

## Factors Associated with Sleep Pattern Disturbance among Patients in Critical Care Units

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### Abstract :

**Background:** Sleep is a basic need much as food and water, which are necessary for human survival. Sleep is a periodic, reversible state of cognitive and sensory disengagement from the external environment with a complex physiologic and behavioral process essential for rest, repair, well-being, and survival. **This study aimed to identify factors associated with sleep pattern disturbance among patients in critical care units. A descriptive design was applied in the current study. The study was conducted at critical care units (Intensive Care Units & Cardiac Care Units) at Port Said city hospitals. A convenience sample of 86 patients was included. Three tools were used for data collection; interviewing questionnaire sheet, Groningen's sleep quality Scale and Modified Sleep disturbing scale. Results of the study showed a highly statistically significance correlation between the quality of sleep pattern before and after hospitalization whereas ( $p=0.000$ ). Conclusion: poor-quality sleep and disruptions are common problems among patients in critical care units. These problems are related to many factors and the most effective factors related to the patients such as pain and difficult breathing and critical care environment such as alarms and lights.**

**Keywords -** Sleep, Sleep Pattern, Critical care units, Factors affecting sleep.

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### I. Introduction

Sleep is a natural process occurring in animals and human beings, which is a complicated state involving both behavioral and physiologic processes (Susan, & Patricia, 2014).

Sleep architecture represents the cyclical pattern of sleep as it shifts between the different sleep stages, including non-rapid eye movement (NREM) and rapid eye movement (REM) sleep. It allows people to produce a picture of what sleep looks like over the course of a night, taking into account various depths of sleep as well as arousals to wakefulness (Peter, 2014).

Research has shown that, the prevalence of sleep disturbance among critically ill has been shown to be more than 50.0%, and of the remaining sleep time only 3.0% to 4.0% in REM sleep (Bihari, McEvoy, Kim, Woodman, & Bersten, 2012).

Hospitalized patients, particularly those who are critically ill, are known to have severe sleep fragmentation and disturbed sleep. The sleep pattern of a critically ill patient is characterized by a predominance of wakefulness and light sleep (sleep stages I and II), and a relative lack of Rapid Eye Movement (REM) and deep sleep (delta sleep, formerly referred to as non-REM sleep stages III/IV). Sleep deprivation is known to lead to several clinical and physiologic manifestations (Belinda, & Polly, 2013).

The body undergoes a constellation of physiologic changes during sleep that play an important role in growth and homeostasis. These alterations are particularly significant in patients with unstable hemodynamic, impaired defense mechanisms, and limited physiologic reserve; hence, these alterations may be particularly important in critically ill patients who may suffer severe consequences from abrupt physiologic fluctuations (Lewis, Dirksen, Heitkemper, Bucher, & Camera, 2011).

Lack of sleep causes disastrous results for the critically ill patients. The nurse can promote recovery and healing through facilitating sleep for patients by controlling environmental noise and formulating individualized interventions (urden, stacy, & Lough, 2013).

Critical care units provide treatment to critically ill patients. Intensive care monitoring and treatments involve intrusive and invasive devices such as artificial airways and intravascular catheters. These together with symptoms of illness and the noisy environment may lead to discomfort including the inability to sleep (Mantz, Paugam-Burtz, & Hamada, 2010).

Many factors contribute to sleep and fatigue symptoms during recovery from acute illness or injury. Pre-existing sleep disorders, path physiology of the underlying illness/injury, therapeutic interventions, medications, and the intensive care unit (ICU) environment are major contributing factors in sleep disruption and fatigue (Zhang et al., 2013). Patients Factors can affecting sleep pattern included; pain/discomfort, environmental changes, anxiety/fear, depression, medications, excessive or inadequate stimulation, abnormal physiological status or symptoms (dyspnea, hypoxia, neurological dysfunction, and others), and normal changes associated with aging(UK Health Centre, 2014).

There are many environmental factors affecting patients' sleep pattern in ICU such as; ambient light, ambient noise, equipment (television, ventilator, monitor), alarms (ventilator, monitoring equipments), procedures (blood draws, diagnostic tests), and staff related factors such as nursing procedures, beepers, phone, overhead paging and staff conversation (Bihari, et al., 2012).

