# Sleep medicine service in Saudi Arabia

## *A quantitative assessment*

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## ABSTRACT

**Objective:** To assess quantitatively sleep medicine services in Saudi Arabia (KSA) and identify obstacles that face specialists and hospitals and preclude the establishment of this service.

**Methods:** A self-administered questionnaire was mailed to 53 major governmental and private hospitals in KSA on September 2005. The response rate was 69.8%. Data were coded and analyzed.

**Results:** The survey identified 9 sleep disorders facilities in KSA; 7 were defined as sleep disorders centers and 2 as sleep laboratory using the American Academy of Sleep Medicine definitions. The per capita polysomnography (PSG) rate was 7.1 PSG/year/100,000 population, which was much lower than the reported rates in developed countries. The occupancy rate of sleep facilities was found to be low (45.7%). The most important identified obstacles facing the progress of sleep medicine in KSA were lack of trained sleep technicians, shortage of sleep medicine specialists and the un-availability of fund or designated space for the facility.

**Conclusion:** Sleep medicine seems to be underdeveloped in KSA compared to developed countries. Organized efforts are needed to overcome the identified obstacles and challenges facing the progress of sleep medicine in KSA.


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Sleep medicine is a relatively new specialty; however, over the past 25 years this field has expanded and developed in order to diagnose and treat different sleep-related disorders. The latest international classification of sleep disorders (ICSD) included more than 84 disorders.[1] As a result, the number of clinical sleep facilities (SFs) needed to diagnose and treat patients with sleep disorders has increased worldwide. The interest in developing clinical SFs has increased with the recognition of obstructive sleep apnea (OSA) and its complications. For accurate diagnosis of OSA and proper initiation of therapy, the patient needs to spend at least one night in the sleep laboratory for an overnight sleep study (polysomnography [PSG]). Polysomnography remains the gold standard diagnostic test for OSA and an essential part of the diagnosis of other sleep disorders such as narcolepsy and movement disorders.[2] During the study, different physiological parameters are monitored and recorded continuously by a trained sleep technician. If the patient was diagnosed to have OSA, continuous positive airway pressure (CPAP) trial is attempted where the pressure of CPAP is titrated gradually under PSG monitoring to reach the optimal pressure that will eliminate the obstructive events and improve sleep architecture. Patients with OSA can be evaluated in the SF for an entire diagnostic night followed by a CPAP titration night; or a split-night protocol can be used, where a single split-night study for diagnosis and CPAP titration is performed.[3] Objective assessment of daytime sleepiness in the SF is performed using standardized tests. The most commonly used tests are the multiple sleep latency test (MSLT) and the wakefulness maintenance test (MWT).[4] The American Academy of Sleep Medicine (AASM) described 2 different types of sleep disorders facilities. Sleep disorders center (SDC) is a medical facility providing clinical diagnostic services and treatment for patients who present with symptoms or features that suggest the presence of any sleep disorder;



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and sleep laboratory (sleep lab) that provides diagnostic and treatment services limited to sleep-related breathing disorders, such as OSA.[5] Sleep medicine as a specialty is relatively new in the Kingdom of Saudi Arabia (KSA). Papers addressing the awareness of physicians about sleep disorders and the impact of lacking sleep disorders facilities capable of diagnosing different sleep disorders in KSA started to appear in the literature few years ago.[6-8] Since then, the specialty has moved few steps forward; the number of sleep medicine specialists has increased and a number of hospitals started to provide the needed medical services to patients with different sleep disorders. Nevertheless, in our experience, this service is still underdeveloped and underutilized and many obstacles face sleep medicine practitioners in KSA. Therefore, we carried out a national survey to assess quantitatively sleep medicine services in KSA and identify obstacles that face specialists and hospitals and preclude them from establishing this service. Additionally, we want to compare sleep medicine activity in KSA to other countries.

