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ORIGINAL ARTICLE

Planning and Designing of a Sleep Center

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ABSTRACT

Sleep disorders have become very common in today's world. The various sleep related disorders are increasing at an alarming proportion. The first sleep clinics in the United States were established in the 1970s by interested doctors and technicians; sleep centers are specialized centers where an individual is provided home like environment and surroundings and his sleep cycle is monitored. Active therapeutic and diagnostic interventions are also done here. This article discusses various planning and designing issues of sleep center.

Keywords: Sleep disorders, Obstructive sleep apnea, Sleep medicine, Room acoustics.

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INTRODUCTION

Sleep disorders have become common phenomena in today's world. The advent in technology in modern medicine has brought to surface a number of sleep disorders which earlier were accepted as normal. Sleep is more than rest and it is a state of unresponsiveness brought about by nervous activities which ensures that the whole body including nervous system recuperates.[1] Improvement in modes of travel has shrunk the world, but has increased the number of patients who have sleep related ailments. In the present environment, Jet Lag increases with age and number of time zones travelled through and is also affected by the direction in which you travel.[2]

The various sleep related disorders are increasing at an alarming proportion. Bixler, Kales and Healey in a study conducted in US found that the prevalence of sleep disorder is more than 50%.[3] Thus, it is imperative that planning and designing of a sleep center be done very carefully.

Sleep medicine is a medical specialty or subspecialty devoted to the diagnosis and therapy of sleep disturbances and disorders. From the middle of the 20th century, research has provided increasing knowledge and answered many questions about sleep-wake functioning.[4] The rapidly evolving field has become a recognized medical subspecialty in some countries. The first sleep clinics in the United States were established in the 1970s by interested doctors and technicians; the study, diagnosis and treatment of obstructive sleep apnea (OSA) were their first tasks. As late as 1999, virtually any American doctor, with no specific training in sleep medicine, could open a sleep laboratory.[5]

HISTORY

The evolution of sleep medicine is pretty interesting. The practice of sleep medicine evolved in many centers in the 1970s. Although, sleep clinics were established in USA and in some other countries in Europe in 1970, most of these were confined to diagnosis and management of OSA.[6] The use of patients complaining of insomnia in hypnotic efficacy studies brought a group of researchers in Stanford closely into relation with many insomnia patients and demolished the notion that the majority of such patients were psychiatric subjects. One early question was, 'How reliable are the descriptions of their sleep by these patients?' The classic all-night sleep recording could yield a great deal of information. The diagnosis of OSA in patients who had profound excessive daytime sleepiness nearly always was completely unambiguous. During 1972, the search for sleep abnormalities in patients who had sleep-related complaints continued; the intent was to conceptualize the pathophysiologic process as an entity and as the cause of the presenting symptom. With this approach, several phenomena seen during sleep rapidly were linked to the fundamental sleep-related presenting complaints. Toward the end of 1972, the basic concepts and procedures of sleep disorders medicine were established.

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Types of Sleep Disorders

Breathing-related sleep disorders are syndromes in which the patient's sleep is interrupted by problems with his or her breathing. There are different types of breathing related sleep disorders:

- *Obstructive sleep apnea syndrome*: This is the most common form of breathing-related sleep disorder that has been reported to occur in 2 to 4% of middle aged adults, it is marked by episodes of blockage in the upper airway during sleep. It is found primarily in obese people. Patients with this disorder typically alternate between periods of snoring or gasping (when their airway is partly open) and periods of silence (when their airway is blocked). Very loud snoring is a clue to this disorder.
- *Central sleep apnea syndrome*: This disorder is primarily found in elderly patients with heart or neurological conditions that affect their ability to breathe properly. It is not associated with airway blockage and may be related to brain disease.
- *Central alveolar hypoventilation syndrome*: This disorder is found most often in extremely obese people. The patient's airway is not blocked, but his or her blood oxygen level is too low.
- *Mixed-type sleep apnea syndrome*: This disorder combines symptoms of both obstructive and central sleep apnea.
- *Insomnia*: Inability to fall or stay asleep.
- *Daytime sleepiness.*
- *Restless legs syndrome*: Feel tingling or 'crawling' sensations deep within your legs.
- *Narcolepsy:* Narcolepsy is a neurological disorder that affects the control of sleep and wakefulness. People with narcolepsy experience excessive daytime sleepiness and intermittent, uncontrollable episodes of falling asleep during the daytime. These sudden sleep attacks may occur during any type of activity at any time of the day.

