Medical - Surgical Nursing Journal 2016; 5(1): 43-49.

Published online 2016 June 21 Original Article

Effects of a quiet time protocol on the sleep quality of patients admitted in the intensive care unit

Hamid Chamanzari[1], Maryam Hesari Moghadam[2], Javad Malekzadeh[1], Mohammad Taghi Shakeri[3], Seyed Kaveh Hojjat[4], Seyede Maryam Hosseini[5], Toktam Kianian[6]

1. Instructor, Department of Medical Surgical Nursing, School of Nursing & Midwifery, Mashhad University of Medical Sciences, Mashhad, Iran
2. MSc of Critical Care Nursing, School of Nursing & Midwifery, Mashhad University of Medical Sciences, Mashhad, Iran
3. Professor, Department of Biostatistics and Epidemiology, School of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
4. Assistant Professor, Department of Psychiatry, Addiction and Behavioral Sciences Research Center, North Khorasan University of Medical Sciences, Bojnord, Iran
5. MSc of Nursing, Shahrekord University of Medical Sciences, Shahrekord, Iran
6. Instructor, Department of Community Health Nursing, Community Nursing Research Center, School of Nursing & Midwifery, Zahedan University of Medical Sciences, Zahedan, Iran

***Correspondence:* Maryam Hesari-Moghadam, School of Nursing & Midwifery, Mashhad University of Medical Sciences, Mashhad, Iran. Email:** Hesarimm901@mums.ac.ir

ARTICLE INFO

Article history:

Received: 30 December 2015
Revised: 06 April 2016
Accepted: 09 April 2016

Key words:

Quiet time protocol
Sleep quality
Intensive care unit

ABSTRACT

Background: Sleep disorders are one of the major challenges in intensive care units (ICUs). Psychological, physical and environmental factors are involved in the development of sleep disorders. Therefore, proper adjustment of these factors is of paramount importance. This study aimed to evaluate the effects of a quiet time protocol on the sleep quality of patients admitted in the ICU.

Methods: This clinical trial was conducted on 60 patients admitted in the surgical ICU of Ghaem Hospital of Mashhad, Iran in 2013. Patients were selected via convenience sampling and randomly divided into two groups of intervention and control. Quiet time protocol was implemented in the intervention group for three consecutive nights (7 pm-5 am). Data were collected using researcher-made questionnaires of subjective sleep quality on the first, second and third night. Data analysis was performed in SPSS version 21 using Fisher's exact test, Chi-square, independent T-test, and repeated measures ANOVA.

Results: In the intervention group, mean score of sleep quality in the domain of sleep effectiveness was higher compared to the control group during all three nights ($P<0.001$). Moreover, mean score of sleep disorders domain significantly reduced after the intervention in the experimental group on the first ($P=0.002$), second and third night ($P<0.001$) compared to the control group.

Conclusion: According to the results of this study, implementation of a quiet time protocol is effective in improving the sleep quality of patients admitted in surgical ICUs. Therefore, it is recommended that nurses apply this protocol to enhance the quality of sleep in critical patients.

1. Introduction

Sleep is an indispensable need for the recovery of hospitalized patients.[1] Patients admitted in intensive care units (ICUs) normally have critical conditions and a greater need for sufficient restful sleep. Incidentally, these patients are at a higher risk of sleep deprivation, poor sleep quality, and impairment of natural sleep-wake cycle.[2] In previous studies, sleep deprivation has been identified as a major challenge in ICUs,[2, 3] and more than 60% of ICU patients are reported to suffer from sleep deprivation and sleep disorders during hospitalization.[4]

Development of sleep disorders in ICUs has several causes, which are mainly divided into internal and external factors. Internal factors are patient-related factors, such as pain, medication side effects, stress, low mobility, nausea and vomiting, and disruption of eating habits. External factors are psychological and physical parameters related to the ward of admission, including monitoring and noise in the ICU or other hospital wards,[5-7] light and temperature, coughing or complaints of other patients, and noise caused by the opening and

closing of doors and windows. Moreover, continuous care procedures in ICUs are performed by nurses at least once an hour and more than once for each patient.[1, 3]