**Methods.** A self-administered questionnaire along with a covering letter and prepaid envelope to return the completed questionnaires were mailed to 53 major governmental and private hospitals and medical centers in KSA. The list of hospitals and centers were obtained from the office of the Postgraduate Medical Education of the College of Medicine at King Saud University and the office of the Saudi Thoracic Society. The letters were addressed to the sleep disorders facility in hospitals that have such service and to the medical director in hospitals not known to have sleep medicine service. The questionnaire was mailed initially in September 2005. Another set of questionnaires were mailed on December 2005 to centers that did not respond to the first survey. We then contacted centers that did not respond to both surveys by telephone or by e-mail to obtain the needed information. The objectives of the study were explained to all participants centers and hospitals. The questionnaire was divided into 3 sections. Section 1 - collected general information about each hospital and was intended to be filled by all participants. Section 2 - was intended to be filled by hospitals that do not have sleep medicine service and collected information about the reasons for not starting sleep medicine service; and section 3 was intended to be filled by hospitals that have sleep medicine service and collected information about their SFs, the number of beds, types of conducted studies and the number of sleep studies performed. To identify the type of conducted sleep studies, we used the American Sleep Disorders Association (ASDA) definitions.[9] Type 1 (standard in-laboratory attended polysomnography [PSG]) is considered the reference standard to which other monitor types were compared; type 2, comprehensive portable PSG which incorporates a minimum of 7 channels including neuro-cardio-respiratory monitoring; type 3, which incorporates a minimum of 4 channels including cardio-respiratory monitoring; and type 4, which incorporates one or 2 channels, typically oxygen saturation or airflow. The average number of PSGs per month in all SFs was calculated, and then the total number of PSGs per year was calculated. The per capita number of PSGs were calculated by dividing the number of sleep studies performed per year by the country's population (21,500,000 citizens).[10] The annual occupancy rate of sleep facilities beds were calculated using the National Center for Health Statistics (NCHS) definition.[11] We assumed that beds in SFs will be utilized during week days (around 5 nights per week) for 48 weeks (4 weeks were considered as national or official holidays). We used the AASM criteria to define sleep disorders center (SDC) and sleep laboratory for sleep-related breathing disorders.[5] The returned questionnaires were coded and entered into a spreadsheet before analysis. Data were expressed as mean ± standard deviation (SD).

**Results.** Thirty-seven completed questionnaires were collected (69.8%). Eleven percent of the surveyed hospitals had >600 total hospital beds, 47.2% from 301-600 beds, 22.2% from 101-300 beds and 19.4% had less than 100 beds. We inquired about the presence of the main specialties related to sleep medicine in surveyed hospitals. All surveyed hospitals had pulmonary medicine service, 77.7% had neurology service, 63.8% had psychiatry service and 88.8% had otolaryngology (ENT) service. Ten hospitals reported having sleep medicine specialists (defined as doctors who had formal fellowship training in sleep medicine). The number of sleep medicine specialists in the surveyed hospitals was 19 specialists; 15 (79%) of them came from pulmonary medicine background and 4 (21%) from neurology background. Only 2 hospitals reported having pediatric sleep medicine specialists (both from pediatric pulmonology background). The most important reasons for not having SFs are illustrated in **Figure 1**. Lack of trained sleep technicians was the most important reason for not having a sleep disorders facility. Other important reasons include shortage of sleep medicine specialists, and the un-availability of fund or a designated space for the facility. In private hospitals, the lack of insurance coverage for sleep studies was a major obstacle. We asked sleep medicine specialists who have SFs in their institutes about the problems that faced them while trying to establish the facility and to rate that on a scale from 0-5 (0 indicates no problem and 5 indicates major problem). The rating



