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Business Plan for Sleep Center

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BUSINESS PLAN FOR SLEEP CENTER

by

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The following individuals read and discussed the project submitted by student Mohammed Al Ghamdi, and they also evaluated his presentation and response to questions during the final oral examination. They found that the student passed the final oral examination, and that the project was satisfactory for a master's degree and ready for any final modifications that they explicitly required.

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ABSTRACT

A sleep disorder is a medical disorder of the sleep patterns of a person, and it is serious enough to affect normal physical, mental, and emotional function. Most sleep disorders can be diagnosed in a sleep center through the use of a common test known as the polysomnogram. The wide need of sleep medicine and the severe shortage of centers and technologists impact our understanding of sleep disorders, especially in the Kingdom of Saudi Arabia. Currently, several health service organizations have started to focus on the need to study the function of sleep, to understand and develop better treatments for many sleep disorders. King Fahad Medical City (KFMC) is one of these organizations as its leaders believe the only option for better health services and quality improvement is to move forward on this plan. The KFMC plan is to start a sleep center to aid patients with sleep disorders and will be used for referrals from other hospitals in the Kingdom of Saudi Arabia.

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CHAPTER 1: SLEEP MEDICINE IN THE KINGDOM OF SAUDI ARABIA

In the field of clinical or academic medicine, sleep medicine has become a necessary and essential specialty service. Over the past 25 years this field has considerably expanded in order to meet the high demand for diagnosing and treating the increasing number of different sleep disorders (Hauri, 2005). In the mindset of many physicians, a sleep disorder means obstructive sleep apnea only; however, more than 84 disorders have been included by the International Classifications of Sleep Disorders (BaHammam & AlJafen, 2007). Therefore, all around the world the need for clinical sleep facilities to diagnose and treat patients with sleep disorders is being realized. To help meet this need, structured training programs have been implemented in developed countries. However, the International Classifications of Sleep Disorders (ICSD) arranged the sleep disorders into the following eight categories: insomnia, sleep-related breathing disorders, hypersomnias of central origin (not due to a circadian rhythm disorder), circadian rhythm sleep disorders, parasomnias, sleep-related movement disorders, isolated symptoms and other sleep disorders (Hauri, 2005).

Introduction

The wide need for sleep medicine and the severe shortage of centers and technologists impacts our understanding of sleep disorders, especially in the Kingdom of Saudi Arabia (K.S.A.). Recently, several health service organizations have started to focus on the need to study the function of sleep, to understand and develop better

treatments for many sleep disorders. The only option for better health services and quality improvement is to move forward on this plan. The organizational vision for King Fahad Medical City (KFMC) is to develop a sleep medicine center to meet internal and external customer needs, to improve the direction of the service's future, and to start providing new therapies and current care recommendations. KFMC staff will learn from others' experiences, the work of advanced centers, and scientific progress in this area to provide positive changes and significant quality improvement in sleep medicine health services. Expanding knowledge of the internal relationships between sleep disorders and sleep-related problems will give the organization the ability to provide the best treatment for patients. KFMC will encourage and support staff members who aspire to be sleep center technologists by developing appropriate training opportunities and clinical studies.

Sleep Medicine in the Kingdom of Saudi Arabia

There are several challenges facing sleep medicine in the K.S.A. today. Some of these are due to changes in technology, laws passed by the government, scientific research, healthcare financing, and quality standards. A study conducted by the College of Medicine at King Saud University revealed a large disparity in sleep medicine activity in the K.S.A. compared to other countries (see Table 1 in Appendix A). That study addressed the severe shortage in sleep facilities in the K.S.A., which impacts the opportunity to address patients' health problems and provide the best health care for patients. The study reported there were only 14 beds divided among nine sleep centers in

the country for 21,500,000 citizens. Compared to other countries this gap is clearly visible; the main challenge in the K.S.A. is now to develop sleep centers (KSU, 2009).

Furthermore, College of Medicine at King Saud University reported survey results of the most important factors for not having a sleep disorders facility in hospitals. The survey clearly indicates that the main reasons are lack of sleep technicians, low number of sleep medicine specialists, and lack of space (KSU, 2009) (see Figure 1 in Appendix E).

Based on the growth in demand and the shortage of specialized skills in sleep disorder treatment, developing future leaders to coordinate the services is required. Plans for future growth must include structure expansion to meet the dramatic increase in the number of patients served. A flexible financial program is required to ensure an adequate supply of funds for operating the business and other needs, applying effective methods for searches, and global communication to update and organize the services.

Planning is the most important step that is required to move successfully through the Business Plan for Sleep Center Project and help to achieve some specific goals. Included in these goals is to work with the public and health care professionals to build a life-impacting sleep medicine program through education, diagnosis, and treatment of sleep conditions that interfere with people's ability to live vital lives.

CHAPTER 2: LITERATURE REVIEW

Many patients are not even aware that they have a sleep disorder, and how when they regularly fail to get a good night's sleep it affects their mental and physical health each day. As noted earlier, at least 84 disorders of sleeping and waking lead to poor quality of life and impair personal health. This chapter aims to describe all currently recognized sleep and arousal disorders that have been created by ICSD.