Typically, a disturbing factor arises every 20 minutes in the ICU, even while the patients are asleep. Average time of natural sleep-wake cycle is 90 minutes, and frequent disturbance diminishes the resting time of hospitalized patients in the ICU.[8] Other important disturbing factors are the conversations between personnel and noise while working in the ICU. According to the literature, 30-60% of the noise in ICUs is produced by medical and nursing staff. In addition to its adverse effects on the recovery of patients, disturbance in the clinical environment increases the possibility of medical errors by inducing stress in healthcare team members.[9-11]

In a study, Zakerimoghadam et al. (2006) reported that the majority of patients attributed the disturbance of the hospital ward to environmental factors, such as phone ring, staff conversations, sound of equipment, and uncomfortable mattress, which lower the quality of sleep. Furthermore, it was stated that bedtime habits (e.g., reading, praying, eating and drinking) could enhance sleep quality.[12]

All the aforementioned factors are involved in the development of sleep disorders or sleep deprivation in patients admitted in ICUs, leading to significant physiological consequences for the patients, especially those with critical conditions.[13] After 24-48 hours of sleep deprivation, the body responds to this inconvenience as a stressor.[14] Increased stress causes the elevation of cortisol levels, which leads to the reduction of circulating lymphocytes and functional monocytes. This weakens the defense mechanisms of the body, thereby reducing immunity and infection resistance and increasing susceptibility to infections.[15] Other negative responses to sleep deprivation are ventilatory and respiratory changes, impaired function of upper airway muscles, problematic weaning from mechanical ventilation, peripheral vasoconstriction, changes in gastrointestinal motility, blood and urine biochemical changes, delayed healing process, and increased rate of morbidity and mortality.[3, 13, 16, 17]

With this background in mind, quality of sleep is considered a major healthcare issue in patients admitted in ICUs.[13] Nevertheless, ICU patients frequently experience sleep problems,[12] which highlights the need for implementing appropriate protocols to control the effects of environmental factors. The majority of studies in this regard have focused on controlling the effects of light and sound on the sleep quality of patients admitted in the ICU.

In a study conducted in Taiwan, Li SY et al. (2011) reported that adjustment of some environmental factors (e.g., light and sound) by nurses could enhance the sleep quality of ICU patients and decrease sleep disorders.[18] In another research in the United States, Dennis et al. (2010) suggested that elimination of two disruptive external factors (e.g., light and sound) positively influenced the sleep quality of the patients admitted in the ICU.[19] Therefore, nurses should adopt non-invasive, simple, cost-efficient approaches, such as the physical and mental relaxation of ICU patients, in order to adjust the impact of environmental factors on sleep quality.[12] To the best of our knowledge, no former studies have applied a comprehensive protocol to improve the sleep quality of patients admitted in the ICU.

This study aimed to evaluate the effects of the implementation of a quiet time protocol on the sleep quality of ICU patients.

2. Methods

2.1. Design

This clinical trial was conducted on all the patients admitted in the surgical ICU of Ghaem Hospital of Mashhad, Iran in 2013.

2.2. Participants and setting

In this study, Sample size was determined through a pilot study performed on 10 hospitalized patients. Final sample size consisted of 30 patients selected based on the following formula, (X_1=0.66, X_2=1.2, S_1=0.6, S_2=0.61, $Z_{1-\alpha/2}$=1.96, $Z_{1-\beta}$=0.84). Through non-random allocation, patients were divided into two groups of intervention and control. Initially, control subjects were selected via convenience sampling. Sleep quality and influential physical and mental factors in this regard were assessed in patients of the control group. Patients in the intervention group were selected via convenience sampling after an interval to design and implement the quiet time protocol in the ICU.

Inclusion criteria were as follows: 1) age of >18 years; 2) Glasgow coma scale score of ≥13 (based on clinical records); 3) ICU admission for more than 24 hours; 4) passage of 24 hours after general anesthesia; 5) no auditory or visual disorders; 6) no consumption of narcotics or sedatives within five hours before night sleep; 7) no psychiatric disorders or use of psychiatric medication; 8) absence of sleep disorders (e.g., sleep apnea, narcolepsy, chronic insomnia) at the beginning of study (based on psychiatrist's visit and statement of patient families); 8) no history of night shift work during the past three weeks; 9) no mechanical ventilation and 10) no

drug addiction. Exclusion criteria were daily sleep of more than two hours during the study, need for cardiopulmonary resuscitation and use of sedatives during the study.

