



Factors affecting Quality of Sleep in Intensive Care Unit

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Significance:

The environment of intensive care units is mostly responsible for disturbance of patient behavior and sleep than the underlying disease. Mostly noises have sound peaks >80 dBA are amendable to behavior modification and the intensive care unit noise can be decreased through behavior modification program. In ICU the alarms are responsible for most irritating noise. The hospital management should pay great intention to internal noise.

ABSTRACT

Background: The etiology of sleep disruption in intensive care unit is poorly known and often ignored complication. It is caused by the environmental factors especially pain, noise, diagnostic testing and human interventions that cause sleep disruption. Light, medications and activities related to patient care interfere with patient's ability to have good sleep. There are multi-factorial environmental etiologies for disruption of sleep in ICU.

Objective: The objective of this study was to evaluate the factors disturbing the sleep quality in intensive care unit (ICU) admitted patients.

Methodology: A cross sectional study was designed involving 150 patients admitted in intensive care unit and high dependency unit of Gulab Devi Chest Hospital. The duration of study was from September 2015 to March 2016. The questionnaire was made and filled with the help of patients. The data was analyzed using SPSS version 16.00.

Results: Mean age of patients was 50.46±10.96 with maximum age of 65 and minimum age of 30 years. There was 53.33% male patients and 46.67% females participating in this study. The sleep quality was significantly poor in ICU than at home. After analysis, 54.67% patients were with poor quality of sleep due to pain and 48.67% were due to noise of environmental stimuli. The other factors were alarms, light and loud talking.

Conclusion: Current study shows that reduced sleep quality is a common problem in ICU with multi-factorial etiologies. Patient reported the poor sleep quality in ICU due to environmental issues that are potentially modifiable.

Introduction

Sleep is normal and episodic condition of immobility and dynamic physiological process in which individual is unresponsive to external sensory stimuli and unaware of environment. All voluntary muscles are inactive and metabolic rate is decreased during sleep. It rules almost a third of lives. (1) The particular functions of sleep is unknown but for proper functioning of host defense system it is important. There are two types of sleep: rapid eye movement (REM) or non-rapid eye movements (NREM). Both stages have specific anatomical, physiological and behavioral characteristics. Rapid eye movement and non-rapid eye movement both alternate cyclically. (2) Sleep fragmentation and deprivation have negative effect on respiratory system by reducing the respiratory muscles functions and the ventilator response to CO₂. Sleep disturbance has significant physiological and psychological effect in patients of intensive care unit patients that protract recovery and maximize mortality. The etiologies responsible for sleep disruption are multi-factorial i.e noise, light and clinical care interactions. (3)

In respiratory failure patients, sleep deprivation impairs the recovery and mechanical ventilation weaning. The factors which cause sleep disturbance and disruption of circadian rhythm are sound, light and weaning levels interruption. (4) In critical care units, the disruption of sleep is a basic problem for patients. It is complex and active process. Different factors which are responsible for patient's inability to sleep are noise, lights, pain, discomfort, stress and medications. (5) Environmental noise is main cause of sleep disturbance in intensive care unit. (6)

Sleep loss is common in patients having respiratory disorders. (7) Stress have damaging effects on patient sleep in ICU and the nursing interventions also increase the patients sleep disruption. It is required to minimize the stressors to encourage sleep in ICU. (8) In intensive care units, there is bedside measurement of vital signs. (9) Intensive care unit bed numbers vary between countries. (10) Multifactorial issues that are disturbing the sleep include noise lighting, patient care activities, vital sign monitoring, phlebotomy and medication administration. (11) Pain and poor ventilation of hospital rooms also affect quality of sleep in ICU. (12)

In intensive care units, the presence of strange machinery alarms, unpleasant smells, unfamiliar

people and bright lights are factors which contribute to physical and psychological stress in patients. (13) The patient entering in intensive care units is bombed with huge range of sensory stimuli. The machinery with flashing lights, buzzing and monitors have great effect. The atmosphere is fully tension charged. In intensive care units, death is equally distributed among study groups except sepsis. The sepsis is more frequently encountered among intensive care unit deaths. (14) Intensive care units are considered as unpleasant places for residents. The environment of intensive care units is mostly responsible for disturbance of patient behavior and sleep than the underlying disease. (15) Mostly noises have sound peaks >80 dBA are amendable to behavior modification and the intensive care unit noise can be decreased through behavior modification program. (16) In ICU the alarms are responsible for most irritating noise. The hospital management should pay great intention to internal noise. (17)