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revealed the following: no sleep technicians (4.25), no designated space for the facility (3.0), the administration is not convinced (2.9) and finally the needed equipment are not available (2.6). The main problems were the unavailability of sleep technicians, designated space for the facility and the needed equipment. Convincing the administration about the importance of the problem was another obstacle in some hospitals. All but one hospital had designated space and beds for the sleep disorders facility. Using the definitions of the AASM for sleep disorders center (SDC) and sleep lab;[5] 7 facilities met the definition of SDC and 2 the definition of sleep lab. All facilities reported conducting type 1 sleep studies based on the ASDA definition. Administratively, all surveyed SFs were under the pulmonary division and all directors of SFs had a pulmonary medicine background. The number of beds in each facility ranged from 1-4 beds with a mean of 1.5 ± 1.0 beds. The total number of beds designated for SFs were 14 and the per capita number of beds was 0.06 beds/100,000 population. The number of PSGs performed per week in each SFs ranged from 1-10 studies with mean of 3.6 ± 2.1 studies/week. All SFs utilized a split-night protocol for CPAP titration. The estimated number of sleep studies per year was 1536 PSG. The per capita PSG rate was 7.1 PSG/year/100,000 population. Two SFs did not conduct any MSLT and the number of MSLTs at other sites ranged from 1-3 per month. None of the SFs reported performing MWT. Of all PSGs performed, 80.0% were for patients with sleep-related breathing disorders (SBD), 4% for periodic limb movements disorder (PLMD), 1.4% for narcolepsy, 2.5% for insomnia and 12% for other reasons. Based on the total number of beds designated to SFs (14 beds) and assuming that beds will be occupied every night during weekdays (around 5 nights per week for 48 weeks); we expect to have 3,360 PSGs/year. The above indicates that this service may be underutilized with an occupancy rate of 45.7% (actual number of PSGs / expected number of PSGs). The occupancy rate was much lower in private hospitals (18%) versus (61.1%) in governmental hospitals. **Table 1** demonstrates a comparison between sleep medicine activity in KSA and some other countries.[12-15] Only 4 facilities have the needed setup and staffing to perform sleep studies for children less than 4 years of age. While one SF had certified sleep technicians; the other SFs had technicians from different backgrounds (respiratory therapists, electroencephalographic technicians, and nurses).

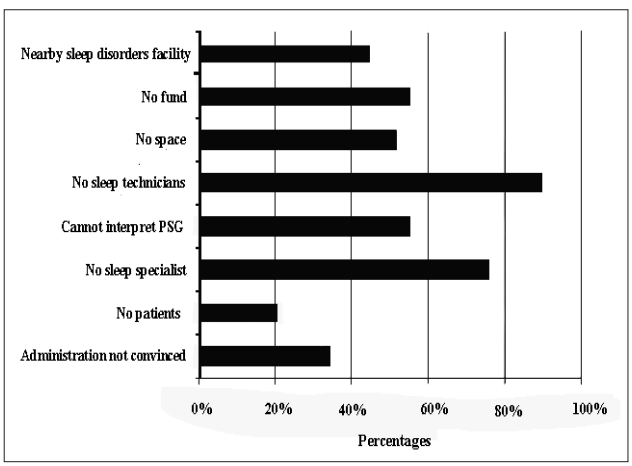


**Figure 1 -** The most important reasons for not having a sleep disorders facility in hospitals is that they do not have sleep medicine service. More than one reason was possible. PSG - polysomnography

**Discussion.** This is the first study that quantitatively assessed sleep medicine activity in KSA. Our results indicate that sleep medicine service is underdeveloped in KSA. This is clearly reflected by the lack of enough sleep

**Table 1 -** Sleep medicine activity in Saudi Arabia compared to other countries.

| Country | Population | No. of sleep facilities | No. of sleep beds | No. of beds/100,000 | No of studies/year | No. of studies/year/100,000 |
|---|---|---|---|---|---|---|
| United States[15] | 280,000,000 | 1,292 | - | - | 1,170,000 | 427.0 |
| Canada[12] | 31,400,000 | 100 | 440 | 1.4 | 116,000 | 370.4 |
| Australia[12] | 18,970,000 | 65 | 244 | 1.3 | 53,500 | 282.0 |
| Belgium[12] | 10,000,000 | 50 | 150 | 1.5 | 17,716 | 177.2 |
| Spain[13] | 40,341,462 | 63 | - | 0.29 | 17,270 | 45.6 |
| United Kingdom[12] | 58,800,000 | 84 | 170 | 0.3 | 25,000 | 42.5 |
| Japan[14] | 126,686,000 | 146 | - | - | 23,184 | 18.3 |
| Saudi Arabia | 21,500,000 | 9 | 14 | 0.06 | 1,536 | 7.1 |



