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Factors Influencing Quality of Sleep among Critically Ill Patients in Selected Hospitals in Western Kenya

Sarah Makong'o
School of Nursing, Midwifery& Paramedical Sciences,
Masinde Muliro University of Science & Technology,
P.O.Box 190-50100, Kakamega, Kenya
Tel: +254-0724068046 Email: shameem.sm60@gmail.com

Dr. Damaris A. Ochanda (Corresponding author)
School of Nursing, Midwifery& Paramedical Sciences,
Masinde Muliro University of Science & Technology,
P.O.Box 190-50100, Kakamega, Kenya
Tel: +254-0721445063 Email: dochanda@mmust.ac.ke

Prof. John O. Okoth
School of Nursing, Midwifery& Paramedical Sciences,
Masinde Muliro University of Science & Technology,
P.O.Box 190-50100, Kakamega, Kenya
Tel: +254-0724458545 Email: jokoth@mmust.ac.ke

Abstract

Sleep is essential for rest, repair, well-being, and survival of the patient. Sleep quality varies in critically ill patients and is measured by patient's satisfaction of the sleep experience, integrating aspects of sleep initiation, sleep maintenance, quantity of sleep and the refreshment upon awakening. Altered sleep is a common problem experienced by patients in critical care units. This alterations may lead to physiological and psychological dysfunctions that may affect recovery. Critically ill patients frequently experience poor sleep, characterized by frequent disruptions and loss of circadian rhythms. This study investigated factors influencing the quality of sleep among critically ill patients in hospitals in Western Kenya. A cross-sectional descriptive research design was used to examine these factors. A total of 142 patients above 18 years who were admitted to the Intensive Care Unit (ICU) and those transferred from the ICU to the general ward during the study period were conveniently selected for participation in the study. For triangulation, 10 nurses who worked in the ICU also participated in the study. A structured questionnaire was used to collect data from patients while a checklist was used to observe nursing interventions. Descriptive statistical techniques used were frequencies and percentages, while chi-square was used with the p-value set at 0.05 to test the association between factors and quality of sleep. The study results showed that frequent, nursing care activities 96.5% (n=137) noise from ventilator alarms 83.1% (n=118), feeling thirsty 57.7% (n= 82) and pain 52.8% (n=75) were among the major factors influencing the quality of sleep in ICU. A one-way analysis of variance (ANOVA) revealed patient factors significantly associated with quality sleep were age p=.006 and marital status p=.02, environmental factors significantly affecting sleep were presence of light at night with a p <0.0001 and noise from alarms p=.01. Physiological factors included feeling of thirst and hunger (p=0.03). This study recommends optimal use of analgesics and sedatives for pain management, adequate fluid replacement and hydration, noise reduction strategies, including minimizing monitor and ventilator alarms, reducing staff and telephone conversations and use of ear plugs for patients in ICU. Further, nurses should implement clustered procedures to reduce disruption of sleep among critically ill patients.

Key words: *sleep, sleep deprivation, sleep duration, , sleep pattern, sleep quality, sleep quantity and nursing int erventions*

1.0 Introduction

Sleep is defined as a periodic, reversible state of cognitive and sensory disengagement from the external environment (Kamdar, Needham & Collop, 2011). It is a complex physiologic and behavioral process essential for rest, repair, well-being, and survival. Protein synthesis, cell division and growth hormone release are increased during sleep suggesting that sleep is an important element of the healing process (Mostaghimi, *et al.,* 2005). Normal sleep architecture is characterized by four to five 90- min sleep cycles. Each sleep cycle, has an

orderly progression through non-rapid eye movement (NREM) and rapid eye movement (REM) sleep. NREM sleep is divided into four stages: Stages 1 and 2 are associated with superficial or lighter sleep. Stages 3 and 4 (slow wave sleep) are described as deeper restorative sleep and often last for longer periods. Rapid eye movement sleep is thought to be associated with dreaming and memory formation (Jones & Dawson, 2012).