Literature Review

A sleep disorder is a medical disorder of the sleep patterns of a person, and it is serious enough to affect normal physical, mental, and emotional function. Most sleep disorders can be diagnosed in a sleep center by the use of a common test known as a polysomnogram. Researchers still do not completely understand all of the functions of sleep in maintaining health (Hauri, 2005). Researchers have learned about the cyclical patterns of different types of sleep and their relationships to breathing, heart rate, brain waves, and other physical functions (Hauri, 2005). As noted earlier, ICSD has created a simple list that clearly classifies sleep disorders based on what causes them, and they are divided into eight categories (Hauri, 2005). A sleep study is conducted to diagnose sleep disorders, and to fully understand sleep syndrome and brain activities that can be observed throughout the night.

Common Sleep Disorders

Insomnia is a sleep disorder that causes poor sleep, and it can occur in people of all ages. Insomnia can cause difficulty in sleeping, frequent awakening, fatigue during the day, disturbances in patients' day and night, and a poor quality of life (Berry, 2003). There are two types of insomnia: Primary insomnia and secondary insomnia. Primary insomnia is not directly related to health conditions, and it is an idiopathic psychophysiological, adjustment sleep disorder, related to sleep state misperception (Berry, 2003). The second type of insomnia is secondary insomnia, which is related to health conditions, including: sleep apnea, periodic limb movement disorder (PLMD), restless legs syndrome (RLS), psychiatric disorders (depression, panic attacks), inadequate sleep hygiene (bad sleep habits, excessive napping, and sleep-incompatible behaviors) environmental sleep disorders, drugs (nicotine, ethanol, caffeine), chronic pain syndromes, chronic obstructive pulmonary disease (COPD), medication (beta blockers, theophylline), and circadian disorders (Berry, 2003).

Sleep apnea is a term that means cessation of breathing. It is an absence of air flow in the airway for 10 seconds or more. Apneas may be obstructive, central, or mixed (Berry, 2003). Patients with sleep apnea usually breathe normally during the day, and do not know that they stop breathing during sleeping, nor do they remember it upon awakening. A sleep study is needed to diagnose sleep apnea. Patients often benefit from treatment known as continuous positive airway pressure (CPAP). This treatment helps them keep their airways open for normal breathing. Patients usually use full face masks

that are worn over the mouth and nose, or a nasal mask that is worn over the nose only during sleep.

Obstructive sleep apnea (OSA) occurs when a patient's airway becomes narrowed because of obstruction in the airway (e.g. throat muscle relaxation). OSA increases breathing effort which causes frequent arousal and can disturb sleep each night (Berry, 2003). The relaxation leads to narrowing of the throat, and the breathing becomes difficult, which increases the effort needed to breathe. However, the brain senses that breathing is difficult, which leads to frequent awakenings, and arousal from sleep tends to repeat itself throughout the night. OSA causes low quality of sleep and a lack of oxygen during sleep, and these both affect work life and/or social activities. OSA may also lead to high blood pressure, heart failure, heart attack, or stroke. CPAP is a highly effective therapy for OSA. CPAP produces gentle air pressure that holds the throat open and allows normal sleep and breathing (Berry, 2003).

Central sleep apnea (CSA) is caused by the failure of the brain to signal the muscles of breathing to act (Berry, 2003). Carbon dioxide in the blood is normally monitored by chemoreceptors in the brain, which in turn are involved in signaling inspiration. Patients with CSA have complete cessation of air flow for at least 10 seconds, with no associated respiratory effort (Berry, 2003). Patients with CSA suffer from frequent awakening at night gasping for air, and moderate daytime sleepiness. Bi-level ventilation (BiPAP) provides a backup respiratory rate, and two pressures (one to maintain a patent airway as in CPAP, and a higher pressure to force air into the lungs

during inspiration). BiPAP may be the best therapy for this syndrome. Sleep studies find this option works best for patients when they use it (Berry, 2003).

Mixed apnea appears to have both central and obstructive problems (Berry, 2003). However, the condition begins as CSA and develops into OSA. The breathing effort decreases before the airflow does, however at the end of the event, the breathing effort returns before the air flow does.

A patient with narcolepsy suffers from sleep attacks at inappropriate times. The cause of narcolepsy is not known, however, it seems the brain is unable to control when the patient falls asleep. Patients with narcolepsy may fall in deep sleep while they are awake. Common symptoms of narcolepsy are:

- Excessive daytime sleepiness
- Cataplexy (sudden loss of bilateral muscle tone)
- Sleep paralysis
- Hallucinations (Berry, 2003).

Circadian rhythms are controlled in the middle of the brain (the suprachiasmatic nuclei or SCN) which controls the body's temperature, and other many functions (Berry, 2003). Light plays an important role in this syndrome (circadian clocks) (Berry, 2003). The circadian rhythm causes the body temperature to rise during the last hours of sleep, and that causes a feeling of alertness in the morning. In the evening, body temperature decreases in preparation for sleep (Berry, 2003). Blind people often report problems with circadian rhythm because it is difficult for them to set their circadian clocks. Other

factors that affect the SCN and the setting of the circadian clock include exercise, hormones, and medication (Berry, 2003).

