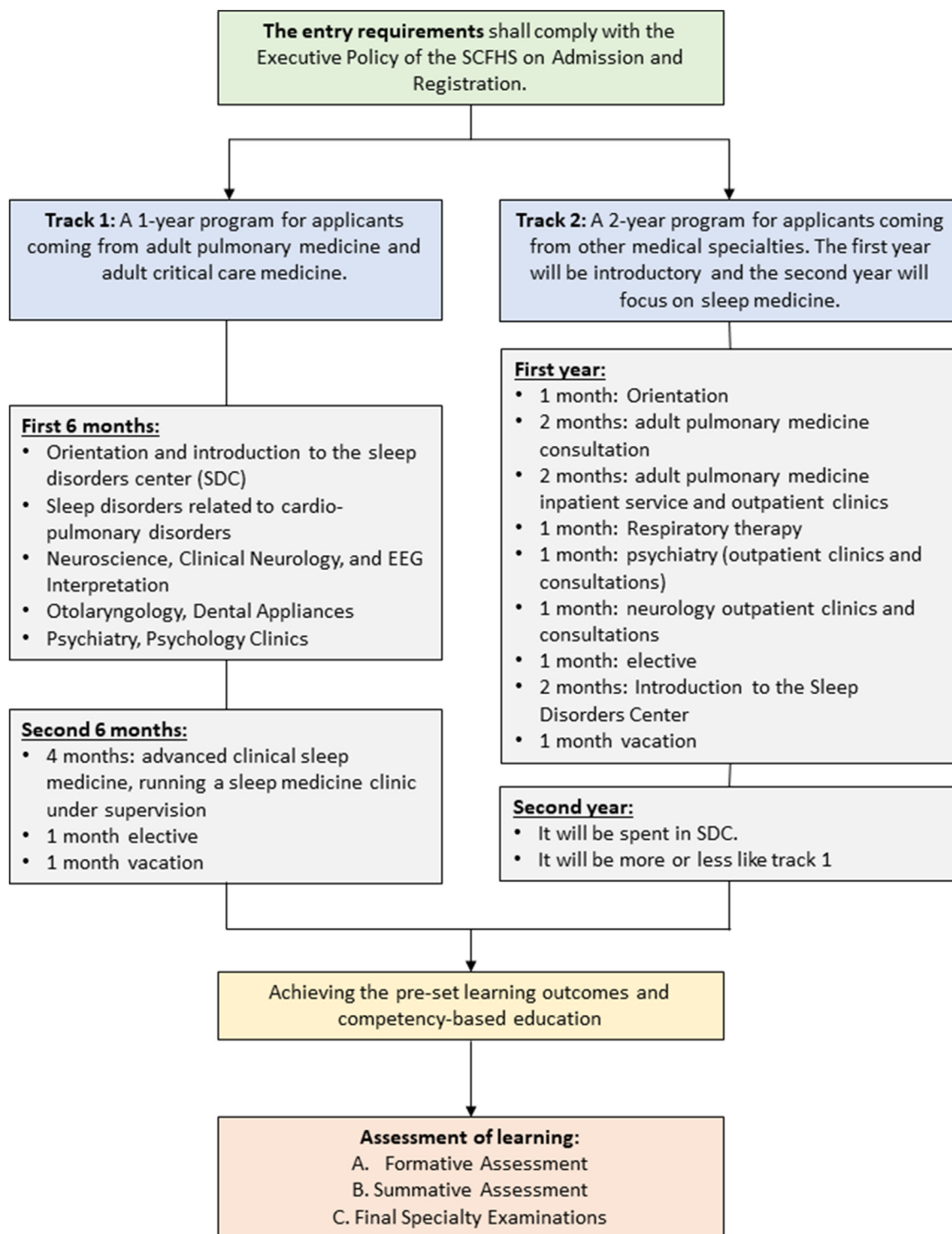
medicine, neurology, otolaryngology, or psychiatry that satisfies the requirements, or the candidate must have successfully passed the final written component of the Saudi Board examination in a core programme.