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technicians, extremely low number of sleep medicine specialists, low number of beds designated for sleep medicine/100,000 and the low number of performed PSGs/100,000 compared to other developed countries. With the increased recognitions of sleep disorders especially OSA, centers for diagnosing and delivering treatment for sleep disorders became overwhelmed. Unfortunately, we did not get enough data from surveyed SFs about the waiting time for patients, however, based on our experience in non-urgent cases, the waiting time before seeing the specialist was approximately 6 months, and then another 6 months to undergo PSG. This study identifies the major obstacles that challenge the progress of sleep medicine service in KSA. The lack of trained sleep technicians remained the most important obstacle. While one SF had certified sleep technicians, the remaining SFs recruited health allies from different backgrounds and trained them to do the job of sleep technicians. To overcome this problem, we have to give good incentives to technicians with respiratory therapy or electro-encephalography background to join this field and then we have to start formal training programs to get certified sleep technologists. Sleep medicine may be considered unimportant by some decision making authorities in some hospitals. Hence, sleep specialists have to communicate a clear and evidence-based message to the medical authorities and insurance companies expressing the seriousness of the problem, its impact on patients' morbidity and mortality and the health care system in general.[16] Treatment of OSA has been shown to decrease morbidity and mortality[17] and reduce health care utilization and costs paid by health care authorities.[18] We think there is a need to have a local academic organization such as AASM and association of polysomnographic technologists to set standard diagnostic and therapeutic procedures for sleep disorders and to consider accreditation of sleep disorders facilities in KSA. Sleep medicine service seems to be underutilized in the surveyed SFs as the occupancy rate was less 50%. Possible causes for the low occupancy rate include lack of adequate number of trained sleep technicians who can run a full service every day for the whole year. In addition to the above, a possible explanation for the very low occupancy rate in the private SFs is the fact that most insurance companies in KSA do not cover the cost of sleep studies. Many patients are not willing or cannot afford to pay the cost of the study. In the current study, all SFs belonged to pulmonology. This concurs with other reports from other countries, which showed that the majority of SFs belong to pulmonology (50.8% and 43.8% in the US and Japan, respectively) and were directed by pulmonologists.[14,15] In the last 2 decades, the field of sleep medicine has attracted pulmonologists because of the high prevalence and clinical importance of OSA and the important discovery of an effective treatment (CPAP).[19] This is reflected by the high percentage of PSGs performed for SBD in the surveyed SFs. Our results are in accord with data published in the literature. Punjabi et al demonstrated in a national survey conducted in accredited sleep centers the US that SBD represented 73.4% of primary diagnoses.[20] Among patients who underwent sleep studies in UK and Japan, 60.5% and 67.9%, respectively were diagnosed to have SBD.[21,22] However, it should be emphasized here that the high prevalence of SBD in sleep facilities does not reflect the prevalence of sleep disorders in the community. The high prevalence of SBD in SFs could be related to the increased awareness of OSA and its impact on morbidity and mortality among physicians and the general public. Additionally, the ability of PSG to discover the physiological derangements in patients with OSA and to assess the severity of the disorder, which allows sleep specialist to start and titrate CPAP therapy encouraged physicians to refer patients with OSA for sleep studies. It is important to acknowledge here that the accuracy of our estimates may have been compromised by the fact that we relied on self reports to obtain information about the number of PSGs conducted in each SF. This problem is universal in all studies using self-reported questionnaires. Nevertheless, the primary value of this study is the fact that it addresses for the first time the activity of sleep medicine and the number of sleep medicine facilities in KSA. Moreover, it reveals some of the obstacles that hinder the development of this new specialty in KSA.

In summary, sleep medicine seems to be underdeveloped in KSA compared to developed countries. Many obstacles face the progress and development of this specialty including inadequate number of trained sleep technicians, and sleep medicine specialists and lack of fund and insurance coverage. A collaborative work involving different institutes, sleep medicine specialists, health care authorities and insurance companies is needed to overcome those defined obstacles.

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