Restless leg syndrome (RLS) is a movement disorder which is described as leg movement at bedtime (Berry, 2003). Some people have symptoms in the arms and other parts of the body. Most people with RLS have periodic limb movements (PLMs) (Berry, 2003). The movements usually happen every 20-40 seconds, and that leads to poor quality of sleep which leads to poor quality of life (Berry, 2003). Patients with this syndrome suffer from frequent awakenings (micro arousal), that disturb sleep and cause fatigue during the day. Researchers are not sure of the exact cause, however, some medical conditions may increase the chance of developing RLS and PLMs such as:

- Low blood iron levels
- Poor blood circulation
- Nerve problems
- Muscle disorders
- Kidney disorders (Berry, 2003).
- The sleep disorders described above are the most common abnormalities. A number of others are listed in Appendix B for the sake of completeness, however they are not fully described.
- Sleep is not a simple process; many parts of the brain control sleep and its different stages. Sleep stages are intervals of sleep which have distinct individuality observed on electroencephaloghraphy (EEG), electro-oculography (EOG), and electromyography (EMG) channels during the sleep

study (Berry, 2003). A sleep center study is considered the appropriate venue to diagnose sleep disorders by revealing relationships between brain activities and body systems that will be observed throughout the sleep study. The study result will help a sleep specialist to understand specific sleep patterns and detect the presence of disorders. Sleep studies also provide the data that a specialist needs to make treatment recommendations.

CHAPTER 3: SLEEP CENTER STRATEGIES

This chapter will address the strategies that the proposed sleep center needs to succeed. Sleep centers have both external and internal customers who must have their needs met. Sleep centers must involve steps to identify the essential elements of customer service, and address techniques that can be applied to improve the centers' functions.

Mission Statement

The mission statement for any sleep center should focus on the quality of medical care in terms of diagnostic and therapeutic procedures, in which the patients' satisfaction is the main target (Jonson, 2008). In other words, business plans must be consistent with the "patients first" philosophy. Lack of sleep directly affects the daily activity of an individual, which has a negative impact on the overall quality of an individual's life. Sleep studies involve direct patient contact in a sleep center setting in which the patient is there to sleep and in which patients might have different expectations. Sleep center facilities should meet the patient's expectation, for example by having furniture that makes the patient comfortable. Therefore, the mission statement is to strive to provide patients with the best possible medical care to diagnose and treat possible sleep disorders and ultimately, improve the quality of patients' lives. The mission of the sleep center can be summarized in four points:

- To provide exceptional health care and support through quality service to all patients with sleep disorders

- To provide well-structured and up-to-date training programs for doctors and technicians in sleep medicine
- To conduct high-quality research related to sleep disorders (with emphasis on local diseases and disorders) and to promote collaborative work with international centers
- To increase the awareness of the public about sleep disorders

Keys to Success

There are strategies that a sleep center needs to follow in order to succeed. A manager of a sleep center must take steps to identify the essential elements of customer service and address techniques that can be applied to improve the functional system (McConnell, 2006).

For a manager to be successful in controlling finance, expenditure and income, while maintaining high patient revenue and negotiating contracts with third parties, a business plan is an essential tool (McConnell, 2006). The first step in designing a business plan is to develop a mission statement (McConnell, 2006). The statement should reflect what one expects, and desires for the future. These expectations are based on personal experience, knowledge and professional training. The vision should give the organization shape and direction, be a guide for reaching its goals, what it wants to become and an image of itself (McConnell, 2006). Managers should also develop personal vision to guide themselves in making informed decisions and developing appropriate strategies for achieving their personal goals (McConnell, 2006).

Goals

When setting goals, time frames need to be established (McConnell, 2006). Goals need to be achievable, have measurable outcomes, and have positive intent and documentation to support them (McConnell, 2006). For any sleep center, its ultimate goal is to improve patients' or clients' sleep quality and knowledge of their disorder. Other goals would include client satisfaction and raising the profile of sleep disorders within the medical and public community. By raising awareness, early diagnosis and prevention can be implemented. Constructing, equipping and staffing an ultra-modern sleep center should be performed within an allocated time frame. This time frame is generally set by the organization as one of its goals (McConnell, 2006). The establishment will incorporate a high technology training center to increase the level of expertise of specialists and technicians within the field of sleep medicine. A further goal is to ensure that all employees in direct contact with clients are registered polysomnographers and/or graduates of accredited programs related to the field of care (McConnell, 2006).

The facility should meet the needs of the intended project in terms of location, size, and furniture. As for medical equipment, based on the evidence derived from the literature, the sleep center must have equipment that ensures the accuracy and the precision of diagnostic and therapeutic procedures. Because sleep medicine is a fast-growing field, an annual review of available equipment should be conducted to ensure that the available equipment is up-to-date and no further upgrade is required. Hiring employees who operate according to the mission statement of the institution and can achieve the goals is vital. Employees of the sleep center should be graduates of

accredited, related programs in order to ensure that high quality care is provided. Employees who conduct the sleep studies must be registered polysomnographers. Employees should receive intensive continuous education that is related to the following topics: Patient satisfaction, sleep medicine, motivation, team work, and communication skills. Employees must strive to educate the patients and their families about sleep disorders and therapies in order to achieve maximum possible outcomes (Healthcare Success Strategies, 2009).

Action Plan

Realization of the expected outcomes can be achieved through adopting an action plan (McConnell, 2006). An action plan can enable KFMC to determine whether goals have been achieved, what means can be utilized to make them measurable and what barriers KFMC might face such as time constraints, financial deficiency or shortage of other resources or supplies. A clear list of actions must be developed, which includes essential and effective steps that must be taken to achieve the goals, an individual work plan designed for each goal that is based on a needs assessment process, and ongoing assessment of the plan. In this project the action plan can serve as a guide that assists KFMC in achieving a targeted goal through effective implementation of objectives (McConnell, 2006). Critical performance issues must be addressed and balance must be maintained between the organization's existing capabilities and its ambitions. The following steps represent a general format of an action plan:

- Continuous evaluation of provider services to identify potential problems or needs
- Comprehensive data collection to support any potential future modifications and to provide a physical evidence base for the plan
- Formulating an action plan that aims to improve the quality of the service
- Implementing the plan
- Evaluation and monitoring (assessment) of the action plan

The marketing plan for sleep centers must be implemented effectively to meet both internal and external customers' expectations. However, the secrets to success for this plan are location, education, and service (Thomas, 2008).