*B. Learning outcomes and competency-based educational content of the curriculum*

To develop the following competencies needed to certify sleep medicine physicians, the committee was guided by the updated (2021) European ‘catalogue of knowledge and skills’ for sleep medicine,<sup>27,28</sup> based on the Bologna Process on the general concept of medical and scientific education,<sup>29</sup> while abiding by the SCFHS regulations and policies. Clinical exposure and the number of procedures needed were guided by the SCFHS’ Saudi Regulations for Accrediting Sleep Medicine Physicians.<sup>5</sup>

- Extract appropriate history and perform the relevant physical examination of patients with sleep disorders pertinent to evaluating the seven major sleep disorders, according to the ICSD- 3.
- Demonstrate the competency and skills required to diagnose and manage common sleep disorders at the consultancy level by acquiring the requisite knowledge, skills, and attitudes to recognise, investigate, and manage adult sleep disorders.

- The trainee must be familiar with the indications and interpretations of commonly used sleep disorder questionnaires, sleepiness assessment questionnaires, and sleep/wake diaries.
- Demonstrate the ability to recognise, evaluate, and manage complex sleep disorder cases and the importance of specialty referral whenever indicated (e.g. identifying abnormal movement and involving an epileptologist or other specialist(s) early in the course of the disease for appropriate management).
- Demonstrate knowledge of the clinical use, indications, advantages, and limitations of type-1 polysomnographic testing, portable sleep studies (home sleep apnoea testing), actigraphy, multiple sleep latency, and maintenance of wakefulness testing.
- Develop the skills needed to effectively use all technical aspects of sleep testing procedures—patient instrumentation, signal acquisition and processing, and troubleshooting recorded signals, including recognising and correcting recording artefacts.
- Demonstrate the skills for interpreting actigraphy, cardiorespiratory ambulatory studies (home sleep apnoea testing), and polysomnographic sleep studies. Competency in scoring sleep studies will comprise recognition of the non-rapid eye movement (NREM) and rapid eye movement (REM) sleep stages, as well as the American Academy of Sleep Medicine (AASM) scoring criteria for sleep