Sleep quality and characteristics vary markedly in critically ill patients (Kamdar *et al.,* 2011). The quality of sleep is determined by the patient's satisfaction of the sleep experience, integrating aspects of sleep initiation, sleep maintenance, quantity of sleep and the refreshment upon awakening. The aetiology of ICU sleep quality disturbances is multifactorial manifesting itself by the inherent nature of the environment, effect of acute illness, medications, ventilator patient dysynchrony, pain, loss of mobility and increased social isolation. Detrimental physiologic and psychological effects have been associated with alteration in metabolic and regulatory process that are controlled by sleep duration and quality of sleep (Hardin, 2009).

Sleep interruption has been identified as a challenge for patients in the ICU for decades and this may lead to a variety of physiological and psychological dysfunctions that affect the recovery process amongst these patients (Eliassen & Hopstock, 2011). The intensive care unit environment has been regarded as a leading stressor because of the complex nature of patient's health problems that require an extensive use of highly sophisticated machines and equipment (Honkus, 2010). The main stressors experienced by ICU patients includes immobility and presence of tubes in the nose and mouth, Illness and hospitalization increase psychological stress and these limit sleep (Hofhuis *et al.,* 2008). Although patients may sleep 8 hours or more in a 24-hour period, sleep is highly fragmented and sleep architecture is abnormal with minimal time spent in the deeper restorative stages of sleep (Friese, Diaz-Arrastia, McBride, Frankel & Gentilello, 2007).

Previous studies conducted over the past 30 years were mostly on healthy volunteers and indicate that sleep deprivation alters respiratory function, disrupts hormone levels, lowers immune function, and leads to neuro-cognitive changes (Stuck, Clark, & Connelly, 2011). In ICU patients, these sleep-related disturbances may have significant consequences including patients having difficulties to be weaned from both non-invasive ventilation and mechanical ventilation, developing hyperglycemia which makes them more at risk for hospital-acquired infections, and developing depression and anxiety (Stuck *et al.,* 2011).

Studies in healthy volunteers and mechanically ventilated patients in Canada showed that sleep deprivation can cause negative nitrogen balance, impaired cellular and humoral immunity, increased oxygen consumption and carbon dioxide production, and disrupted thermoregulation (Gabor, 2010; Friese, 2011). These outcomes predispose the criticality ill patients to infections which eventually interfere with the quality of sleep they experience. Similarly a study by Little, Ethier, Thanachayanont, Jiang, and Mehta (2012); patients reported fragmentation in sleep quality and quantity in the ICU as compared to sleep at home. The five most reported sleep disruption factors were noise, bright light, pain, positional discomfort, and intravenous catheters.

Other studies suggest consolidation of patient care interventions for improving patient‘s sleep quality in ICU (Jones & Dawson, 2012; Kamdar *et al.,* 2011). Further addressing both the physiologic changes secondary to acute illness or injury as well as environmental factors such as noise levels, lighting practices, and patient care routines may result in improved sleep quality for patients cared for in the ICU (Johansson, Karlsson, Brödje & Eddel-Gustafsson, 2012). Non-pharmacological methods based on cognitive behavioral therapy provided by nurses are also needed to enhance sleep in the care of the critically ill. Critical care unit nurses can implement music therapy, environmental interventions, therapeutic touch (a technique in which the hands are used to direct human energy for healing purposes without actual physical contact), and relaxing massage to promote sleep in critically ill patients. These interventions are safe and may improve patient sleep quality (Johansson *et al.,* 2012). There is limited literature on similar studies in Africa and with particular reference to Kenya. This study therefore sought to investigate determinants of sleep quality among the critically ill patients in selected health facilities in Western Kenya.