Location: Select the appropriate location for sleep diagnostics that satisfy customers by selecting the right site for them to meet their expectations. The service should be in the medical community, in a clinical setting, which is accessible and has visible signage (Thomas, 2008).

Education: Sleep specialists and technicians play an important part in this task. It is important to make a commitment to physician education, sleep diagnostics, sleep therapies, accreditation, and regular compliance with sleep center standards. It is also important to make a commitment to patient and public education, sleep disorder education, sleep study understanding, and sleep therapy options (Thomas, 2008).

Service: Provide in-depth training in sleep disorders and diagnostic methods to all staff in the sleep center. Empower all staff members in the sleep center to handle all requests professionally to the best of their ability and to know when to involve others.

Strive to provide outstanding service in every encounter point between physicians, patients, and the public (Thomas, 2008).

The SWOT Framework

The SWOT framework is a powerful technique for understanding organizational strengths and weaknesses and for evaluating opportunities and threats (Thomas, 2008). It includes the following elements:

Strengths: The quality of the KFMC services that are helpful to achieving the organization's objective, the high value or performance points, can be tangible (for example, loyal customers, efficient distribution channels, very high quality products, excellent financial condition, good leadership), and can be intangible (for example, strategic insights, customer intelligence, solid reputation, highly skilled workforce). These are often considered core competencies and the best leverage points for growth without draining resources (Thomas, 2008).

Weaknesses: The factors that prevent the KFMC from accomplishing necessary activities. Because weaknesses are internal, they are controllable. Weaknesses include poor leadership, unskilled workforce, insufficient resources, poor product quality, slow distribution and delivery channels, outdated technologies, and lack of planning (Thomas, 2008).

Opportunities: Potential areas for growth and higher performance are external in nature (e.g., marketplace, customers unhappy with competitors, better economic

conditions, more open trading policies). Internal opportunities should be classified as strengths. Timing may be important for capitalizing on opportunities (Thomas, 2008).

Threats: Challenges confronting the organization are external in nature. Threats vary widely (e.g., negative press coverage, shifts in consumer behavior, substitute products, new regulations). The more accurate one is in identifying threats, the better one is positioned for dealing with the sudden ripples of change (Thomas, 2008).

The analysis frame process should focus on both external and internal marketing assessment, because the KFMC cannot externally market services until it is confident that the internal delivery systems are operating efficiently. The assessment should include the following elements:

- Patient service survey assessment
- Referring physician service survey assessment
- Reading physician service survey assessment
- Staff evaluation of the service to patients and physicians (Willie Taylor, personal communication, June 8, 2009)

Service Strategies

Because customer service is considered an area of challenge for any health service, effective strategies are needed to result in customers' satisfaction and meet their expectations. Some effective and practical tactics that may be used to reach the goals include:

- Outstanding phone/fax/E-mail/website service
- Customizable options for physician ordering
- Timely/convenient patient scheduling
- Welcoming new physicians and patients
- Patient orientation, education, and tours
- Patient satisfaction surveys
- Sending scored reports to the interpreting physicians in a timely manner
- Sending interpretations to referring physicians in a timely manner (Willie Taylor, personal communication, June 8, 2009)

Cost and Funds

Budgeting is not a concern because in the K.S.A., the central government funds 100% of the cost for any health service project in any hospital. The health care industry in K.S.A. is growing rapidly and will continue to support excellent opportunities for providers. The Ministry of Health is the major client with 63% of the hospital beds, followed by the private sector with 13%, the Ministry of Defense and Aviation with 8%, the Ministry of Higher Education with 7%, the National Guard with 3%, and the General Organization for Social Insurance, the Royal Commission, and the Ministry of the Interior with 2% each. The government of K.S.A. continues to provide massive support

to existing as well as new projects in order to ensure that health services are accessible to all people at all levels of care: Primary, secondary, and tertiary (Arab Medicare, n.d.). Chapter 4 (Sleep Center Business) presents an overview to help the plan's sponsor know how much this center will likely cost.

CHAPTER 4: SLEEP CENTER BUSINESS

This chapter will review different business models for sleep centers, and the data needed to monitor the progress, deadlines, budgets, and ensure that the service otherwise stays on track. Measuring the impact of marketing sleep centers allows marketers to determine the success of the effort and justify the costs involved.

Types of Sleep Center Business Structures

Three basic business structures of physician-practice sleep centers have been reported. These include:

(1) hospital-owned,

(2) independent diagnostic and testing facility (IDTFs), and

(3) extension of physician practice (Sleep Doctor Blog, 2008).

The first type of structure, "hospital-owned," is the one that is planned in K.S.A., and the nine sleep centers that are currently in existence there belong to hospitals. As mentioned earlier, services will be fully covered by central government funds. However, the opportunity to have massive support, especially from the technical angle, is to be part of the medical center (inside the hospital) and to provide the best services for both internal and external customers. That will provide the business with a reliable tracking system to identify the source of new patients and to measure the effectiveness of marketing, advertising, promotion, and referral efforts (Healthcare Success Strategies, 2009).