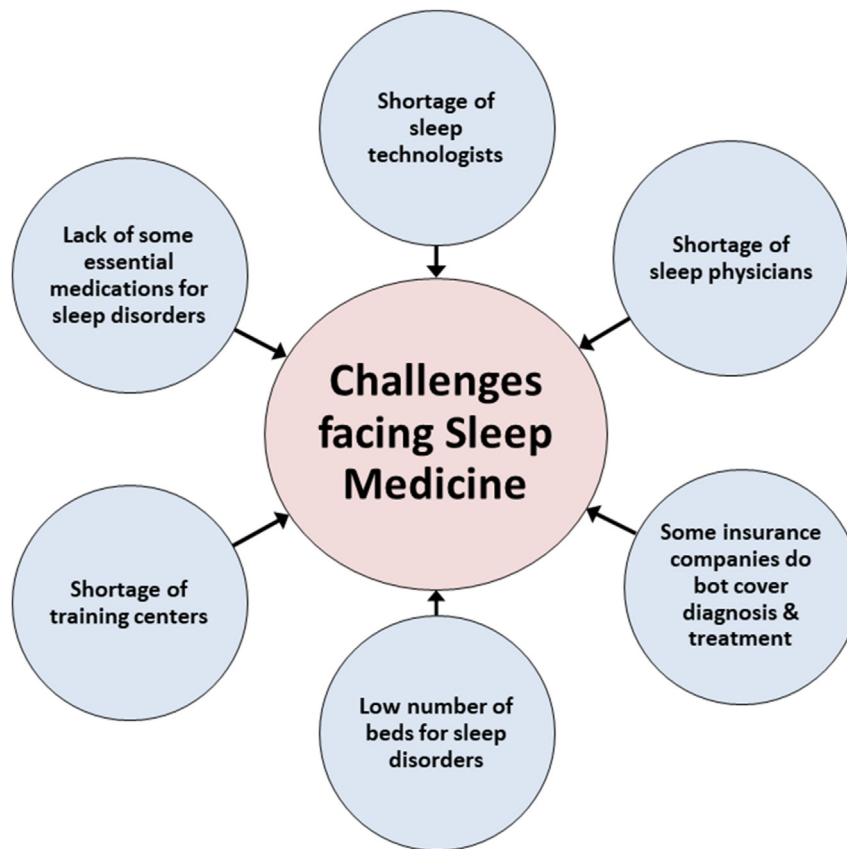


**Figure 2:** An outline of the structure and duration of the sleep medicine fellowship programme.

- arousals, and identification of normal or disturbed sleep architecture.
- Detect and interpret abnormal waveforms or neurological events, such as seizure activity, score periodic limb movements, recognise different respiratory events, including apnoeas, hypopnoeas, upper airway resistance events, and

hypoventilation, and interpret histograms (including hypnograms).

- Demonstrate mastery of theoretical knowledge and practical skills pertaining to all modes of positive airway pressure (PAP) therapy (conventional vs. auto-adjusting continuous PAP [CPAP]) and all modalities of bi-level



**Figure 3:** An illustration of some challenges facing sleep medicine in KSA.

(pressure support) mode, adaptive-servo ventilation, and oxygen therapy in the treatment of breathing-related sleep disorders.

- Demonstrate familiarity with and adherence to PAP therapy follow-up protocols, interpretation of PAP devices' stored data and waves, and telemonitoring.

*For clinical exposure, the trainee needs to achieve the following:*

- A minimum of 100 new patients and 150 follow-up patients documented in the trainee's logbook
- At least 50 new patients must have a diagnosis other than sleep-disordered breathing
- Evaluation of at least ten paediatric patients with sleep disorders
- Two sleep medicine clinics weekly
- Set up at least five patients for overnight studies
- A minimum of 100 PSG (polysomnography) interpretations
- A minimum of 10 MSLT/MWT (multiple sleep latency test/maintenance of wakefulness test) interpretations
- Must attend all sleep lecture series ( $\geq 80\%$ ) and complete the required readings
- Demonstrate adequate knowledge of the following topics by the end of their training: physiology of sleep; sleep and wakefulness physiology and its relationship with age; sleep control; the proposed biological functions of sleep; EEG signals during wakefulness, sleep, and different sleep stages; familiarity with the latest AASM scoring criteria for the different sleep stages; physiological and pathological changes to different bodily functions during sleep; the proposed functions of the NREM and REM sleep stages; the chronobiological characteristics of sleep; methods for assessing time-dependent changes in sleepiness and vigilance; circadian rhythm disorders (diagnosis and treatment); assessment of and diagnostic procedures for sleep disorders; the ability to perform clinical and psychological workup (interview and examination); adequate knowledge of the diagnostic approach to those diseases listed in the ICSD-3 (2014); mastery of the diagnostic procedures applicable to various sleep disorders; PAP therapy and its different modes; strategies to enhance PAP adherence; telemonitoring of PAP therapy; interpretation of PAP stored data; cognitive behavioural therapy for insomnia and other psychotherapeutic procedures; sleep hygiene and light therapy; the influence of medication on sleep; drug therapy for sleep disorders; surgical procedures for sleep-disordered breathing and dental appliances for obstructive sleep apnoea (OSA), including indications and side effects; [Appendix A](#) presents the medical and scientific topics that training needs to cover during the fellowship
- It is strongly recommended that trainees write at least one article that is preferably a result of the trainee's sleep research project

The training committee of the SCFHS will be responsible for preparing the timetable and rotations for all participating

candidates. Candidates rotate between assigned hospitals regardless of their original hospital affiliation, as stated in the SCFHS regulations.