Sleep Assessment

a. The epworth sleepiness scale (ESS), designed to give an indication of sleepiness and correlated with sleep apnea,[8] or other questionnaires designed to measure excessive daytime sleepiness, are diagnostic tools that can be used repeatedly to measure results of treatment.
b. A sleep diary, also called sleep log or sleep journal, kept by a patient at home for at least 2 weeks, while subjective, may help determine the extent and nature of sleep disturbance and the level of alertness in the normal environment. A parallel journal kept by a parent or bed partner, if any, can also be helpful. Sleep logs also can be used for self-monitoring and in connection with behavioural and other treatment.

Planning and Designing of Sleep Center

Sleep centers are specialized centers where an individual is provided home like environment and surroundings and his sleep cycle is monitored. Active therapeutic and diagnostic interventions are also done here. Mechanical ventilators, administering aerosols, monitoring the sleep pattern, recording of any abnormality, maintenance of equipments, etc. is also undertaken here.

Facilities and Space Requirement

a. *Reception*: A well designated reception should be there in all sleep centers. Receptions can be planned to ensure privacy while discussing with the patient. Reception can be suitably planned in the entrance lobby of sleep center. Reception will require an area of 8 to 10 m^2 for smooth functioning. Sufficient number of drawers and shelves should be provided at reception.
b. *Patients' room*: The most important parts are the patient rooms, they are usually next to one another as they are quiet locations. Ideally, they are similar to the patients' room, so it should look a minimum comfortable. Bed should be larger than standard, as a lot of patients are wide and need space to kick. Night table, with small lamp for personal belongings. An approximate area of 15 m^2 per bed can be planned. Patient testing rooms must be of sufficient size, generally having a minimum of 140 square feet and no dimension less than 10 feet.[9] Std 6a accreditation of sleep disorder center of American academy of sleep medicine (AASM). A two-way communication system between the patient bedroom and center personnel. A mechanism for visual monitoring and recording of patients during testing should be there. Polygraphic equipment capable of recording and storing

a minimum of 12 channels of data. Equipment for the delivery of continuous positive airway pressure (CPAP) and bilevel positive airway pressure, including remote control of pressure. Std 8- accreditation of sleep disorder center of AASM.

- *Room acoustics*: Patients' room have special acoustic design wherein decibel level can be around 15 to 20 decibels.[10] (putsep 249). The most difficult aspect of space planning by clinicians for sound control is isolating operational noise sources. Operational noise is created by people and by machines brought into the building after it is constructed. Operational noise that can be isolated from business areas (desks, phones, printers), bulk storage, and pass-by foot traffic to other beds or common destinations (sinks, storage, entrances and exits). The best means of protecting from operational noise is a private cubicles. Room entrances should have solid doors with good seals. Light sleep, NREM which hospitalized patients spend most of their sleep time, showed the greatest vulnerability to acoustic disruption. It was less protected than either dream sleep, REM.[11] However, some openings, e.g. between two single-bed patient rooms, communication between quiet spaces that are used often but by few people. Such communicating rooms without a door can meet permissible noise criteria if other aspects of the design offer sufficient protection. Automatic sliding doors are expensive and generate a good deal of noise in operation.