Service Objectives

To create a distinguished sleep center, providing all services related to sleep medicine

- Diagnostic tools:
  - To perform complete overnight sleep studies (polysomnography)
  - To perform the multiple sleep latency test (MSLT)
- Therapeutic tools:
  - Titrate non-invasive ventilation: CPAP, Bi-PAP
- Preventive tools:
  - Health education for sleep-related problems at a hospital level, community level, and clinic
- Clinic:
  - For patient follow-up by a physician and sleep technician
  - To create a national sleep registry

Service Aims

The service aims are:

- To operate the service 24 hours a day, seven days a week
- To have at least a minimum of two studies being conducted at any given time
- In the future, to have a separate center, functioning apart from the main hospital

What is Needed to Start?

Space:

The center should be approximately 600 ft^2, located in a quiet and low traffic area. It is recommended that enough supplies for eight studies a week for six months should be available to begin (PSG Laboratories, 2009). Other features should include:

- Home-like bedroom
- Room (10 x 10) per patient and a bathroom required in each room
- Beds for parents to sleep with the child for pediatric studies
- Control room that is less than 100 feet away from the bedrooms
- Storage area
- Waiting area
- Staff lounges
- Sleep center coordinator office
- Scoring room
- Manager's office
- Education room (PSG Laboratories, 2009)

Supplies that will be needed for marketing and advertising include the following:

- Educational materials, including videos, workbooks, screen and projector or overhead projector
- Brochures for distribution to other physicians, hospitals, and clinics
- Flyers and newsletters

Supplies that will be required during the course of treatment include those shown in the following list:

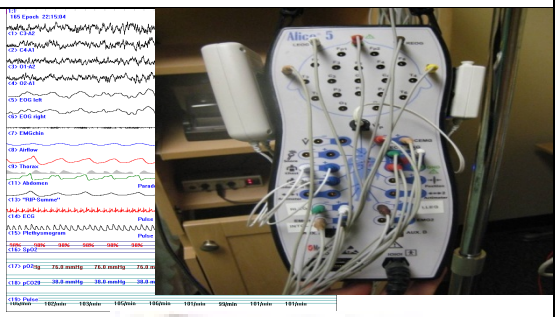
- Diagnostic sleep systems (computers, jack box, servers)
- Pulse Oximeter for measuring oxygen saturation of the blood
- Capnograph for measuring exhaled carbon dioxide
- CPAP, BiPAP, and masks
- EEG, EMG, and EOG equipment for recording brain waves and muscle activity
- Airflow thermistor
- Airflow pressure transducer
- Respiratory effort belts to measure chest and abdomen motion
- Snoring microphones

Sleep study equipment should come with one full year of warranty coverage included with the system purchased, and the system company should provide training on the system to cover recording, scoring, sleep study, and troubleshooting techniques (PSG Laboratories, 2009).

Cost

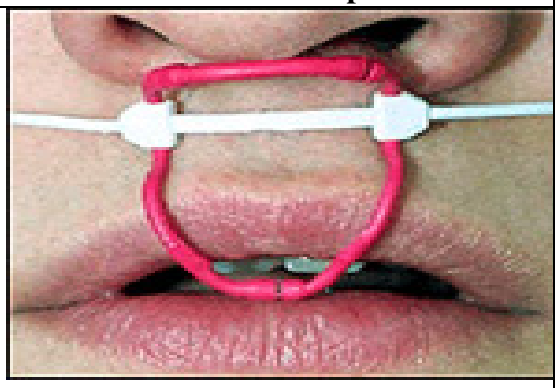
Cost is variable in this plan depending on the service capacity (numbers of rooms, numbers of patients), location, and types of sleep center business structures. In general, the following two tables provide a brief summary of likely costs:

Equipment Cost

Item	Cost	Picture Example
Center building cost	$3000-$5000 per month lease and utilities	
Patient room (furniture, bathroom, camera, speaker)	$4,000 per room	
Diagnostic sleep system (computers, jack boxes, servers, and remote access). It is the signal pathway, and recording system with computer interface	$24,000 per room	 

Item	Cost	Picture Example
Pulse Oximetry. To measure the oxygen saturation of a patient's blood	Included with PSG equipment. If patient wants a separate one, it is $700 per room	
Capnograph. To measure the carbon dioxide (CO2) during normal tidal breathing for a patient	$5,000 for equipment, $200 per filter use for 3 patients	

Item	Cost	Picture Example
CPAP, BiPAP, and masks. To treat hypopnea, obstructive apnea, and apnea	$200 per quarter per room for machine. $15 per mask	 
EEG/EMG/EOG setup (electrodes). For recording by using the inter-national 10% / 20% system of electrode placement	Gold service electrode, $39 each. Electrode kit $1,175	 

Item	Cost	Picture Example
Airflow thermistor. To record respiratory airflow	$775 for each thermistor	
Snoring microphones. Snore sensor	$175 for each	
Respiratory effort belts. To record respiratory effort	$570 for each	 

Item	Cost	Picture Example
Technologist salaries	$11.50-$30.00/ hour, depending on experience Ratio 1:2 (one technologist for two patients)	
Secretaries' salary	$8-$15/hour Total of two: • Reception & Appointment • Coordinator & recording	
Billing Staff & Educator	$12-$20 / hour Two staff	
Manager Salary	$50,000-$100,000 per year	

Equipment cost source: (Willie Taylor, personal communication, June 8, 2009)

Supply Cost

Name of Item	Cost	Quantity Shipped	Quantity per patient	Comments
Surgilast Head Netting	$12.95	25 yards	6"	
Nuprep 4 oz	$6.25	24	0.5 oz	
Lemon Prep 6 oz	$6.25	24	0.25 oz	
Electrode Prep Pads	$5.95	100	10	
Oxiband Adhesive Wraps	$50.00	100	1	