### C. Programme duration, structure, and rotations

A review of the available literature indicated that the Accreditation Council for Graduate Medical Education's (ACGME) sleep medicine training guidelines were first established in the United States in 2011 as a one-year sleep medicine fellowship programme.<sup>20</sup> Nevertheless, sleep medicine has grown significantly as a discipline over the past decade. Therefore, sleep medicine experts have criticised the existing structure of sleep medicine fellowships as being less than optimal and insufficient to facilitate mastery of all the required competencies, particularly for applicants from backgrounds other than pulmonary medicine.<sup>20,30</sup> As 70–80% of sleep disorders encountered at sleep disorder centres are related to sleep-disordered breathing, a one-year training programme cannot equip trainees from other medical backgrounds with all the relevant missing background information.<sup>8</sup> Additionally, all internal medicine subspecialty fellowship training programmes are at least for two years. A recently developed programme in Asia has adopted a two-year fellowship training programme in sleep medicine.<sup>31</sup>

Based on the above, the committee adopted two tracks: a one-year programme for applicants from adult pulmonary

medicine and adult critical care medicine and a two-year programme for applicants from other medical specialties, as detailed below.

#### *The programme will have two tracks:*

1. **Track 1:** A one-year programme for applicants from adult pulmonary medicine and adult critical care medicine
2. **Track 2:** A two-year programme for applicants from other medical specialties; the first year will be introductory (as detailed below), and the second year will focus on sleep medicine

##### *1. Track 1*

One year will be spent mainly at the Sleep Disorders Center, attending different clinical activities. However, time will be allocated to emphasise the following points on the specified timelines:

- A) **The first six months of sleep medicine training will take place during the one-year Sleep Medicine Fellowship Program as follows:**
  - **Four months** of sleep medicine training will primarily be spent on advanced clinical sleep medicine and running a sleep medicine clinic under supervision, with at least four paediatric sleep medicine clinics during this period
- B) **The second six months of sleep medicine training will take place during the one-year Sleep Medicine Fellowship Program as follows:**
  - **Four months** of sleep medicine training will primarily be spent on advanced clinical sleep medicine and running a sleep medicine clinic under supervision, with at least four paediatric sleep medicine clinics during this period

<b>Month 1</b>	<ul style="list-style-type: none"> <li>● Orientation to sleep medicine service</li> <li>● Introduction to sleep laboratory procedures and policies</li> <li>● Introduction to polysomnogram interpretation</li> <li>● Introduction to polysomnogram scoring</li> <li>● Sleep-focused history and physical examination</li> <li>● Differential diagnosis of hypersomnia, insomnia, and parasomnia</li> <li>● Sleep medicine clinics (2–3 clinics/week, with mentoring)</li> <li>● Understanding questionnaires commonly used at the Sleep Disorders Center</li> </ul>
<b>Month 2</b>	<ul style="list-style-type: none"> <li>● Introduction to management and entry of patients' clinical data at the Sleep Disorders Center</li> <li>● The trainee will spend time with the Sleep Disorders Center staff to learn about the following:               <ul style="list-style-type: none"> <li>○ Patients' data collection</li> <li>○ Data management and cleaning</li> <li>○ Computer skills needed for data entry (spreadsheets)</li> <li>○ Basics of data analysis and basic statistics for use at the Sleep Disorders Center</li> </ul> </li> </ul>
<b>Month 3</b>	<ul style="list-style-type: none"> <li>● Emphasis on sleep disorders related to cardiopulmonary disorders</li> </ul>
<b>Month 4</b>	<ul style="list-style-type: none"> <li>● <b>Neuroscience, Clinical Neurology, and EEG Interpretation</b> <ul style="list-style-type: none"> <li>○ In addition to the work at the Sleep Disorders Center, attend one (half-day) session on advanced EEG scoring and troubleshooting EEG signals per week at the Sleep Disorders Center</li> <li>○ Attend one neurology clinic per week to familiarise with common neurological disorders and be trained to read the EEGs of patients with nocturnal epilepsy either at their training centre or at an external training centre</li> </ul> </li> </ul>
<b>Month 5</b>	<ul style="list-style-type: none"> <li>● <b>Otolaryngology (Ear, Nose, and Throat [ENT]), Dental Appliances</b> <ul style="list-style-type: none"> <li>○ In addition to the work at the Sleep Disorders Center, attend one ENT clinic weekly for two weeks (with an ENT doctor interested in upper airway surgery)</li> <li>○ Attend one orthodontic clinic weekly for two weeks (with an orthodontist interested in dental appliances and dental surgery for OSA) (optional)</li> </ul> </li> </ul>
<b>Month 6</b>	<ul style="list-style-type: none"> <li>● <b>Psychiatry, Psychology Clinics</b> <ul style="list-style-type: none"> <li>○ In addition to the work at the Sleep Disorders Center, attend one psychiatry clinic weekly to become acquainted with the diagnosis and management of common psychiatric disorders</li> <li>○ Attend one behavioural sleep medicine clinic weekly (optional)</li> </ul> </li> </ul>