The critical care nurse is an integral part of the multidisciplinary health care team who is responsible for recognize patient's problems and caring it to achieve optimal care. The maintenance of normal sleeping pattern should feature high on the nurse's list of priorities. Critical care nurse can identify patients at risk for sleep disturbance, and then nurses could target interventions toward specific aspects of sleep problems by considering characteristics that are unique to the individual (Motron & Fontaine, 2013).

### **1.1 Significance of the study:**

Disturbances in sleep patterns in critically ill patients are still a subject given little attention by health professionals, especially in nursing, and thus this important event is being neglected. Practitioners do not acquire suitable knowledge for the diagnosis and subsequently for the prophylaxis and treatment of complications associated with this problem. By understanding the physiology of the sleep cycle, rest and ways to promote relaxation and sleep, nurses can minimize the factors that cause sleep disruption in ICU patients and avoid the possible negative effects caused by sleep deprivation (Silveira, Bock, & Silva, 2012).

Promotion of sleep for patients is therefore not only a humanistic intervention but can be a life-sustaining one as well. Critical care nurses play a vital role in the care of critically ill patients since they spend more time beside the patients and they are concerned with human's responses to life threatening problems.

### **1.2 Aim: The aim of this study:**

Identify the factors associated with sleep pattern disturbance among patients in critical care units (Intensive Care Units & Cardiac Care Units) at Port Said city governmental hospitals.

### **1.3 Research Question:**

To achieve the aim of this study the following research questions are formulated:

- A. What are the factors associated with sleep pattern disturbance among patients in critical care units?
- B. Is there a relation between socio-demographic characteristics and sleep pattern disturbance among patients in critical care units?
- C. What is the relation between factors affecting sleep pattern and sleep quality among patients in critical care units?

## **II. Subjects And Methods**

### **1. Subjects**

#### **1.1 Research design:**

A descriptive design was used in this study to fulfill the aim of the study and answer the research questions.

#### **2.1 Setting:**

This study was carried out in Intensive care units (ICU) and Cardiac Care Unit (CCU) in Port-Said City governmental (General & Health Insurance) hospitals as the following: General Hospitals are (Port-Said General, El-Zohoor Hospital and Port-Fouad Hospital), and Health Insurance Hospitals are (El-Mabarrah Hospital and El-Tadamon Hospital).

#### **3.1 Subjects:**

A convenience sample of 86 critically ill patients over a period of four months from the beginning of March, 2013, to the end of June, 2013 was included in the study.

**4.1 Tools of data collection:** Three tools were used in this study to collect the necessary data.

**1.4.1 Tool I:** Modified Interview Questionnaire Sheet: was developed by **Shaban (2008)**. It was consisted of two parts:

**Part 1:** it was concerned with socio-demographic characteristics of patients under study such as (age, sex, level of education, occupation, marital status.....etc).

**Part 2:** sleep pattern assessment questionnaire, it was used to assess the quality of sleep during the normal life before hospitalization, such as (habits before sleep and special preparations in the bedroom, use of sleeping medication, hours during which the patient sleep.....etc).

**2.4.1 Tool II:** The Groningen's Sleep Quality Scale: was developed by **Hajonides, Haukka, and Partonen (2003)** to measure the subjective quality of sleep. It was contained of 15 statements, which answered by true or false. The quality of sleep was ranged as; good (0-5), fair (6-8) and poor (9-14).

**3.4.1 Tool III:** Modified Sleep disturbing scale: was developed by **Reda and Ibrahim (2000)**. It was used to measure the extent of each factor that disturbs the sleep pattern. The sleep disturbing factors scale uses Likert-type format with a 4-pionts scale no affection (0), mild (1), moderate (2) and sever (3). It was composed of 35 factors and divided into three parts:

**Part 1:** Patient related factors; this part composed of 18 factors related to patient such as (pain, cough, anxiety, nightmares...etc).