2.3. Instruments

Data collection tools were demographic forms and modified subjective sleep quality questionnaire. Demographic data of the patients included age, gender, length of hospital stay before the study (days), length of admission in the ICU before the intervention (days), physician diagnosis, sleep duration of patients at home (hour), and type of surgery.

Subjective sleep quality questionnaire was based on the questionnaire developed by Verran and Snyder-Halpern (1987)[14] to measure the subjective responses of adult hospitalized patients to sleep and perception of the previous night's sleep. This visual scale consists of eight items in two separate domains of "sleep effectiveness" and "sleep disorders". Each item is graded between 0-100 mm, and respondents mark their sleep perception within this continuum. Higher scores in the sleep disorders domain indicate higher rate of sleep disorders, while higher scores in the sleep effectiveness domain represent better sleep quality. In general, it is not recommended to sum up the scores of the two domains of this questionnaire since each domain measures the perceptions of individuals differently. As such, we checked each domain separately, and the mean scores of each domain were calculated afterwards. Content and face validity of subjective sleep quality scale was confirmed by 10 faculty members of the School of Nursing and Midwifery at Mashhad University of Medical Sciences to apply corrective feedback. In addition, reliability of subjective sleep quality questionnaire was assessed using a Interrater reliability. The questionnaire was separately completed for 10 patients by the researcher and research assistant, with the correlation-coefficient determined at 0.84.

2.4. Data Collection

Patients in the control group received routine ICU care. Initially, we assessed the sleep quality of control subjects for three consecutive days at 9 am.2 At the end of this process, patients were asked an open-ended question regarding the sleep-disturbing factors. Within a two-week interval, the researcher examined ICU conditions in terms of the time of implementing the quiet time protocol. After determining the sleep-disturbing factors based on the responses of control subjects, similar studies,[18, 15, 2] clinical experience of the researcher in the ICU, and comments of nursing professors and experts engaged in the ICU, the designed quiet time protocol was implemented in three domains: adjustment of nursing activities, preparing the environment, and preparing the patient (Table 1). This protocol was reviewed by 10 faculty members and professors of the School of Nursing and Midwifery at Mashhad University of Medical Sciences to apply their comments. After necessary modifications, the model was used to adjust the ICU environment.

In the second phase of the research, required permit was obtained from Mashhad University of Medical Sciences to explain the study objectives to all the nurses participating in the intervention, and informed consent was obtained from the nurses as well. Intervention in this study consisted of training sessions during three days (two hours each) held in the workshop of the hospital. Educational content for general surgery ICU nurses focused on influential factors in sleep quality, sleep deprivation side effects, strategies to reduce environmental stimuli, and methods to implement the quiet time protocol. In order to receive training feedback, a written test was conducted for ICU nurses, and possible questions, ambiguities and errors were answered and removed, along with necessary modifications in the ward. Additionally, a poster was displayed in the ICU of the hospital to illustrate the study process and quiet time protocol.

In the third phase of the study, the quiet time protocol was implemented on the patients of the intervention group for three consecutive nights (7 pm-5 am) under the supervision of the researcher. Meanwhile, subjective sleep quality questionnaires were completed by the intervention group at 9 am. Moreover, daily sleep quantity assessment checklists were completed by nurses for the intervention and control groups in morning and evening shifts (7 am-9 pm), and patients with more than two hours of daily sleep were excluded from the study and replaced with another participant via convenience sampling.

2.5. Ethical considerations

Prior to the study, research objectives were explained to the participants, and they were assured that participation was voluntary and refusal to continue the study would not affect their treatment process. Moreover, the researcher was present during all the stages of the study in order to respond to the questions of the patients. Informed consent was obtained from all the participants before the study.

2.6. Statistical analysis

Data analysis was performed in SPSS version 21 using descriptive statistics (mean and standard deviation) and Fisher's exact test to compare the two groups in terms of the type of surgery and length of hospitalization in the ICU (days) before intervention. In addition, independent T-test was used to compare the age differences, sleep hours at home, and scores of sleep effectiveness and sleep disorders domains between the two groups. In this study, Chi-square test was applied to compare the two groups in terms of marital status, education level, occupation status, ethnicity, causes and degree of trauma, and number of damaged spinal vertebrae. Moreover, repeated measures ANOVA was used to investigate the changes of sleep quality scores at different phases of the study between the two groups.