1.1 Methods

The study was conducted in selected 2 public teaching and referral hospitals (Moi Teaching and Referral Hospital (MTRH) and Jaramogi Oginga Odinga Teaching and Referral Hospital (JOOTRH) and 2 private hospitals in western Kenya including, St Luke's Orthopeadic and Trauma Hospital Eldoret (SLOTH), and Aga khan Hospital Kisumu (AGHK); a descriptive cross-sectional study was adopted. Convenient sampling

technique was used to select both patients and nurses as study participants. The study participants were 142 patients admitted to the ICU and 10 nurses working in the critical care unit. Ethical clearance to conduct the study was approved by Masinde Muliro University of Science and Technology, Ethical Review Committee. Further, permit was also granted by National Council for Science & Technology (NACOSTI). A pretest study was conducted at Avenue Hospital Kisumu to test the reliability and validity of the research instruments. Quantitative data was collected by use of structured questionnaire and observation checklists while qualitative data was collected through key informant interviews. Data was then coded, entered in excel sheets, cleaned and analyzed using Statistical Package for Social Sciences version 23. Chi-square, Fisher's exact, p value, frequency, mean and percentages were used in data analysis. Qualitative data was analyzed using thematic content analysis.

1.2 Results

Participants included 142 patients who had been admitted to the ICU for more than 48 hours and had no impaired cognitive function. Patients who were transferred to the general wards within one-week period of their transfer from ICU were also sampled to participate in the study. More than one-third 38% (n=54) of the patients were from MTRH. Overall mean age (±SD) was 46.7±20.1 and ranged from 18 to 87 years. Patients from SLOTH had a higher mean age of 52.2 years (*SD*=17.3) among these 49% (n=83) were aged 55 years and above. More than 40% (n=35) of patients in MTRH and JOOTRH were aged 15 to 34 years.

More than half of the patients 55.6% (n=79) were females compared with 44.4% (n=63) males. Most of patients from MTRH were females 63% (n=34). There were more males than females in SLOTH 54.6% (n=12) against 45.4% (n=9) and AKH 53.1% (n=17) vs 46.9% n=15). 70% (n=39) were married. The proportion of married patients in MTRH 72.2% (n=39), SLOTH 72.7% (n=16) and JOOTRH 73.5% (n=25) was comparable.

1.2.1 Patient factors that influence quality of sleep

1.2.1.1 Pain

Pain is a very common symptom in critically ill patients, it contributes to awakenings during sleep (Kamdar *et al.*, 2011). Among the selected hospitals 52.8% (n=75) of patients respondents reported pain influenced quality of sleep in ICU. In a patient survey assessing sleep quality in ICU, Little *et al.*, (2012), found 40% pain contribution to sleep deprivation. Ehlers, Watson and Moleki, (2013) also reported 91.2% contribution of pain to sleep deprivation.

1.2.1.2 Physiological factors

The Physiological factors that patients perceived to be associated with quality of sleep included feelings of thirst at 57.7%. (n=82), hunger at 26.8% (n=38) and urge to smoke which was the least bothersome as stated by 15.5% (n=22).