Materials and Methods

A questionnaire designed by Freedman et al. (18) was used and patients were asked to complete the questionnaire. This Freedman questionnaire included data on environmental factors affecting the quality of sleep. Deliberate consent from each patient data was taken before data collection. All patients with ages between 30 to 65 years of any gender admitted in intensive care unit or high dependency unit of Gulab Devi Chest Hospital, Lahore, Pakistan were included. Patients on ventilator with severe pain and unable to fill the questionnaire were excluded. After modification of Freedman’s questionnaire, pain was included as pain can also affect the quality of sleep in ICU. This questionnaire rate the quality of sleep on patient on a 10-point scale ranging from (poor sleep) to 10 (best possible sleep). For analysis purpose it was graded into 4 parts: 1: 1-3 for poor sleep; 2: 4-6 for good sleep; 3: 7-8 for very good sleep; and 4: 9-10 for excellent sleep.

It also included quality of sleep (a) at home before admission to ICU and (b) sleep during ICU admission. Patients were also asked their daytime sleepiness and rated on 10-point scale (1= unable to stay awake, 10 = fully alert) during whole stay of ICU. Patients were then asked to rate about various environmental factors caused their sleep to be disrupted (1= no disruption and 10 = significant disruption). The environmental factors were pain, noise, light, nursing interventions, diagnostic testing, vital signs measurement, blood samples, heart monitor alarms, ventilator alarms,

Figure 1. Descriptive statistics of quality of sleep at home

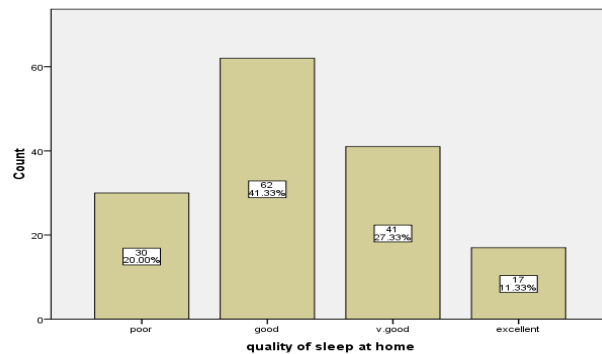


Figure 2. descriptive statistics of quality of sleep in ICU

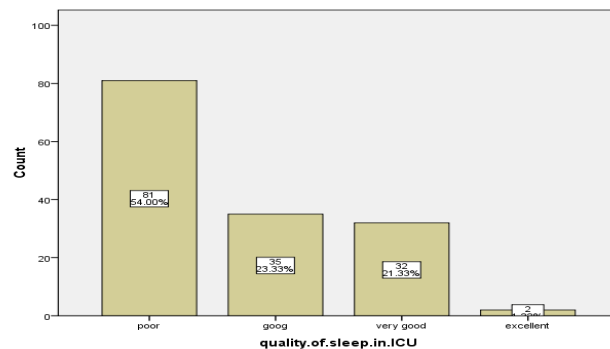


Figure 3. Descriptive statistics of quality of sleep due to daytime sleepiness

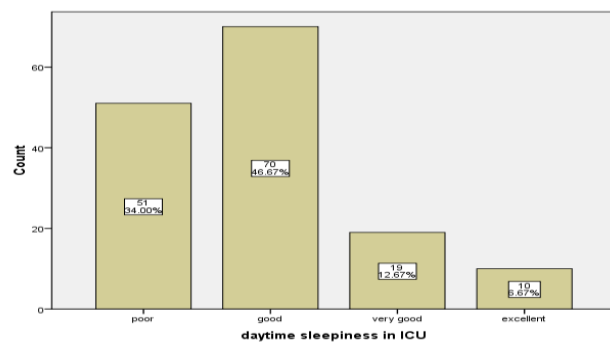
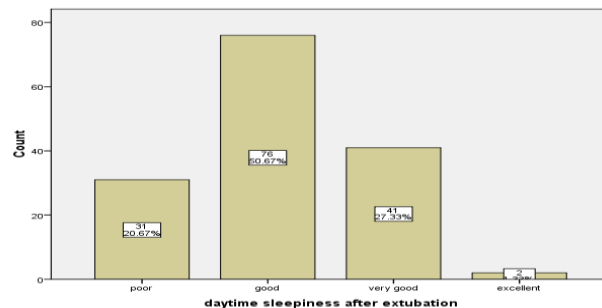


Figure 4. descriptive statistics of quality of sleep after extubation



oxygen finger probe, talking, phlebotomy, alarms and doctors/nurses pagers and phones.