Table 1. Summary of quiet time protocol

Preparing the patient	Preparing the environment	Adjustment of nursing activities
Checking hospital wavy bed mattress in terms of air pump and airflow in all parts	Dismissing entrance doorbell ringtone (midnight-5 am)/installation of a paper labeled "Please knock quietly " on the door	Coordination with the night supervisor
Suctioning and using bedpan before bedtime (if needed)/ Mouth washing or teeth brushing before bedtime	Setting the ward's phone ringtone volume to minimum/setting all ICU personnel's cell phones on silent mode since 11 pm	Necessary arrangements with physicians to visit patients before 11 pm
Using a proper blanket to prepare the physiological conditions of the patient based on his request (sensitive to cold or heat)	Setting the volume of the attached alarm to the patient to minimum/turning off the computer (due to its fan sound) if not needed since 11 pm	Performing all radiographies before 11 pm
Using a proper pillow for patients based on their need (patients without medical contraindications)	Turning off overhead lights at midnight/ Reducing the lights of the ward and nursing station at midnight	Performing venous and arterial blood sampling and switching IV catheter before 11 pm
Using smooth bed sheets (without wrinkles or folding)	Attending to the sound and vibration of the wavy mattress air pump and replacing it in case of excess noise or vibration	Replacing Foley catheter, nasogastric tube and dressing/controlling central venous pressure/performing electrocardiography and gavage before 11 pm
Changing bed sheets and clothes, bath in bed (if needed), and repositioning the patient before 11 pm	Cleaning and scraping the floor/using disinfectants before 11 pm	Lung sound auscultation, percussion, chest physiotherapy, tracheostomy care, placement of tracheal tube and ventilator before 11 pm
Controlling and fixing the pulse oximetry probe on patient's finger to prevent the alarm sound	Replacing bed, serum stand and trolley (if needed) before 11 pm	Transferring the patient to the ward (if required) or receiving patients in the ward before 11 pm (with the exception of emergency patients)
Finishing the patient's infusion before midnight if possible (with the exception of emergency patients)	Quiet interactions of personnel, avoiding unnecessary moving, prohibiting sheet and chair replacement in the nursing station (from midnight until 5 am)	
Using the prescribed medications in case of pain, nausea and vomiting	Precise control of monitors, ventilators, infusion pumps, and pulse oximetry probes to prevent unnecessary alarm sounds (from midnight until 5 am)	
In case of the need for special measures in a patient or meet the needs of patients (e.g., monitoring vital signs), the personnel had to avoid conversations and prevent the noise of equipment (from midnight until 5 am)	Pulling the bedside curtain if patients on the next bed were critically ill in order to create a private environment and prevent other patients from seeing the care measures	

3. Results

Demographic characteristics of the participants are presented in Table 2. According to the information in this table, there were no significant differences in the demographic variables of the two groups.

After the implementation of the quiet time protocol, sleep quality scores in the sleep effectiveness domain changed from 253.00±80.17 to 329.00±71.64 in the intervention group, while in the control group, this score changed from 165.00±86.57 to 215.00±61.06. In this regard, the difference between the two groups was considered significant (Table 3). According to the results of repeated measures ANOVA, sleep quality scores were significantly different between the two groups in the sleep effectiveness domain (P<0.001), while no statistically significant difference was observed in terms of the time of intervention (P=0.086). Moreover, sleep-disturbing factors had no significant effects on the changes of the sleep quality scores in the sleep effectiveness domain of the intervention and control groups (P=0.413).

Sleep quality scores in the sleep disorders domain of the questionnaire changed from 204.00±59.04 to 134.33±75.96 in the intervention group, while in the control group, this score changed from 260.00±74.92 to 218.00±44.75. Although these changes were not significant within the groups, they were significantly different between the intervention and control groups (Table 3).

According to the results of repeated measures ANOVA, sleep quality of the patients in the intervention and control groups had a significant difference in terms of the score of the sleep disorders domain (P<0.001), while no significant differences were observed regarding the time of intervention (P=0.359) (Table 3).