**Part 2:** Staff related factors: It consists of six factors related to the staff working with the patient such as (pre-sleep routines, physician's interference, nursing-physicians speaking...etc).

**Part 3:** Environmental factors: It includes 12 factors related to ICU environment such as (lights, noise, alarms sound, telephone...etc).

## **2. Methods**

### **1.2 Ethical Considerations:**

An official litter was directed from the dean of Faculty of Nursing, Port – Said University to the hospitals managers. Written permission to conduct the study was obtained from the director of each setting and the head of critical care units of the selected hospitals after explaining the purpose of the study to gain their cooperation during the period of the study. Verbal consents were obtained from each participant (patients) to be included in the study after explaining clarification of the nature and purpose of the study. The researcher was emphasized that, the participations were absolutely voluntary and each patients have the right to withdraw from the study at any time without explaining any reasons, as well as confidentiality was assured.

### **2.2 Content Validity and Reliability:**

Content validity was tested by nine experts from Faculty of Nursing in the field of Medical - Surgical Nursing and physicians from faculty of medicine. The questionnaire was modified according to the experts' comments and recommendations and the tools tested for reliability. The internal consistency of tools has been tested using Cronbach's alpha coefficient. Cronbach's alpha for Croningen scale, patient related factors, staff related factors and environmental factors were (0.86, 0.88, 0.73, & 0.70) respectively.

### **3.2 Pilot Study:**

A pilot study was done to assess the feasibility and applicability of tools and to estimate the proper time required for answering the questionnaire. It was conducted on 10.0% of patients from previously mentioned selected settings. The patients included in the pilot study were excluded from the main sample.

### **4.2 Field of work:**

An official written permission to conduct the study was obtained from the director of each setting and the head of critical care units of the selected hospitals, and verbal consents were obtained from each participant (patients) to be included in the study after explaining clarification of the nature and purpose of the study. A verbal consent was obtained from each patient and wrote his name on the questionnaire sheet after the researcher introducing himself to the patient and explaining the purpose of the study at the beginning of the interview. The patients were assured that, all information will be confidential and will be used only for the purpose of the study.

Data were collected over a period of four months from the beginning of March, 2013, to the end of June, 2013. Data were collected for five days a week from Saturday to Thursday at morning shift from 8:00 am to 2:00 pm and afternoon shifts from 2:00 pm to 8:00 pm. Data were collected using written questionnaire sheet for each patient that was interviewed individually to fill in the questionnaire sheet by the researcher which was read the

questionnaire to the patients and as they answered the researcher filled in the questionnaire. The all-time needed for the application of the tool was lasted approximately about 40-45 minutes. First tool was interviewing questionnaire; it lasts about 15 minutes to fill in it, while the second tool was Groningen's Sleep Quality Scale it lasts about 10 minutes to fill in it, and finally the third tool was Sleep disturbing scale it lasts about 15-20 minutes to fill in it.

### **5.2 Statistical Data Analysis:**

Data were extracted from the interview questionnaire and computerized in Microsoft Excel 2007. Data analyzed was done using Epi-Info 6.04 computer software package, while statistical analysis was done using the statistical package for social sciences (SPSS) version 21.0. Data were presented using descriptive statistics in the form of frequencies and percentages for qualitative variables, and means and standard deviations for quantitative variables.

### **III. Results**

The Results showed that the mean age of patients under study was (50.6±10.2). Regarding gender; more than half of patients in the current study (55.8%) were males. Concerning occupation, more than one third of patients (34.9%) were house wife, while the minority of them (2.3%) was students. As regard to level of education, more than two fifths of the patients (44.2%) were able to read and write, while 7.0 % were university degree. In relation to marital status, most of patients (82.6%) were married, while the minority of them (7.1%) was single. Regarding to residence, the majority of patients (97.7%) were from urban Table (1).