Statistical analysis: Descriptive statistics were calculated using Statistical Package for Social Sciences (SPSS) version 16.00. Mean, standard deviation, range and frequencies were calculated.

Results

Mean age of patients was 50.46±10.96 with maximum age of 65 and minimum age of 30 years. Male patients were 53.33% and female were 46.67%. In current study, there was 12.67% individuals with high socioeconomic status, 30.67% with low socioeconomic status and 56.67% with middle socioeconomic status.

There was poor quality of sleep at home in 20% participants, 41.33% had good sleep at home and 27.33% had very good sleep at home. There were 11.33% individuals with excellent quality of sleep at home shown in Figure 1.

Out of 150 patients who were admitted in ICU 54% were with disturbed sleep, 23.33% with good sleep, 21.33% with very good sleep and 1.22% were with excellent sleep in intensive care unit as shown in Figure 2.

In study population, 46.67% had good quality of daytime sleepiness, 34% had poor daytime sleep, 12.67% had very good daytime sleep and the daytime sleep quality was excellent in 6.67% as shown in Figure 3.

Majority of study population was with good quality of daytime sleep after extubation. 50.67% had good sleep, 27.33% had very good sleep, 1.33% had excellent sleep and 20.67% had poor quality of daytime sleepiness after extubation. (Figure 4)

Majority of patients had poor quality of sleep due to pain. 54.67% of patients had poor sleep due to pain. 21.33% had good, 14% had very good sleep and only 10% had excellent sleep quality during pain. (Figure 5)

In current study, 48.67% of patients had poor sleep quality due to noise in intensive care unit, 20.67% had good sleep, 17.33% had very good sleep and only 13.33% patients had excellent sleep. Mostly patients had disturbed sleep in ICU due to noise which is often overlooked. (Figure 6)

Sleep quality was good in 37.33% (56) patients due to light, 25.33% (38) were with very good sleep and 27.33% (41) were with excellent sleep due to light. Others having poor sleep due to light were only 10% (15). Lights had little effect on sleep quality of patients on ICU. (Figure 7)