If equipment, such as a refrigerator are to be put in the sleep lab, it should be placed far from the bed in a housing that absorbs the condenser noise or be built specifically to produce little noise and vibration.[12]

- *HVAC*: Sleep centers should be centrally air conditioned with total circulated air quantity should not be less than 12 airchanges/hour. Regulatory mechanism should exist with temperature monitoring panel in each room. Ambient temperature of 23 to 25ºC be maintained at all times.
- *Lighting standards*: The surrounding should be pleasant and conducive to rest and relaxation. The light can be totally blocked out. Intensity of light should be controllable. Natural light is important to keep the patient in sync with the environment but adequate blinding facilities should be provided. Reading lights should be provided to each patient and 150 to 200 lux is recommended. There needs to be network so that a receiver and camera can be inside the room. Nearby plugs are also practical. Avoid white neon lights, and make sure the room can be made light free.
- *Walls*: Walls should be painted with light colors and should be decorated to get it close enough to the feel of being at home. Corners of the wall should be protected against physical impact by stretchers.[13]
- *Doors*: Doors should have minimum 90 to 120 cm clear opening to allow easy passage to patients and a level space of 152 cm wide should extend about 45 cm on each side of doorway for facilitating opening closing by a wheel chaired person.

The facility must afford rapid access to the patient by emergency personnel. Std 19- accreditation of sleep disorder center of AASM.

c. *Prep area*: The other important room is where the computers are, patients are usually prepared in this room, so that a signal check can be carried out. Technical staff also spends the night there in case something happens. A room of area 12 m^2 can be planned for prep area. Prep area will be an integral part of sleep center.

d. *Control room*: Control room is the area where technologists will reside for data collection. Control room should be very close to sleep rooms for safety and timely care. It should have adequate area to accommodate equipments and other computer peripherals. An area of 8 m^2 will be adequate for this control room. This area can be seamlessly merged with a glass partition to separate them from sleep suites and offer the patients privacy. The control room must be adequate in size, design, location, and comfort to allow for effective function and comfort of technologists. Std 7- accreditation of sleep disorder center of AASM.

e. *Storage area*: Adequate storage areas for equipments and other accessories like patient luggage and wheel chair, etc. Storage area of 15 m^2 can be planned. This area should preferably be on the exit end and can have a door opening to outside from where day today needs of the center can be met and privacy of patients is not disturbed.

f. *Doctors' office*: Doctors' office should be planned closed off from the rest, so that scoring can be done without being disturbed. Patients also come in to hear the diagnosis. This room can be planned in an area of 12 m^2. There should be adequate privacy.

g. *Toilets*: Toilets can be planned as per the local needs of populace. An area of 10 m^2 be earmarked. Toilets should have provision for wheel chaired patients also. At least one bedroom and bathroom must be handicap accessible. Toilets should be close to waiting areas. Clean bathrooms must be available and conveniently located within the center. 6B-Accreditation of sleep disorder center of AASM.
h. *Waiting room*: There should be designated waiting area for patients relatives. This area can be planned in an area of 20 m^2. This place can have magazine stands, TV, information kiosks, etc.

The Challenge of the Future

The greatest challenge for the future is the cost-effective expansion of sleep medicine so that its benefits will be available readily throughout society. It will be very important to plan for customized sleep centers across the world as per the regional requirement. A major problem is the current failure of sleep research and sleep medicine to penetrate the mainstream educational system effectively at any level. As a consequence, the majority of human beings remain unaware of important facts of sleep and wakefulness, the fundamentals of biologic rhythms, and knowledge about sleep disorders, in particular the symptoms that suggest a serious pathologic process. The management of sleep deprivation and its serious consequences in the workplace, particularly in those industries that maintain sustained operations, is only beginning to be addressed comprehensively. Finally, the education and training of health professionals to be sleep specialists has far to go to reach adequate numbers. It has made a concern for the health of human beings a 24-hour enterprise and has energized a new effort to reveal the secrets of the healthy and unhealthy sleeping brain.[14]

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