Name of Item	Cost	Quantity Shipped	Quantity per patient	Comments
Oxiciq disposable sensor 24 pack	$255.00	24	1	Used on patients when non-disposable oximeter is not working or patient requires different type of probe
Oxiciq disposable sensor- Pediatric 24 pack	$255.00	24	1	Pediatric patients may remove periodically and have to use 2-6 during one study if being difficult
Goo Gone 8 oz	$4.95	1	0.05	Lasts about 6 months
Super Sani-cloth	$6.95	160 per canister	3	1 canister lasts 1 week
Ten 20 Conductive Paste 8 oz Jar	$9.75	1	.5 oz	
Pre-tac 15 ml Bottle	$6.50	1	.10 oz	2 bottles a month
EC2 Cream 3.5 oz Tube	$3.25	1	.5 oz	
Hy-Tape	$39.95	24 per tube		2 rolls per month
1.5" blue dot electrode	$14.50	50	6	
MVAP 2 electrode	$70.00	300	6	
Elifix Tube 180 g	$9.50	1	.5 oz	
Control III disinfectant concentrate	$22.80	1	.25 oz	1 gallon lasts 2 months
Nail polish remover pads	$3.95	100	1.25	
Cover-roll woven	$11.25	1	4"	4 roles a month
Medical Adhesive Remover 2 oz	$14.00	6 bottles	.10 oz	1 bottle lasts 1 month

Name of Item	Cost	Quantity Shipped	Quantity per patient	Comments
3" q-tips	$7.10	1000	4	Lasts about 2 months
6" q-tips	$7.35	1000	4	Lasts about 2 months
Large q-tips	$2.50	50	1	Lasts about 1 month
Pro-tech adult nasal cannula	$178.50	30	1	
Red Dot trace preparation	$23.05	1	.25"	Very few technicians use and will last 6 months
Pro-tech pediatric multipurpose nasal cannula	$210.00	30	1	Pediatric Patients do clog cannulas periodically. Use 2-3 in one night for 1 out of 4 patients
Protech Pro-Flow Plus	$178.50	30	1	
Adult ThermiSense Nasal Cannula/ Holder w/ 7" Airflow Pressure tube with Filter	$85.00	25	1	
Pediatric Thermi-Sense Nasal Cannula/Holder w/ 7' Airflow Tube and 7' ETCO tube w/o filter	$85.00	25	1	
Collodion USP by Mavidon Medical	$30.20	1	1	14 tubes have lasted 7 months
Medicine Cups	$2.50	100	1	
Transpore Surgical Tape	$14.95	12 roles	1"	1 case lasts about 4 months
Micropore Surgical Tape	$9.45	12	1"	1 case lasts about 4 months
8 Ply Gauze Sponge 2X2	$4.25	200	1	1 package lasts 1.5 months

Name of Item	Cost	Quantity Shipped	Quantity per patient	Comments
4 Ply Gauze Sponge	$2.35	200	1	1 package lasts 1.5 months
Extra Small Nitral Powder Free Textured Exam Gloves	$10.75	100	2	1 box lasts 6 months
Small Nitral Powder Free Textured Exam Gloves	$10.75	100	2	1 box lasts 6 months
Medium Nitral Powder Free Textured Exam Gloves	$10.75	100	2	1 box lasts 2 months
Large Nitral Powder Free Textured Exam Gloves	$10.75	100	2	1 box lasts 6 months
Extra Large Nitral Powder Free Textured Exam Gloves	$10.75	100	2	1 box lasts 6 months
Disposable Male Urinal	$12.00	10	1	1 case lasts about 6 months
Razors	$15.00	100	1	1 case lasts about1 year
CO2 Filters	$750.00	50	1	
Metri Mist	$7.25	1	0.1	1 bottle lasts about 1 year
Distilled Water	$0.97	1	0.25	4 patients
Body Wash	$1.00	1	1	Only used when a patient needs to shower which is about 5 per month
Shampoo	$1.00	1	1	Only used when a patient needs to take shower which is about 5 per month

Name of Item	Cost	Quantity Shipped	Quantity per patient	Comments
Toothpaste	$25.00	144	1	Only used when a patient needs to brush teeth which is about 10 per month
Shaving Gel	$18.95	200	1	Only used when a patient needs to shave which is about 8 per month
Tongue Depressors	$5.45	500	1	1 case lasts about 4 months
Ear Plugs	$26.00	200	2	Only used per patient request. 1 box will last 3 years
Teddy Bears	$4.00	1	1	To give to young pediatric patients to help comfort--about 10 per month
Coloring Book/Crayons	$2.00	1	1	To give to young pediatric patients to help comfort--about 10 per month
Posy Wrap	$8.95	12	4	6 Months
Blue Grease pencils	$5.95	3	?	1 Year
Black Grease Pencils	$5.95	3	?	1 Year
Red Peel-off China Markers	$12.00	12	?	3 months
Tape Measure	$3.95	1	?	2 months
Hair Clips 3.5” long (Chrome Plated)	$3.25	12	3	6 Months

Item cost source (Willie Taylor, personal communication, June 8, 2009)

Cost Summary

Cost is one of the main factors that should be understood in this sleep center plan, because it is the important part in any business plan, and understanding cost is the best way to facilitate the process for a decision. Equipment is the largest contributor to the cost, and it is variable. However, equipment cost depends on the service capacity (the number of patients served in one night) and how many studies can then be conducted during the same night. One estimate of equipment cost to start the service for a one bed center is about $90,000-$235,000 (see Table 2 in Appendix C). Cost of service includes equipment, facility, and personnel. So, to identify the total cost for the proposed sleep center, the number of sleep studies each day needs to be known. An estimate of cost for a 4-bed sleep center is about $570,000 (see Table 3 in Appendix C).