Table 2. Demographic characteristics of patients

Variable	Group	Intervention N (%)	Control N (%)	P-value
Gender	Male	17 (56.7)	16 (53.3)	**0.795
	Female	13 (43.3)	14 (46.7)	
Length of hospitalization before sampling (day)	0-3	23 (76.7)	19 (63.3)	**0.260
	4-7	7 (23.3)	11 (36.7)	
Length of hospitalization in ICU before intervention (day)	0-3	30 (100)	28 (93.3)	***0.246
	4-6	0 (0)	2 (6.7)	
Physician diagnosis	Pulmonary disorders	7 (23.4)	9 (30)	**0.724
	Esophagus and stomach problems	19 (63.3)	16 (53.3)	
	Intestinal problems	4 (13.3)	5 (26.7)	
Type of surgery	Emergency	11 (36.7)	16 (53.3)	**0.194
	Elective	19 (63.3)	14 (46.7)	
Age (year)	M±SD	50.36±13.75	52.30±11.67	*0.559
Sleep time at home (hour)	M±SD	5.96±1.62	6.43±1.59	*0.266

*Independent T-test; **Chi-square; ***Fisher's exact test

Table 3. Comparison of mean scores of sleep quality in domains of sleep effectiveness and sleep disorders in intervention and control groups

Domain	Group	Intervention M±SD	Control M±SD	P-value
Sleep effectiveness	First night (total score)	253.00±80.17	165.00±86.57	<0.001
	Second night (total score)	303.33±66.08	206.00±53.01	<0.001
	Third night (total score)	329.00±71.64	215.00±61.06	<0.001
	**P-value	0.08	0.052	
Sleep disorders	First night (total score)	204.00±59.04	260.00±74.92	0.002
	Second night (total score)	153.33±63.48	223.00±50.38	<0.001
	Third night (total score)	134.33±75.96	218.00±44.75	<0.001
	**P-value	0.097	0.051	

*Independent T-test; **repeated measures ANOVA

4. Discussion

According to the results of the present study, implementation of a quiet time protocol increased the sleep effectiveness and decreased the sleep disorders of the patients hospitalized in the ICU. Use of non-pharmacological approaches to improve the quality and quantity of sleep could reduce healthcare costs and drug side effects. Furthermore, these methods facilitate the immediate detection of changes in patient conditions by the patient and nurses, thereby allowing patients to receive the required care procedures within the shortest time.[20]

Several studies have confirmed the findings of the current research. ICU could enhance the quality of sleep and rest in the patients.[21] On the other hand, in the present study, sleep quality of ICU patients was assessed by a modified tool specifically used to measure subjective sleep quality. However, in the mentioned study, Richmond agitation – sedation scale was used to investigate the needs of patients for sedatives. Therefore, precise examination of sleep quality requires accurate instruments in order to yield reliable results.

In a study, Gardner et al. (2009) stated that intervention through implementing a quiet time protocol in the ICU could affect the sound levels in hospital wards, as well as the sleep-wake patterns of the patients.[22] Moreover, Walder et al. (2000) reported that intervention through the adjustment of environmental factors, especially noise and light, in the ICU (11 pm-5 am) significantly increased the sleep quality of hospitalized patients.[23] In another research, Dennis et al. (2010) investigated the positive effects of a quiet time protocol on the neurological patients admitted in the ICU and concluded that at the time of implementing the protocol, light and sound disturbances significantly reduced, resulting in the higher quality of sleep.[19]

In this regard, findings of Zolfaghari et al. (2013) demonstrated that adjustment of environmental

factors could significantly improve the sleep quality of the intervention group compared to control subjects. However, the results were indicative of no significant difference in sleep quality after the intervention compared to the pre-intervention phase.[24] Although these results are in line with our findings, the quiet time protocol in the aforementioned studies was explored in general terms and implemented for only one day. Furthermore, the mentioned studies only focused on the effects of environmental factors (e.g., light and noise) on sleep quality, while in the protocol designed for the current research, we attempted to eliminate therapeutic and diagnostic measures during the resting time of patients in the ICU.

In a study, Olson et al. (2001) claimed that quietening the environment even for a short time could increase the sleep hours of patients. Although the mentioned study mostly evaluated sleep quantity, it demonstrated the positive impact of controlling environmental factors on the sleep duration of hospitalized patients.[25] In another research conducted by Neyse et al. (2011), environmental factors were adjusted using blindfolds and earplugs, and the researchers concluded that diminishing environmental stressors could enhance sleep quality in patients admitted in ICUs.[8] On the other hand, findings of Arab et al. (2013) suggested that adjustment of environmental factors using blindfolds and earplugs only influenced the sleep disorders domain of subjective sleep quality.[26] Considering the reduction of environmental stimuli in the aforementioned studies, their results are in congruence with our findings. However, use of blindfolds and earplugs, as physical factors, may not be tolerated by many patients and lower their tranquility. In the current research, we implemented a quiet time protocol in order to systematically change the sleep quality of patients during the night without any stress and diminish the effects of sleep-disturbing factors.