Table 1: Socio-demographic characteristics of Patients

Variable	Categories	MTRH		SLOTH		JOOTRH		AGHK		Total	
Age group	18 – 24	9	16.7	3	13.6	7	20.6	2	6.2	21	14.8
	25 – 34	14	25.9	1	4.6	8	23.5	9	28.1	32	22.5
	35 – 44	7	13.0	2	9.1	4	11.8	4	12.5	17	12.0
	45 – 54	5	9.3	6	27.3	1	2.9	5	15.6	17	12.0
	55 – 64	0	0.0	3	13.6	4	11.8	5	15.6	20	14.1
	≥65	19	35.2	7	31.8	10	29.4	7	21.9	35	24.7
	Total	**54**	**100.0**	**22**	**100.0**	**34**	**100.0**	**32**	**100.0**	**142**	**100.0**
Mean age in years ±*SD* (Range)		**44.4±20.1 (18 – 80)**		**52.2±17.3 (19 – 80)**		**46.2±23.5 (18 – 87)**		**47.3±18.1 (18 – 80)**		**46.7±20.1 (18 – 87)**	
Sex	Male	20	37.0	12	54.6	14	41.2	17	53.1	63	44.4
	Female	34	63.0	10	45.4	20	58.8	15	46.9	79	55.6
	Total	**54**	**100.0**	**22**	**100.0**	**34**	**100.0**	**32**	**100.0**	**142**	**100.0**
Marital status	Single	9	16.7	3	13.6	4	11.8	4	12.5	20	14.1
	Married	39	72.2	16	72.7	25	73.5	20	62.5	100	70.4
	Widowed	6	11.1	2	9.1	4	11.8	2	6.2	14	9.9
	Divorced	0	0.0	1	4.6	1	2.9	6	18.8	8	5.6
	Total	**54**	**100.0**	**22**	**100.0**	**34**	**100.0**	**32**	**100.0**	**142**	**100.0**
Occupation	Employed	19	35.2	8	36.4	11	32.3	10	31.2	48	33.8
	Unemployed	15	27.8	6	27.3	6	17.6	5	15.6	32	22.5
	Self-employed	7	13.0	6	27.3	6	17.7	9	28.1	28	19.7
	Housewife	13	24.1	2	9.2	11	32.4	8	24.9	34	23.9
	Total	**54**	**100.0**	**22**	**100.0**	**34**	**100.0**	**32**	**100.0**	**142**	**100.0**
Place of residence	Urban	35	64.8	11	50.0	21	61.8	21	65.6	88	62.0
	Rural	19	35.2	11	50.0	13	38.2	11	34.4	54	38.0
	Total	**54**	**100.0**	**22**	**100.0**	**34**	**100.0**	**32**	**100.0**	**142**	**100.0**

Table 2: Physiological factors

Variable	Categories	n	%
Feeling of thirst	Yes	82	57.7
	No	60	42.3
	Total	**142**	**100.0**
Feelings of hunger	Yes	38	26.8
	No	104	73.2
	Total	**142**	**100.0**
Smoking urge/smokers	Yes	22	15.5
	No	120	84.5
	Total	**142**	**100.0**
Patients need for time orientation/day and night awareness	Yes	20	14.1
	No	122	85.9
	Total	**142**	**100.0**

Physiological factors that were significantly associated with quality of sleep were feeling thirst (p = .03), feeling hunger (p = .03) and smoking urge (p= .02). Patients who were not feeling thirsty or hungry had higher mean score of 3.2 and 2.9, respectively, suggesting better quality of sleep than their counterparts. Patients who confessed having had craving for smoking had poor quality of sleep with a lower mean of 1.5 compared with those who had none (2.8). The need for patient orientation on time of day or night was not significantly important as an indicator of quality of sleep.

Feeling of thirst is a common symptom exhibited in the critically ill patients with severe illness. In this study 57.7% (n=82) patients described that feeling of thirst led to loss of sleep in ICU. Sensation of thirst is a frequent symptom in terminally ill patients and is associated with dehydration, hyperosmolality, poor general conditions, stomatitis, oral breathing, and use of opioids (Morita *et al.*, 2001). Oxygen can be very drying to the nasal passage if not humidified (Honkus, 2010). Li and Puntillo (2006), reported approximately 40% of the ICU patients experienced severe thirst, which showed similarity with the current study. In South Africa, Watson (2008) also reported 79% patients suffering from thirst. Variations between studies may be due to difference in severity of illness and/or patient's diagnosis. Feeling of thirst showed high statistical significance between sexes, with a p < .001, Feeling of thirst influences sleep in both men and women at the selected ICUs, however, the severity of the problem varies among male and female patients. Women patients suffer more sleep deprivation due to feeling of thirst than men. There was no well-established explanation found during literature review for women to suffer deprived sleep more than men due to thirst. Therefore, provision of adequate fluid replacement and optimal hydration of patients with critical illness could help improve sleep**.** Feeling of hunger was also described as a challenge influencing patient‘s sleep in ICU, 26.8% (n= 38) of the respondents reported they experienced hunger which led to poor sleep.