The mean of sleep hours and naps per day among patients was (6.7±1.6, & 0.87±.97h) respectively. The same table manifest that, the majority of patients (89.5%) had certain habits before going to sleep such as watching TV and listening to music (90.9%, & 1.3%). Concerning intake of hypnotics before hospitalization, all of patients (100.0%) weren't received hypnotics before hospitalization. Related to certain requirements in bedroom, the majority of the study samples (91.9%) were needed certain requirement in bed room. Result showed that, more than half of patients (51.2%) were slept from (6 – 7) hours, while 4.7% of them were slept from (10 -12) hours, with a mean score of (6.7±1.6). As regard to patient sleep pattern before hospitalization, more than three fifths of patients (62.8%) had good sleep pattern, while 2.3% of them had poor sleep pattern. (Table2). Most of the patients (78.0%) had poor score regarding Groningen's sleep quality scale with a highly statistically significant whereas ( $p < 0.000^{**}$ ). (Fig1). Regarding the patients related factors which affected sleep pattern among patients, it was noticed that, the most common factors were pain (98.8%) pain, difficulty of breathing (95.3%), cough, concern, change position (93.0%), and desire for vomiting (91.9%). Also regards to the factors related to staff; it was observed that, the most sever factors related to medical team was noise (93.0%). In addition, the factors related to environment, it found that the most factors affected sleep pattern were alarm, falling objects, lightning, telephone and patient's sound (97.7%, 96.5%, 90.7%, 93.0%, & 97.7%). (Table 3,4, 5). Regarding relation between socio-demographic characteristics and factors affecting sleep pattern there was a statistically significance relation between patients' gender and factors related to environment whereas ( $p = 0.002^{*}$ ); males were affected with environmental factors more than females. Also, there was a statistically significance relation between patients' residence and factors related to environment whereas ( $p = 0.050^{*}$ ); rural were affected with environmental factors than urban (Table 6).

There was a highly statistically significance differences between the quality of sleep pattern before and after hospitalization whereas ( $p \leq 0.001$ ); it was observed that, hospitalization had a negative effect on sleep pattern. (Fig2) Regarding Correlation between factors affecting sleep pattern and sleep quality as recorded by Groningen scale there was a positive correlation between the Groningen scale and patient related factors that disturbing sleep in the critical care units whereas ( $P = 0.006^{*}$ ). (Table 7)



Figure (1): Groningen's sleep quality scale score of the studied patients (N=86).



Figure (2): comparison between quality of sleep pattern before and after hospitalization (N= 86)

Table (1): socio-demographic Characteristics of the Studied Patients (N=86).

General Characteristics	Study Samples	
	No.	%
<b>Age in years</b>		
Less than 30	6	7.0
30-	7	8.1
40-	13	15.1
50-≤60	60	69.8
Min-Max	18-60	
Mean±SD	50.6±10.2	
<b>Gender</b>		
Male	48	55.8
Female	38	44.2
<b>Occupation</b>		
Housewife/not work	30	34.9
Retired	14	16.2
Worker	16	18.6
Employee	24	28
Student	2	2.3
<b>Education level</b>		
Illiterate	14	16.2
Read and write	38	44.2
Secondary school	28	32.6
University degree	6	7.0
<b>Marital status</b>		
Single	6	7.0
Married	71	82.5
Widow	9	10.5
<b>Residence</b>		
Urban	84	97.7
Rural	2	2.3

**Table (2): Sleep habits of the study samples before hospitalization (N=86).**

Sleep Habits	Study Samples	
	No.	%
<b>Need certain requirements in bedroom</b>		
Yes	79	91.9
No	7	8.1
<b>Type of requirements [n=79]</b>		
Darkroom	74	93.7
Light room	1	1.3
Closed door	15	19.1
Opened door	3	3.8
Watch TV	2	2.5
Calm	63	79.7
<b>Wake up during night</b>		
Yes	77	89.5
No	9	10.5
<b>Frequency of waking up during night [n=77]</b>		
Less than 3 times	36	46.8
3 times or more	41	53.2
<b>Reason for waking up during night [n=77]</b>		
Go to the WC	71	92.2
Pain	22	28.6
Cold	7	9.1
Thirst	14	18.2
Hunger	6	7.8
Sweating	1	1.3
Fear and Anxiety	11	14.3
Noise	2	2.6
<b>Wake up time</b>		
4-6	30	34.9
7-9	38	44.2
10-12	18	20.9
<b>Mean±SD</b>	7.6±2.1	
<b>Preferred sleep Position</b>		
Supine position	13	15.1
Semi fowler position	8	9.3
On side	75	87.2
Prone position	6	7.0
<b>Patient's sleep pattern before hospitalization</b>		
Good	54	62.8
Fair	30	34.9
Poor	2	2.3