- **One-month elective:** Suggestions include two weeks in the Epilepsy Monitoring Unit and two weeks dedicated to cognitive behavioural therapy for insomnia; however, other local or international rotations can be arranged
- **Four weeks of vacation:** (i) The trainee is entitled to a one-month vacation and a one-week Eid holiday per year of training; (ii) Education leaves of not more than one week/year are arranged internally within the rotations; (iii) Educational leave should be in sleep medicine and approved by the programme director and service head; (iv) The trainee must provide a certificate of attendance, or these days will be subtracted from their regular vacation

## 2. Track 2

This track comprises a two-year training programme for medical doctors in internal medicine, family medicine, psychiatry, neurology, and ENT.

The first year will mainly be spent on medical specialties related to sleep medicine to develop good practical knowledge in applied physiology and the clinical skills needed to manage patients with sleep disorders, focusing on pulmonary medicine and non-invasive ventilation. The second year will be spent at the Sleep Disorders Center.

### a) **Year 1: This year will be spent on medical specialties related to sleep medicine to develop good practical knowledge in applied physiology and the clinical skills needed to deal with patients with sleep disorders, focusing on pulmonary medicine and non-invasive ventilation.**

- **One month (1<sup>st</sup> month):** Orientation

#### **Objectives of the orientation month:**

1. To orient to the setting and workflow in the sleep disorders facilities
2. To read the necessary information about sleep disorders and understand the relationship to subsequent rotations in the first year of training
  - **Two months** of adult pulmonary medicine consultation
  - **Two months** of adult pulmonary medicine inpatient service and outpatient clinics

#### **Objectives of the pulmonary medicine rotation are as follows:**

1. Recognise and correct knowledge deficiencies in respiratory physiology, primarily focusing on the mechanisms of breathing, lung mechanics, and arterial blood gas interpretation.
2. Recognise indications, contraindications, modes, and application of non-invasive ventilation and address patients' concerns and complaints about it.
3. Demonstrate diagnostic and therapeutic proficiencies in the assessment and management of common airway diseases, such as asthma, chronic obstructive pulmonary disease (COPD), neuromuscular disorders, and hypoventilation; provide an overview of pulmonary hypertension and its types; elucidate the approach to the diagnosis and management of respiratory failure and the effects of drugs on the respiratory system.

- **One month:** Respiratory therapy service and pulmonary function laboratory

#### **Objectives of this rotation are as follows:**

1. Participate in the multidisciplinary team management of respirology patients. The trainee will work with respiratory therapists (RTs) to familiarise with indications, initiation, troubleshooting, and termination of non-invasive ventilation in inpatient service.
2. Understand preliminary interpretation of pulmonary function tests with the supervisor assigned to the service.
3. Identify abnormalities related to spirometry.