Figure 5. descriptive statistics of quality of sleep due to pain

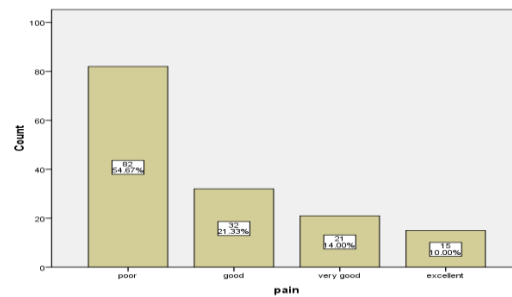


Figure 6. Descriptive statistics of quality of sleep due to noise

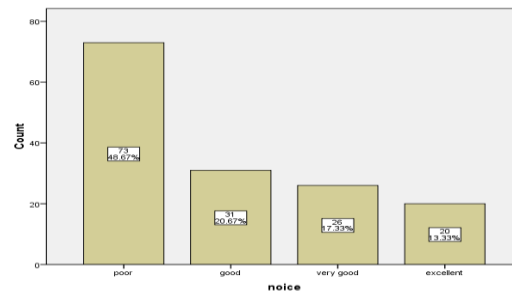


Figure 7. Descriptive statistics of quality of sleep due to light

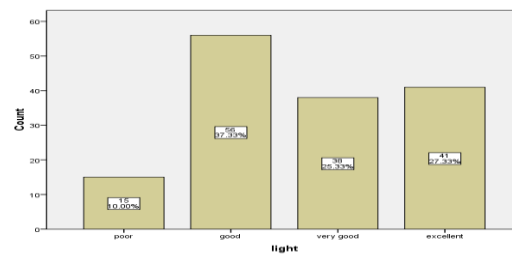


Figure 8. Descriptive statistics of quality of sleep due to nursing

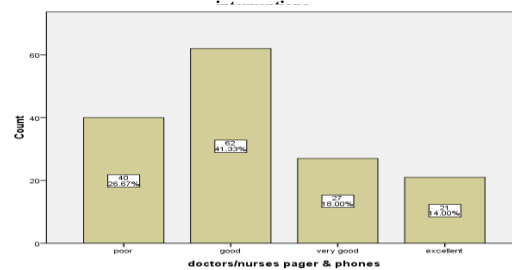


Figure 9. Descriptive statistics of quality of sleep due to diagnostic testing

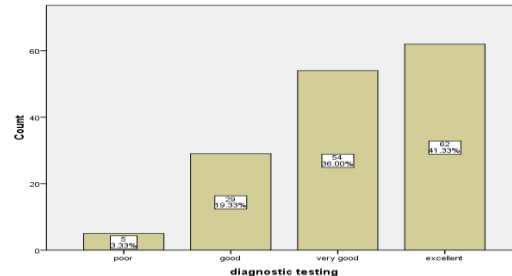


Figure 10. Descriptive statistics of quality of sleep due to vital signs

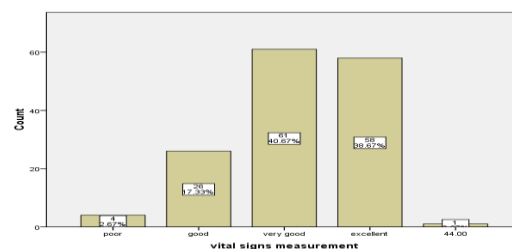


Figure 11. Descriptive statistics of quality of sleep due to blood samples

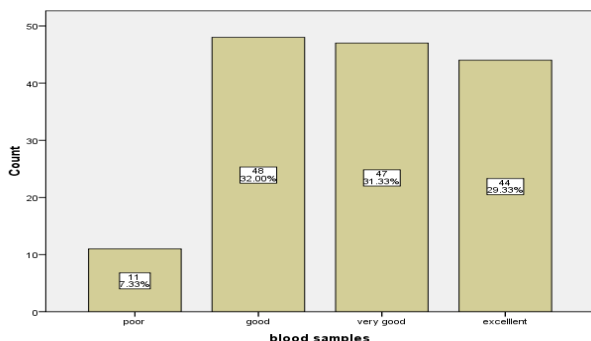


Figure 12. Descriptive statistics of quality of sleep due to cardiac monitor

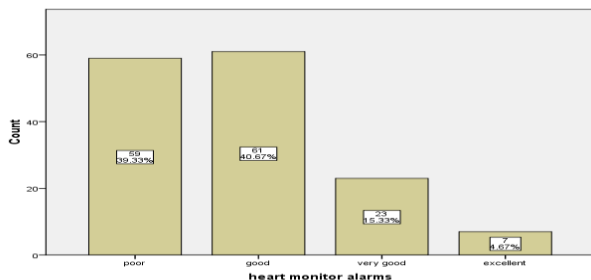


Figure 13. Descriptive statistics of quality of sleep due to ventilator

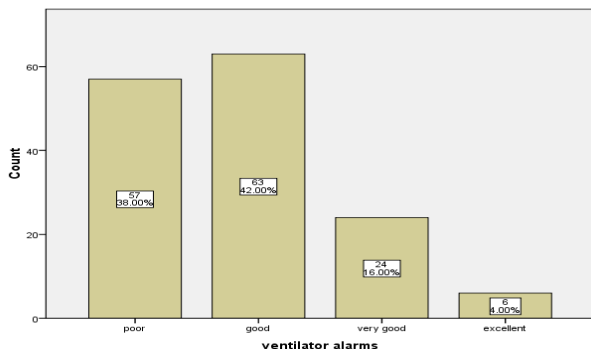


Figure 14. Descriptive statistics of quality of sleep due to oxygen finger

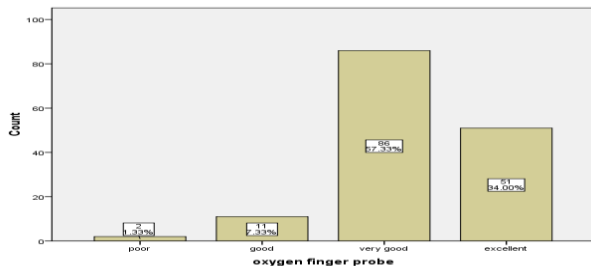
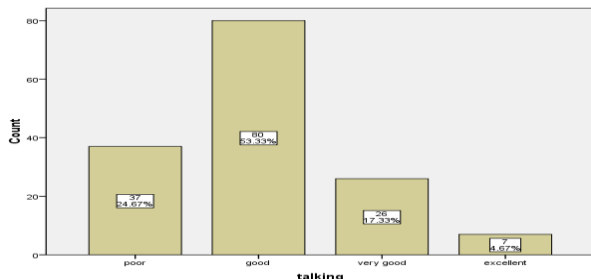


Figure 15. Descriptive statistics of quality of sleep due to talking



Nursing interventions had little effect on sleep quality in ICU. Only 4.67% had poor sleep quality, 21.33% had good sleep, 36% had very good sleep quality and 38% had excellent quality of sleep due to nursing interventions. (Figure 8)

In this study majority of patients had excellent sleep with minimum effect of diagnostic testing. The 41.33% of patient population was with excellent sleep, 36% with very good sleep and 19.33% were with good sleep. Patients population with poor sleep quality was only 3.33%. (Figure 9)