1.2.1.3 Psycho-social Factors

Several psycho-social factors that could be affecting patients’ quality of sleep as reported by patients were examined. The five leading factors were: dislike wearing hospital clothes 88.7% (n=126), lack of privacy 83.8% (n=119), worries about family 78.9% (n=112), deaths occurring in ICU 76.8% (n=109) and stress attributed to medical jargon spoken by health workers 73.9 (n=105). Not seeing doctors often enough was not a major factor at 22.5% (n= 32) as the patients reported that they were regularly reviewed. Patients who did not like wearing

hospital clothes did not significantly enjoy high quality of sleep p=.02 and had low mean score of 2.5 compared with those who liked the clothes who posted a higher mean of 3.7. Self-reported cases of doctors talking to nurses about patients resulted in borderline significant association of p =.08. Patients reporting such cases had a lower quality of sleep with a mean score of 2.1 in contrast to those who did not (2.7). The ICU environment is perceived as a stressful place, loss of sleep increases an individual's risk of infection and conversely, that sleep is vital for recovery from illness (Friese, 2011). At the selected hospitals 73.9% (n=105) of patients stated stress resulting from use of medical jargons spoken while 76.8% (n=109) reported stress from deaths occurring within the ICU. Another 78.9% (n=112) also described that, worries about family and work, and 14% (n= 20) reported time disorientation impacted sleep in the ICU. Little *et al.,* (2012) reported 29% poor sleep due to stress related to time disorientation. Prolonged sleep deprivation produced a catabolic state, opportunistic infection, and death in ICU from septicemia within 27 days (Kamdar *et al.,* 2011). Emotional support and coping strategies to patients with critical illness and their families may help to improve sleep in the ICUs.

1.2.1.4 Environmental and Nursing Activity Factors

In this study 83%, (n= 118) of ICU patients described noise arising from monitor alarms led them to poor sleep. Loud staff conversation was also described by 59% (n= 84) of the study participants. Similar studies support these findings. Little *et al.,* (2012), reported 42%, contribution of noise and loud conversation 33%. In another interventional study using polysomnograhic recordings, Kamdar *et al.,* (2011), reported 17% to 24% awakenings attributing to environmental noise. At the selected hospitals 67.6% (n=96) of patients admitted to the ICU during the study period, described excessive light limited their sleep. Patients cared for in the ICU are frequently exposed to light 24 hrs/day (Friese, 2011). Such continued exposure to light can disrupt the patient's naturally occurring circadian rhythm. According to (Friese, 2011). Among the respondents, 96.5% (n=137) indicated that nursing activities in the ICU lead to disruption in sleep. These findings are supported by Le *et al.,* (2012), who evaluated sleep disruption in different specialty ICUs involving, medical, surgical, cardiothoracic, and pediatric ICUs and. sleep disturbances related to care intervention among these were, 40.0% in medical ICU, 27.8% surgical ICU and 29.3% in cardiothoracic ICU.

1.3 CONCLUSIONS AND RECOMMENDATIONS

1.3.1 Conclusions

Pain and physiological factors such as hunger and thirst influences sleep quality among critically ill patients in the ICU. Feeling of thirst influences sleep in both men and women in the selected ICUs, but the severity of the problem varies among male and female patients. Women patients suffer more sleep deprivation due to pain and feeling of thirst than men. Environmental factors such as noise, light and noise from discussion by nurses also impact negatively on patient's sleep quality. Nursing activities also lead to disruption in sleep among critically ill patients.

1.3.2 Recommendations

Optimal use of pharmacological agents such as analgesics and sedatives should be utilized in the care of ICU patients. Provision of adequate fluid replacement and hydration for critically ill patients may be important to improve patient's sleep. Noise reduction strategies, including minimizing monitor and ventilator alarms, reducing staff and telephone conversations and use of ear plugs should be implemented in the ICUs. Provision of adequate and uninterrupted time for sleep by implementing cluster procedures in the ICU is recommended to reduce disruption in the quality of sleep among critically ill patients.

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