**Note:** To ensure adherence to the objectives and regular attendance of the clinical sessions with the RTs, the trainee needs to present the cases managed and procedures attended at the end of each week of this rotation to their supervisor at the Sleep Disorders Center.

- **One month** in psychiatry (outpatient clinics and consultations)

#### **Objectives of the rotation are as follows:**

1. Demonstrate an appropriate clinical approach to assessing psychiatric disorders and know when to seek consultation from the psychiatry service regarding patients with sleep disorders.
2. Demonstrate how to approach a patient with insomnia and comorbid psychiatric illnesses and use different interventions (behavioural and pharmacological therapy).
3. Demonstrate knowledge of the basics of cognitive behavioural therapy for insomnia, besides indications and methods of using cognitive behavioural techniques.
4. Recognise and learn about the coexistence of sleep disorders/problems with psychiatric disorders and vice versa and their influence on each other (e.g. insomnia and depression).
5. Know the medications for psychiatric disorders and their effect on sleep and sleep disorders.

**Note:** Instead of the psychiatry rotation, sleep medicine fellows from a psychiatry background may elect to perform a neurology rotation or add the month to the Sleep Disorders Center rotation at the end of the first year.

- **One month** in neurology outpatient clinics and consultations

#### **Objectives of the rotation are as follows:**

1. Understand the clinical approach to history taking and physical examination of patients with neurological disorders.
2. Recognise common sleep manifestations of neurological disorders such as Parkinson's disease, Alzheimer's disease, and neuromuscular disorders.
3. Recognise the effect on sleep of medications used for seizure and other neurological disorders.
4. Gain exposure to the basics of EEG and EMG monitoring and interpretation.

**Note:** Instead of the neurology rotation, sleep medicine fellows from a neurology background may elect to do a psychiatry rotation or add the month to the Sleep Disorders Center rotation at the end of the first year.



- **One month:** Elective

**The trainee can choose any elective in arrangement with the programme director.**

- **Last two months:** Introduction to the Sleep Disorders Center

- Introduction to sleep laboratory procedures and policies
- Introduction to polysomnogram interpretation
- Introduction to polysomnogram scoring
- Sleep-focused history, commonly used sleep disorder questionnaires, sleep diaries, and physical examination
  - **Four weeks of vacation:** The trainee is entitled to a one-month vacation and a one-week Eid holiday per year of training. Education leaves of not more than one week/year are arranged internally within the rotations. Educational leave should be in sleep medicine and approved by the programme director and service head. The fellow must provide a certificate of attendance, or these days will be subtracted from their regular vacation.

**Note:** During pulmonology OPD, neurology, and psychiatry rotations, the fellow will attend at least two clinics per week and the unit's academic activities to which they are assigned.

- b) **Year 2:** This year will be spent mainly at the Sleep Disorders Center, attending different clinical activities. It will be more or less similar to Track 1; for more details, see [Appendix B](#).

#### D. Teaching methods

Formal training should include the following three formal teaching activities:

##### a) Programme-specific learning activities

**I. Academic half-day activities.** There should be at least 2–4 h of formal training per week (commonly referred to as an academic half-day). This formal teaching time excludes bedside teaching and clinical postings. The academic half-day should cover the core specialty topics discussed above and align with specialty-defined competencies and teaching methods. The recommended number of academic half-days is 40 sessions per academic training year.

Academic half-day activities need to be conducted weekly on a fixed day of the week for the entire year. They typically comprise the following:

- A theoretical lecture (1 h) following the program developed by the SCFHS training committee
- A case discussion (1 h) will be presented by one of the trainees and discussed by the consultant
- PSG scoring/troubleshooting alternating evenly with a journal club (i.e. one week for PSG scoring and one week for the journal club)

**II. Logbook.** The trainee needs to complete the logbook requirements, including the following: interpret PSGs, interpret MSLT/MWT, sleep diaries, actigraphy, and evaluate new and follow-up patients. These logbook requirements should be verified and approved by a sleep medicine consultant.