The vital signs measurement also has little effect on patient sleep quality. Only 2.67% were with poor sleep due to vital sign measurement, 17.33% with good quality, 40.67% with very good quality of sleep and 38.67% were with excellent sleep. (Figure 10)

In current study only 7.33% patients had poor sleep due to blood samples while others 32% were with good sleep, 31.33% with very good sleep and 29.33% were with excellent sleep quality with little or no effect of blood samples. (Figure 11)

Cardiac monitor alarm in ICU was found to affect the sleep quality of mostly patients. In ICU patients, there was poor sleep in 39.33% of study population, 40.67% were with good sleep, 15.33% with very good sleep and 4.67% were with excellent sleep. (Figure 12)

Majority of ICU patients had disturbed sleep due to ventilator alarms. According to current study results only 4% were with excellent sleep in presence of ventilator alarms. While other 16% were with very good sleep, 42% with good sleep and study population with poor sleep was 38%. (Figure 13)

Sleep quality was good due to oxygen finger probe it has little or no effect on patient sleep in ICU. Only 1.33% were with poor sleep and sleep was good in 7.33%, very good sleep in 57.33% and excellent sleep in 34% patients due to oxygen finger probe. (Figure 14)

Talking in ICU also found to affect patient sleep quality. According to this study results, 24.67% of study population was with poor sleep in ICU which was due to talking while other 53.33% were with good sleep, 17.33% with very good sleep and 4.67% were with excellent sleep. (Figure 15)

Sleep quality was good due to intravenous pump alarms in ICU. Patient with poor sleep quality were only 2.67% while other 20.67% were with good sleep, 50% with very good sleep and 20.67% were with excellent sleep due to intravenous alarms. (Figure 16)