**Table (3): Patients' related factors that affect the sleep pattern of studied patients (N=86).**

Factors	Mean±SD	Median	%
<b>Factors related to patient</b>			
Pain	2.8±0.6	3.0	98.8
Bed	1.8±1.1	2.0	81.4
Cough	2.5±0.9	3.0	95.3
Concern	2.6±0.8	3.0	95.3
Devices and connections in the body	2.4± 0.9	3.0	94.2
Change position	2.3± 0.8	2.0	95.3
Difficulty in breathing	2.6± 0.8	3.0	96.5
Desire for vomiting	2.2± 0.9	2.0	93.0
Too much Sweating	1.7±1.0	2.0	83.7
Frequent medication	1.4±1.2	1.0	65.1
Reduction of the movement in the bed	2.2± 0.9	2.0	91.9
Ways of drug administration	1.4±1.0	2.0	68.6
Annoyance after the visit	1.9±1.2	2.0	79.1
Bad Dreams (nightmares)	1.3±1.2	1.5	59.3
Non-desirable Food	1.3±1.1	1.5	62.8
Frequent pipes entering and leaving the body	2.3±1.1	3.0	86.0
No visits	2.2±1.2	3.0	83.7
Fear	2.5±1.0	3.0	91.9
<b>Total</b>	2.1±0.6	2.3	

**Table (4): Staff related factors that affect the sleep pattern of the studied patients (N=86).**

Factors related to staff	Mean±SD	Median	%
Staff talks at bedside	2.2±1.0	2.0	88.4
Steps of nursing care	2.0±0.9	2.0	90.7
Routine before sleep	1.8±1.0	2.0	83.7
Doctors interruption	1.7±0.9	2.0	84.9
Delay nurses	1.3±1.1	1.0	65.1
Noise (Meals trays)	2.4±1.9	3.0	93.0
<b>Total</b>	1.9±0.6	2.0	

**Table (5): Environmental related factors that affect the sleep pattern of studied patient's (N=86).**

Factors related to environment	Mean±SD	Median	%
Lighting	2.5±1.0	3.0	90.7
Doors	2.0±1.1	2.0	81.4
Ventilation system	0.6±1.0	0.0	29.1
Patients sounds	2.4±0.8	3.0	97.7
Falling objects	2.2±0.8	2.0	96.5
Radio	1.5±1.2	2.0	64.0
Telephone	2.4±0.9	3.0	93.0
Alarms	2.6±0.9	3.0	97.7
Footsteps	1.3±1.1	1.0	69.8
Emergency carts	1.3±1.1	1.5	67.4
Repair acts	1.9±1.2	1.2	76.7
<b>Total</b>	1.9±0.6	1.9	

**Table (6): Relation between Socio-demographic characteristics and factors affecting sleep pattern (N= 86).**

Socio-demographic data	Patients		Patients' factors		Staff factors		Environmental factors	
	No	%	Mean±SD	Significance	Mean±SD	Significance	Mean±SD	Significance
<b>Gender</b>								
Male	48	55.8	2.1±0.5	t= 1.981	1.9±0.7	t= 1.851	1.8±0.5	t= 3.162
Female	38	44.2	2.3±0.4	p=0.051	2.1±0.5	p=0.068	2.1±0.7	p=0.002*
<b>Residence</b>								
Urban	84	97.7	2.5±0.5	t= 1.107	2.0±0.6	t= 0.649	1.9±0.5	t= 1.992
Rural	2	2.3	1.8±0.5	p= 0.271	2.3±0.1	p= 0.518	1.1±0.6	p= 0.050*

**Table (7): Correlation between factors affecting sleep pattern and sleep quality as recorded by Groningen scale among studied patients (N= 86).**

Groningen score	Patients' factors	Staff factors	Environmental factors
Groning total score	r= 0.297 P= 0.006*	r= 0.110 P= 0.312	r= .194 P= 0.170

#### IV. Discussion

The current study aimed to identify factors associated with sleep pattern disturbance among patients in critical care units. This aim was achieved by the present study findings and the research questions were answered. This study was found that, hospitalization in critical care units had a negative effect of the quality of sleep; it was observed that, these disturbances were related to patients' related factors, environmental factors and medical team related factors, which had a negative effect on sleep pattern.