In another study, Maidl et al. (2014) investigated the effects of a quiet time protocol in the ICU and reported that despite the enhancement of sleep quality after the intervention, no significant differences were observed between the experimental and control groups in this regard. This finding is inconsistent with the results of the present study, and this discrepancy could be due to the variations in the design and implementation of the quiet time protocol.[27]

One of the limitations of the current study was inability to completely eliminate and control noise and light due to the needs of patients for continuous care procedures. Furthermore, cardiopulmonary resuscitation of critical patients hindered the implementation of the quiet time protocol in some cases. In case of such issue, the patient would be excluded and replaced with another participant via convenience sampling. In addition, due to the physical differences of ICUs and time limit of the study, the intervention was performed in only one ICU, which might restrict the generalizability of the findings.

5. Conclusion

According to the results of this study, implementation of a quiet time protocol could improve the sleep quality of patients admitted in surgical ICUs. Considering the effectiveness of the quiet time protocol on the adjustment of environmental factors through environmental and behavioral changes, it is recommended that this simple, cost-efficient standard care procedure be employed in hospitals in order to enhance the sleep quality of ICU patients.

Conflicts of interest

The authors declare no conflicts of interest.

Authors' contributions

Hamid Chamanzari: monitoring the implementation of research, participation in statistical analysis, participation in editing the manuscript. Maryam Hesari Moghadam: implementing the study, participation in editing the manuscript. Javad Malekzadeh: designing the protocol, monitoring the implementation of research, participation in editing the manuscript. Mohammad Taghi Shakeri: data analysis, participation in editing the manuscript. Seyed Kaveh Hojjat: participation in the implementation of research and editing the manuscript. Seyede Maryam Hosseini: participation in the implementation of research and editing the manuscript. Toktam Kianian: editing the manuscript.

Acknowledgments

This article was extracted from a master's thesis approved by Mashhad University of Medical Sciences (registration code: 910915, ethical code: 21.1.910915) and registered in the Iranian Registry of Clinical Trials (registration code: IRCT2013022612623N1). Hereby, we extend our gratitude to the hospital manager and nursing director of Ghaem Hospital and all the patients for assisting us in this research project.