Manpower

The following specialists are needed to participate:

- Neurologist
- Pulmonologist
- Otorhinolaryngology physician
- Nurse practitioner
- Sleep Technician

Sleep Technician responsibilities:

- Review orders
- Conduct the sleep study test

- PSG scoring
- Quality control
- Items supply
- Patient and family education

Workload

The workload is defined for a technologist and is dependent upon several criteria. These criteria include the complexity of patients who are being studied as well as the number of patients. Also included are the anticipated or potential interventions or the standard operating procedures and the type(s) of studies along with the ability of the technologist and the accessibility of additional personnel (PSG Laboratories, 2009).

Safety

Safety is an issue separate but related to sleep center service, and it is the strategy that will enable important improvements in the desired health service agenda for the sleep center. This strategy will protect service staff and improve productivity by keeping them healthy and working. The safety system will provide an appropriate understanding of risk management from its onset, and improve health service quality. Therefore, the safety standard for a sleep facility requires reasonable and nearly continuous monitoring of every patient's status while undergoing physiological recording in the facility. The level and continuity of monitoring that is required is dependent upon the severity of the conditions of the patients being studied and the procedural requirements of the center.

Adequate and appropriate additional staff must be available in a timely manner (<30 minutes) to render urgent or emergency assistance. In all circumstances, the center must adhere to state and federal regulations regarding staffing that are pertinent to the facility (PSG Laboratories, 2009).

Conclusion

Millions of patients suffer unnecessarily due to the lack of diagnosis and treatment of sleep disorders. Sleep affects and is affected by every organ system of the body. Every health care provider should have knowledge of the basics of sleep health, awareness of sleep disorders, and complications from lack of treatment. A sleep professional will need to determine what type of information is suitable for the patient, as well as what type of changes the patient will need to make in everyday life to improve his or her sleep hygiene. Currently, there are treatments for most sleep problems, however, the first step is recognizing that a problem exists. The second step is determining what causes the problem, and the third step is treating the cause. Because sleep science is one of the least understood medical areas, sleep centers will increase the medical and public awareness about such disorders in terms of prevention and early diagnosis. A sleep center must have the required equipment that ensures the accuracy and the precision of diagnostic and therapeutic procedures. Because sleep medicine is a fast-growing field, an annual review of available equipment should be conducted to ensure the available equipment is up-to-date and no further upgrade is required, and the facility should fulfill the need of the intended project in terms of location, size and furniture. Research

recommends a sleep study method to provide a patient with the best possible medical care, aiming to diagnose and treat sleep disorders, and ultimately improve the quality of a patient's life. Furthermore, achieving these goals should decrease the costs associated with treating the many complications of sleep disorders.

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APPENDIX A

Table 1

Sleep Medicine Activity in Saudi Arabia Compared to Other Countries (KSU, 2009)

Table 1

Sleep Medicine Activity in Saudi Arabia Compared to Other Countries (KSU, 2009)

Country	Population	No. of sleep facilities	No. of sleep beds	No. of beds/ 100,000 population	No. of studies/ year	No. of study/year/ 100,000 population
United States	280,000,000	1292	-----	-----	1,170,000	427.0
Canada	31,400,000	100	440	1.4	116,000	370.4
Australia	18,970,000	65	244	1.3	53,500	282.0
Belgium	10,000,000	50	150	1.5	17,716	177.2
Spain	40,341,462	63	-----	0.3	17,270	45.6
United Kingdom	58,800,000	84	170	0.3	25,000	42.5
Japan	126,686,000	146	-----	----	23,184	18.3
Saudi Arabia	**21,500,000**	**9**	**14**	**0.06**	**1,536**	**7.1**

APPENDIX B

Sleep Syndrome Categories

Sleep Syndrome Categories

The eight sleep syndrome categories established by ICSD include:

Insomnias:

- Adjustment insomnia (acute insomnia)
- Psychophysiological insomnia
- Paradoxical insomnia
- Idiopathic insomnia
- Insomnia due to mental disorder
- Inadequate sleep hygiene
- Behavioral insomnia of childhood
- Insomnia due to a drug or substance
- Insomnia due to medical condition
- Nonorganic insomnia (NOS)
- Organic insomnia (Hauri, 2005)

Sleep-related breathing disorder:

- Central sleep apnea syndromes
- Obstructive sleep apnea syndromes
- Sleep-related hypoventilation, hypoxemic syndromes
- Sleep-related hypoventilation, hypoxemia due to medical condition
- Other sleep-related breathing disorder (Hauri, 2005)

Hypersomnias of central origin:

- Narcolepsy with cataplexy
- Narcolepsy without cataplexy
- Narcolepsy due to a medical condition
- Narcolepsy, unspecified
- Recurrent hypersomnia
- Idiopathic hypersomnia with long sleep time
- Idiopathic hypersomnia without long sleep time
- Behaviorally-induced insufficient sleep syndrome
- Hypersomnia due to medical condition
- Hypersomnia due to a drug or substance
- Nonorganic hypersomnia (NOS)
- Organic hypersomnia (Hauri, 2005)

Circadian rhythm sleep disorders:

- Delayed sleep phase disorder
- Advanced sleep phase disorder
- Irregular sleep–wake rhythm
- Free-running type (nonentrained type)
- Jet lag disorder
- Shift work disorder
- Due to medical condition
- Due to a drug or substance

- Non-organic disorder (NOS) (Hauri, 2005)

Parasomnias:

- Disorders of arousal from non-rapid eye movement (NREM) sleep
- Parasomnia, usually associated with REM sleep
- Other parasomnias (Hauri, 2005)

Sleep-related movement disorders:

- Restless leg syndrome
- Periodic limb movement disorder
- Sleep-related leg cramps
- Sleep-related bruxism
- Sleep-related rhythmic movement disorder
- Sleep-related movement disorder, unspecified
- Sleep-related movement disorder due to a drug or substance
- Sleep-related movement disorder due to a medical condition (Hauri, 2005)

Isolated symptoms:

- Long sleeper
- Short sleeper
- Snoring
- Sleep talking
- Sleep starts (hypnic jerks)
- Benign sleep myoclonus of infancy
- Hypnagogic foot tremor and alternating leg muscle activation during sleep

- Propriospinal myoclonus at sleep onset
- Excessive fragmentary myoclonus (Hauri, 2005)

Other sleep disorder:

- Other physiological (organic) sleep disorder
- Other sleep disorder not due to a substance or known physiological condition
- Environmental sleep disorder (Hauri, 2005)

APPENDIX C

Table 2

Example of Equipment Cost to Start the Service for a One-Bed Center

Table 2

Example of Equipment Cost to Start the Service for a One Bed Center

Item	Cost
Diagnostic system	$ 24,000-$50,000
Bedroom furniture/bed	$ 1,000-$3,000
Office furniture (desks, chairs, filling cabinets, lamps, bookcases, etc.)	$ 20,000-$30,000
Other: ceiling fans, refrigerator, microwave, toaster oven, coffee service, etc.)	$ 10,000-$12,000
Laboratory equipment (sterilizer, dryer, etc.)	$ 10,000-$15,000
IT system (PCs, servers, software, phones, internet, etc.)	$ 25,000-$125,000

APPENDIX D

Table 3

Total Cost of Service for a 4-Bed Center

Table 3

Total Cost of Service for a 4-Bed Center

Item	**Cost**
6 months rent	$ 50,000
Equipment	$ 160,000
Bed room furniture	$ 8,000
Other furnishings	$ 30,000
Laboratory equipment	$ 12,000
IT	$ 120,000
Personnel	$ 160,000
Other	$ 30,000
Total	$ 570,000

These numbers are averages within the ranges listed in the one bed center (see Table 2)

APPENDIX E

Figure 1

The Most Important Factors that Contribute to the Lack of Sleep Medicine Services in K.S.A.

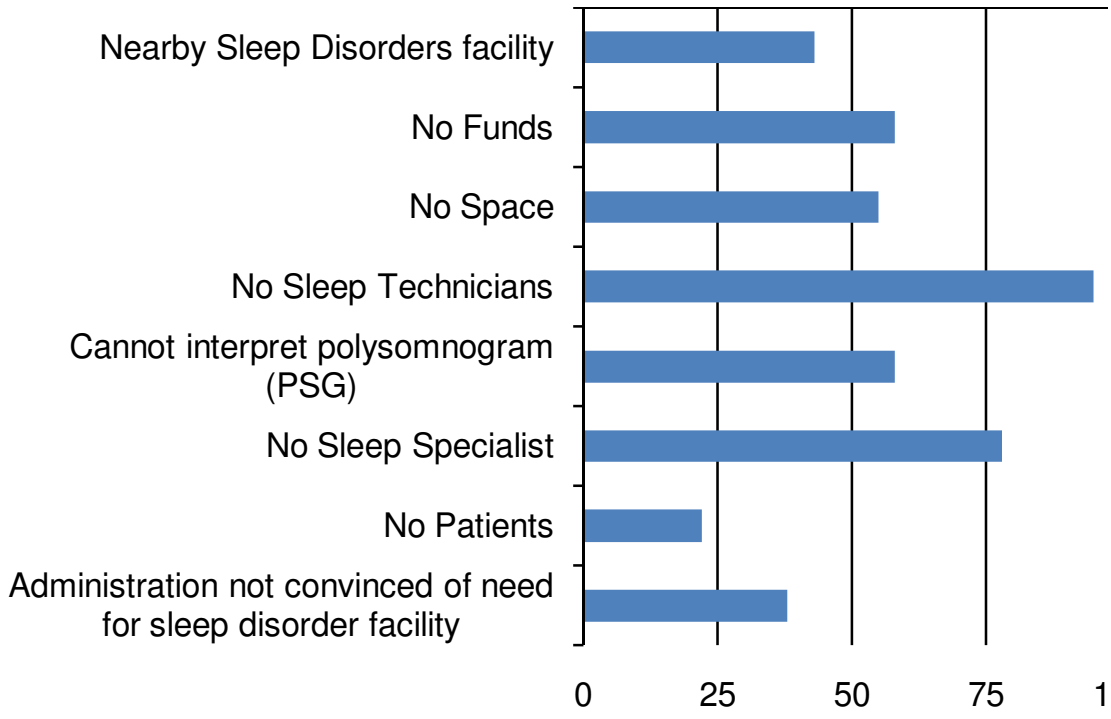

Figure 1. The Most Important Factors that Contribute to the Lack of Sleep Medicine Services in K.S.A.