According to the results yielded by the present study, the majority of patients were male, their age was between (50 to 60) years old, which might explain that most of critical care patients were old adult, more than one third of patients were house wife and not work that is regards to the study sample age on the current study were (50 – 60) years old, the majority of the study samples was educated and married respectively, nearly all the study samples were resided in urban areas, more than two fifths of patients had family size between 5-7 members while the minority of patients hadn't any family member and the most of the study sample was not smoke. The current study findings were revealed that, there was a highly statistically significance relation between the quality of sleep pattern before and after hospitalization. It was observed that, hospitalization had a negative effect on the quality of sleep. In the point view of the researcher, patient had a good sleep pattern before hospitalization because they were in their homes surrounding by their family members and able to maintain all sleep requirements, but when patients are hospitalized they become very anxious and fear especially who admitted to critical care units beside the nature of illness that affect sleep patterns the critical care units environment have multiple factors that disturb their sleep pattern.

This result was in the same line with **Cicek et al. (2014)** who were found that, the sleep qualities of the CCU patients included in their study were mildly decreased on the first day of hospitalization at the intensive

care unit. Also, the result of the present study goes in line with the results of **Atar, Kirbiyık, Turan, Pallos, and Eskimez (2012)** who were studied patients' sleep quality and factors affecting sleep in surgery clinic and were reported that, most of patients were experienced an important change in the sleeping habits in the hospital environment, and more than half of the patients had poor quality of sleep in the hospital.

In addition, **Park et al. (2014)** were mentioned that, most of patients had disturbed sleep after hospitalization as the same as the present study was mentioned also most of patients had poor sleep quality after hospitalization. Moreover, the current study in accordance with **Le et al. (2012)** who were studied sleep disruptions and nocturnal nursing interactions in the intensive care unit and were reported that, hospitalization had affect sleep pattern negatively.

The findings of the present study were found that, there was a statistically significance relation between the Groningen scale and patient related factors that disturbing sleep in the critical care units. The current study findings were found that, pain had a negative effect on sleep pattern. Pain is cited as the most disturbing factors in the present study. The link between pain and sleep disturbances should not be surprising; researchers has discovered that, areas in the brain that process pain signals also regulate NREM sleep. This phenomenon may at least partially explain the interaction between pain and poor sleep.

This finding in the same line with **Bihari et al. (2012)** who were found that, pain had a negative effect on sleep quality. Also, this result was in accordance with **Kamdar et al. (2012)** who were found that, pain is a very common symptom in critically ill patients contributes to awakenings during sleep.

Concern and fear were other issues that impaired patients' sleep in the present study. ICU patients can rarely have any preparation for their admission and worried by the strange surroundings and faces. Also, concern could be related to diagnosis, fear from death, unexplained procedures and unfamiliar environment. This finding in the same line with **Day et al. (2013)** who were studied sleep, anxiety and fatigue in family members of patients admitted to the intensive care unit and were found that, anxiety can also be a result of other medical conditions as well as a new environment or planned life changes.

The current study results were found that, cough and difficult breathing were considered as prominent factors that disrupted sleep of patients in the current study. This finding could be cited to the fact that, cough creates pain and pain result in difficult breathing that interrupt sleep. In addition, repetitive cough force the patient to sleep on unfavorable position and cause awaking, which decrease sleep duration. This result in accordance with **Cohen et al. (2012)** who were studied the effect of honey on nocturnal cough and sleep quality and were stated that, cough can be particularly troubling patients' results in discomfort and loss of sleep. Moreover, the current study in agreement with **Cicek et al. (2014)** who were found that, administration of medication, collecting blood sample and diagnostic tests had a negative effect on sleep quality. In addition, **Elliott et al. (2013)** were mentioned that, administration of medication was affected quality of sleep. Also, **Tastan et al. (2010)** were reported that, the majority of patients had sleep problems because of medication procedures.