References

1. Dehghani K, Fahim Raouf Z, Vaezi AA. The Effect of Eyemasks and Earplugs Use on Sleep Quality of Patients Suffering from Myocardial Infarction in CCU. The Journal of Shahid Sadoughi University of Medical Sciences 2015; 23 (7):700-708. [Persian]
2. Elliott R, McKinley S, Cistulli P. The quality and duration of sleep in the intensive care setting: an integrative review. International Journal of Nursing Studies 2011; 48(3): 384-400.
3. Warren A, Soulsby C, Quasim T, Kinsella J, McPeake. Intensive care unit length of stay is associated with insomnia in critical illness survivors. Critical Care Medicine 2015; 43(12):76.
4. Rozbahan B, Dehghanzade S. Fundamentals of Nursing. Tehran: salemi community; 2012. [Persian]
5. Taylor D, Gehrman P, Dautovich ND, Lichstein KL, McCrae CS. Causes of insomnia. InHandbook of Insomnia. United Kingdom: Springer Healthcare Ltd; 2014.
6. Xie H, Kang J, Mills GH. Clinical review: the impact of noise on patients' sleep and the effectiveness of noise reduction strategies in intensive care units. Critical Care 2009; 13(2): 208.
7. Beltrami FG, Nguyen XL, Pichereau C, Maury E, Fleury B, et al. Sleep in the intensive care unit. Jornal Brasileiro de Pneumologia 2015; 41(6):539-46.
8. Neyse F, Daneshmandi M, Sherme MS, Ebadi A. The effect of earplugs on sleep quality in patients with acute coronary syndrome. Iranian Journal of Critical Care Nursing 2011; 4(3):127-34.
9. Busch-Vishniac IJ, West JE, Barnhill C, Hunter T, Orellana D, Chivukula R. Noise levels in Johns Hopkins hospital. The Journal of the Acoustical Society of America 2005; 118(6): 3629-45.
10. Abbasi S, Talakoob R, Soltani F, Yousefi H. Evaluating the noise level and sources in Isfahan University Hospital's ICU. Isfahan Medical School 2011; 28(118): 1267-74. [Persian]
11. Hardin KA. Sleep in the ICU: potential mechanisms and clinical implications. American College of Chest Physicians 2009; 136(1): 284-94.
12. Zakerimoghadam M, Shaban M, Kazemnejad A, Ghadiani L. Factors that impact on sleep: a comparison of patients and nurses perceptions. Journal of Faculty of Nursing & Midwifery Tehran University of Medical Sciences 2006; 12(5): 5-12 [Persian].
13. Richardson A, Allsop M, Coghill E, Turnock C. Earplugs and eye masks: do they improve critical care patients' sleep? Nursing in Critical Care 2007; 12(6): 278-86.
14. Snyder-Halpern R, Verran JA. Instrumentation to describe subjective sleep characteristics in healthy subjects. Research in Nursing & Health 1987; 10(3): 155-63.
15. Tembo AC, Parker V. Factors that impact on sleep in intensive care patients. Intensive and Critical Care Nursing 2009; 25(6): 314-22.
16. Cmiel CA, Karr DM, Gasser DM, Oliphant LM, Neveau AJ. Noise: a nursing team's approach to sleep promotion: respecting the silence creates a healthier environment for your patients. The American Journal of Nursing 2004; 104(2): 40-8.
17. Van Rompaey B, Elseviers MM, Van Drom W, Fromont V, Jorens PG. The effect of earplugs during the night on the onset of delirium and sleep perception: a randomized controlled trial in intensive care patients. Crit Care 2012; 16(3): 73.
18. Li SY, Wang TJ, Vivienne Wu SF, Liang SY, Tung HH. Efficacy of controlling night-time noise and activities to improve patients' sleep quality in a surgical intensive care unit. Journal of Clinical Nursing 2011; 20(3-4): 396-407.
19. Dennis CM, Lee R, Woodard EK, Szalaj JJ, Walker CA. Benefits of quiet time for neuro-intensive care patients. Journal of the American Associaton of Neuroscience Nurses 2010; 42(4):217-24.
20. Honkus V. Sleep deprivation in critical care units. Critical Care Nursing Quarterly 2003; 26(3): 179-91.
21. McAndrew NS, Leske J, Guttormson J, Kelber ST, Moore K, Dabrowski S. Quiet time for mechanically ventilated patients in the medical intensive care unit. Intensive & critical care nursing. The Official Journal of the British Association of Critical Care Nurses 2016; 16: 12.
22. Gardner G, Collins C, Osborne S, Henderson A, Eastwood M. Creating a therapeutic environment: a non-randomised controlled trial of a quiet time intervention for patients in acute care. International Journal of Nursing Studies 2009; 46(6): 778-86.
23. Walder B, Francioli D, Meyer J-J, Lançon M, Romand J-A. Effects of guidelines implementation in a surgical intensive care unit to nighttime light and noise levels. Critical Care Medicine 2000; 28(7): 2242-7.
24. Zolfaghari M, Farokhnezhad Afshar P, Asadi Noghabi AA, Ajri Khameslou M. Modification of environmental factors on quality of sleep among patients admitted to CCU. Quarterly Hayat 2013; 18(4): 61-68. [Persian]
25. Olson DM, Borel CO, Laskowitz DT, Moore DT, McConnell ES. Quiet time: a nursing intervention to promote sleep in neurocritical care units. American Journal of Critical Care 2001; 10(2): 74.
26. Arab M, Mashayekhi F, Ranjbar H, Abazari F, Dortaj E. Comparing the effects of using Earplugs and eye masks on sleep quality of patients in coronary care unit (CCU). Annals of Military and Health Sciences Research 2013; 11(2): 143-9. [Persian]
27. Maidl CA, Leske JS, Garcia AE. The influence of "quiet time" for patients in critical care. Clinical Nursing Research 2014; 23(5): 544-59.

How to cite: Chamanzari H, Hesari-Moghadam M, Malekzadeh J, Shakeri MT, Hojjat SK, Hosseini SM, Kianian T. Effects of a quiet time protocol on the sleep quality of patients admitted in the intensive care unit. Medical - Surgical Nursing Journal 2016; 5(1): 43-49.