**III. Inter-Scorer Reliability (ISR).** The AASM Accreditation Standards are the internationally accepted 'gold standard' criteria for scoring sleep studies. Therefore, trainees must master the AASM scoring rules. To achieve this goal and ensure scoring consistency in accordance with the latest version of the AASM scoring manual,<sup>2</sup> the Specialty Curriculum Development Committee of the Sleep Medicine Fellowship Program adopted the AASM's ISR program. This enables both individual and facility users to score new records of 200 epochs every month.<sup>32</sup> Thus, a new evaluation exercise is conducted monthly.

If a trainee fails to score above the acceptable level, they must discuss strategies for improving their performance with the programme director.

#### E. Assessment of learning

Continuous assessment is an essential part of quality assurance and improvement of the fellowship programme. The assessment aims to guide trainees and trainers towards achieving the targeted learning objectives through reciprocal feedback and improve training. The assessment should cover curriculum development, teaching methods, and the quality of the learning environment.

The assessment process is classified into two main categories: formative and summative. Assessment will be conducted during training rotations throughout the academic year as a 'continuous assessment protocol/process' involving informative and summative evaluation.

##### i. Formative assessment

The principal goal of formative assessment is to provide trainees with professional and helpful feedback. Additionally, the annual summation of the overall productive assessment tools will be utilised at the end of each year to determine whether individual trainees will be promoted to the next level of training.

Continuous assessment formats comprise the following:

##### a. In-Training Evaluation Reports (ITER)

ITERS should be conducted at least thrice, covering nine training months per year. They will be submitted to the local supervisory committee for each trainee and are based on a series of workplace-based assessments (WBAs) considered relevant to the specialty.

##### b. Final In-Training Evaluation Report (FITER)

In addition to the supervising committee's approval of the completion of clinical requirements (the trainee's logbook), programme directors also prepare an FITER for each resident at the end of their final year of training. This report shall be the basis for obtaining the training programme completion certificate and the qualification to sit for the final specialty examinations.

According to the executive policy of continuous assessment, trainees must earn a specified minimum grade (borderline pass) in every component of the continuous assessment to qualify for promotion.<sup>33</sup>

### ii. Summative assessment

Summative assessment is applied at the end of each rotation to measure the outcome of trainee learning. The general objective of summative assessment is to make informed decisions about trainees' competencies. Unlike formative assessments, summative assessments do not seek constructive feedback.<sup>33</sup>

To qualify to sit for the final exam, a trainee should be granted the certification of training completion.

### iii. Final specialty examinations

The final exam will be administered at the end of the training session. The final examination has two components:

1. **Final Written Exam:** This is a written examination that comprises multiple-choice questions (MCQs); it will be administered annually at the end of each academic year.
2. **Final Clinical Exam:** This examination will assess trainees' clinical skills and management approaches, including data collection, patient management, communication, and counselling skills. It will be held annually at the end of each academic year in either the structured oral examination (SOE) or objective structured clinical examination (OSCE) format, comprising patient management problems (PMPs).

Two important points related to the examinations are as follows:

- a. A candidate must pass the written exam at the end of the first year (the passing mark is 60%) to be allowed to move to the second year of training.
- b. A candidate must obtain a letter from their programme director stating that their performance during the training period is satisfactory to be eligible for the final examination. Upon completing all the requirements and passing all exams, the candidate will be awarded the Saudi Specialty Degree in Sleep Medicine Certificate according to the rules and regulations of the SCFHS. The fellowship is titled the Saudi Fellowship in Sleep Medicine (SF-SM).