The current study findings were showed that, medical team had a negative effect on sleep quality among critically ill patients. The most common factors related to staff were noise and nursing intervention. In the point view of the researcher, health care providers are often unaware of the loudness of their conversations and the irritation they may create in the minds of patients. Also, nursing activities could be a source of noise since it is invisible that, noise will be created while preparing and handling the tools for caring activities.

The present study goes in line with **Elliott et al. (2013)** who were noticed that, nursing interventions had an effect on sleep pattern. In addition, **Cicek et al. (2014)** were mentioned that, nursing interventions and staff talking was affecting sleep quality. The current study goes in the same line with **Park et al. (2014)** who were observed that, the majority of patients had bad sleep; the sleep disturbance was significantly correlated with increasing noise levels. As results yielded by the current study, it was noticed that, numerous of environmental factors had an effect on sleep quality like as external sounds (noise) from telephone, doors or alarms, and lightening. The most common causes of sleep disturbance was noticed in the current study were noise and light. This could be related to the extremely noisy and unfamiliar ICU's environment.

This result goes in the same line with **Bihari et al. (2012)** who were found that, environmental factors had a negative effect on sleep pattern. Furthermore, **Hata et al. (2014)** were found that, physical illness, emotional stress, environmental change, non-optimal lighting, and high environmental noise are factors that can cause sleep deprivation in hospitalized patients. Creating a quiet hospital environment is one component to promote and improve the quality of sleep.

In addition, **Wang and Greenberg (2013)** who were studied sleep and the ICU and were found that, environmental factors in critical care units that might negatively affect sleep include high noise and light levels at times when sleep is desired.

The current study was found that, there was a strong positive statistically significant correlation between the quality of sleep pattern before and after hospitalization. This result confirms the impact of factors especially the patient related factors such as (pain, anxiety, fear, cough and difficult breathing) on the subjective



quality of sleep resulting on change of sleep quality during the ICU stay. The differences in subjective sleep quality between patients were ranged from good to poor sleep.

The result of present study goes in line with the results of **Fontana and Pittiglio (2010)** were reported that, patients under study had poor quality of sleep after hospitalization. In addition, **Dunn et al. (2010)** who were mentioned that, patients in the ICUs were mostly had poor sleep quality.

## V. Conclusion

Based on the findings of the current study, it can be concluded that, sleep disruption are a common problem among critical care units' patients. This problem is related to many factors include patient's related factors as (pain, concern, difficulty of breathing, cough and fear), environmental factors such as alarms, lightning, telephone and patient's sound contribute to elevating the critical care units' noise level, which in turn causes sleep disruption, and staff related factors such as interruption caused by bedside conversation, human intervention and diagnostic procedure to be as important as environmental noise.

## VI. Recommendation

**Based on the findings of the present study, the following recommendations were suggested:**

It Is Recommended That The Responsible Nurses Should:

1. Provide educational programs for nurses about the importance of sleep to critically ill patients and the effect of sleep disturbance on patients' health.
2. Conducting a workshop to identify the nurses with the factors that disturb the patients' sleep and nurses must be learned how to deal with the factors affecting sleep pattern and updates their knowledge about the new trends in this field.

It is recommended that the critical care nurses should:

1. Informed patients about environmental sounds, interventions and invasive procedures to decrease the level of concern, anxiety and fear which lead to sleep disturbance.
2. Procedures and care plan must be organized as possible at the day time to eliminate the interruption for patients at night.
3. Health care team must be aware of their sounds and avoid conversations at night beside the patient.

### Further studies:

1. It is recommended to conduct this study on large sample with different geographical characteristics.
2. It is advised to conduct experimental studies using new trends, which promote sleep quality in critical care units such as back massage, aromatherapy and music.

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