Figure 16. Descriptive statistics of quality of sleep due to intravenous pump

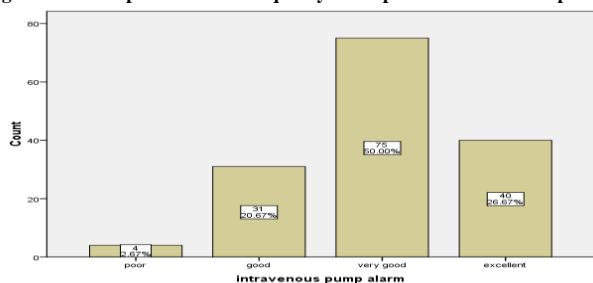


Figure 17. Descriptive statistics of quality of sleep due to nebulizer

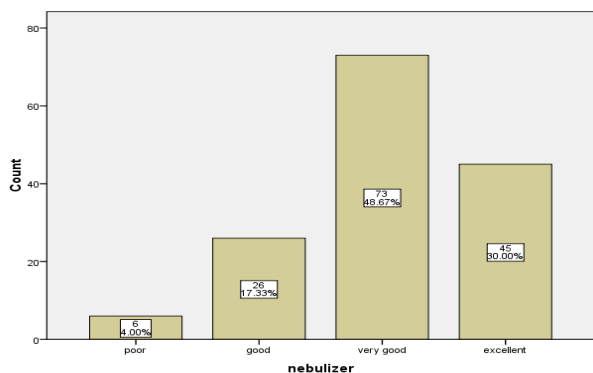
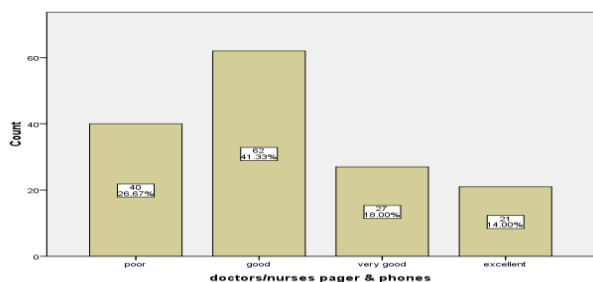


Figure 18: Descriptive statistics of quality of sleep due to doctors/nurses pager and phone



Nebulizer have little effect on patients sleep. There was only 4% patient population with poor sleep due to nebulizer, 17.33% were with good sleep, 48.67% with very good sleep and 30% were with excellent sleep quality with little effect of nebulizer on sleep. (Figure 17)

Doctors and nurses, phones or pagers also found disturbing the patient sleep. In this study there was 26.67% patients with poor sleep quality due to this. The study population with good sleep quality was 41.33%, population with very good sleep was 18% and excellent sleep was in 14% of study population. (Figure 18)

Discussion

In this study, 150 patients were included. Mean age of participating patients was 50.46±10.96 with maximum age of 65 years and minimum age of 30 years.

According to results of this study, sleep quality was poor in patients who were admitted in ICU as compared to patient sleep at home. Environmental factors including noise and alarms in ICU were responsible for sleep disruption. In ICU, there were 54% patients with low quality of sleep while at home there was only 20% with disturbed sleep. According to Freedman study that was conducted on sleep disruption also ICU sleep quality was poor than at home. Quality of sleep was poor due to different human interventions and diagnostic testing such as environmental noise. The environmental causes of sleep disruption are multi-factorial. The results of this study were almost same as by Freedman. (18)

There was another study showing the same results i.e., sleep quality was reduced in ICU as compared to home which is reduced from 7.0±2.2 hours to 4.0±1.7 hours during their stay in intensive care unit. (19)

According to results of this study, majority of patients have disrupted quality of sleep because of noise. There were about 48% patients with disrupted sleep that was caused by noise. The results of Freedman study also showed that environmental noise is responsible for sleep wake abnormalities, it doesn't effect majority of sleep fragmentation. (18)

The sleep quality was reduced in number of patients who were admitted in ICU. In past studies quality of sleep in ICU was extremely poor in 69% of patients. (20)

In this study poor quality of sleep in patients was caused by pain. There were almost 54% of patients having poor quality of sleep caused by pain. According to results of another study conducted by Morin et al., the pain is significant complaint in patient having sleep disruption. (21)

Current study revealed that sleep is poor in 54% patients due to pain and in 48% patients due to noise 10% due to light. There was minor effect of other factors for disturbed sleep. According to another study by Little A (22) sleep was poor in 59% of patients as compared to at home that was 24%. The different factors causing disturbance of sleep were noise pain light and loud talking. Mostly results were co-relating to each other with minor difference in percentages.

Majority of patient had poor sleep quality during first night in ICU. They were 54.67% among first night patients. Daytime sleepiness was also poor in 34% of patients.

Conclusion:

According to results of this study, it was concluded that poor quality of sleep is common in ICU. Sleep disruption is caused by multi-factorial etiologies.

Majority of patients with poor quality of sleep in ICU are because of pain, noise and alarms. Other factors have minor role for sleep disruption. Due to these factors the quality of sleep is minimized in ICU as compared to home. These factors can be potentially modified to better the quality of sleep.

Conflict of Interest: This study has no conflict of interest to declare by any author.

Disclosure: None

Human and Animal Rights: No rights violated

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