### F. Programme evaluation

This step aims to evaluate the implementation of the curriculum. The training outcomes of this programme will be scrutinised per the quality assurance framework endorsed by the Central Training Committee of the SCFHS.<sup>33</sup> Trainees' assessment (both formative and summative) results will be analysed and mapped to the curriculum content.

Other indicators will be incorporated, including reports on the annual trainees' satisfaction survey, reports on trainees' evaluation of faculty members and rotations, reports on the annual survey of programme directors, and direct field communications involving trainees' and trainers' data available from programme accreditations.

The achievement of milestones will be evaluated at the end of each stage to assess curriculum delivery. Any deficiency will be addressed in the following stage, utilising the time devoted to trainee-selected topics and professional sessions.

### Discussion

The establishment of a national sleep medicine fellowship programme is a major step towards filling the clinical and research knowledge gap in KSA. It is also a model that neighbouring and regional countries can imitate.<sup>26</sup>

In response to the continuous increase in the demand for sleep medicine services in KSA,<sup>34</sup> the accreditation and certification of sleep medicine physicians and technologists are crucial to patient care. Several studies have determined that the accreditation of sleep centres and the certification of sleep medicine physicians are associated with better outcomes and better adherence to management plans in patients with sleep disorders.<sup>4,35</sup>

Nevertheless, sleep medicine practices and the establishment of concomitant facilities still face many challenges in KSA.<sup>34</sup> The low number of qualified sleep technologists continues to be a significant challenge for practice in KSA.<sup>9,34</sup> The shortage of trained sleep technologists has been deemed a major obstacle in establishing sleep disorder centres in KSA.<sup>8,9</sup> Figure 3 illustrates a few challenges facing sleep medicine in KSA. Additionally, healthcare decision-makers have no precedence for diagnosing and treating sleep disorders.<sup>13</sup> A national survey showed that 'unconvinced administration' constituted one of the most formidable obstacles to the success of efforts to establish sleep disorder facilities in approximately 50% of hospitals in KSA.<sup>9</sup> This reflects the under-recognition of the seriousness of sleep disorders and their impact on major cardiometabolic complications such as diabetes, stroke, and cardiovascular diseases.<sup>36–38</sup> Executives and managers are generally unaware that sleep medicine could provide a considerable return on investment for human health as well as overall cost savings in medical care.<sup>39</sup>

Another barrier is that collaboration among directors of sleep disorder centres is sometimes hindered by their different medical backgrounds and departmental affiliations<sup>39</sup>; multidisciplinary graduates who can work together at the same sleep disorder centres will help ameliorate this problem.

Additionally, government hospitals and insurance companies do not always freely provide PAP devices used to treat sleep-related breathing disorders. Moreover, some controlled medications for treating sleep disorders, such as modafinil, sodium oxybate, pitolisant, and others, have not yet been approved by the Saudi Food and Drug Administration,<sup>13</sup> resulting in difficulties obtaining these medications.

### Conclusions and Recommendations

Therefore, the launch of a national sleep medicine fellowship programme should be accompanied by the collaborative efforts of all stakeholders to convey the importance of diagnosing and treating sleep disorders to healthcare decision-makers in the country. Additionally, we need to prove to healthcare decision-makers and policy-makers that patient outcomes are better when managed by qualified specialists domiciled at specialised, designated sleep

medicine facilities. Specifically, we need to stress the potential of treatment for sleep disorders to contribute to reduced morbidity and mortality<sup>40</sup> as well as the cost-effectiveness of the provided service.

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### Conflict of interest

The authors have no conflict of interest to declare.

### Ethical approval

Ethical approval is not applicable, as this is an analysis of the literature and the development of guidelines.

### Authors contributions

ASB, HHA, MHA, SAA, and SOW conceived and designed the study, conducted research, provided research materials, collected and organised the data, analysed and interpreted the data, wrote the initial and final drafts of the article, and provided logistic support. All authors have critically reviewed and approved the final draft and are responsible for the content and similarity index of the manuscript.

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### Appendix A. Supplementary data

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