
Sleep Quality Assessment and Its Predictors Among Patients at the Step-Down Room

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ABSTRACT

Background: critical patients often experience sleep disturbances, namely the time that is too short to sleep. Changes in the characteristics and sleep time of critical patients can cause worsening of the disease and increase the risk of death. Sleep in critical patients has a very important function in the repair mechanism of damaged tissue cells (natural healing mechanism).

Purpose: to determine the relationship between disease response factors, environmental factors, and nursing procedure factors on the sleep quality of patients

Methods: this cross-sectional study took place at a tertiary hospital, from March to May 2023, including 50 adults. We collected demographic and clinical data and utilized the Richards-Campbell Sleep Questionnaire (RCSQ) and the Sleep Disorders Factors Questionnaire (KFGT) scale to evaluate sleep quality

Results: the study showed a significant relationship between physical factors and sleep quality in patients with sig. 0.001 (sig. <0.05) and shows a strong relationship (p value = 0.84). There is a significant relationship between environmental factors and the patient's sleep quality with a sig. 0.001 (sig. <0.05) and shows a very strong relationship with a p value of 0.77.

Conclusion: the physical factors, environmental factors, and nursing procedure factors are related to the quality of sleep of patients at the HCU RSUP Dr. Kariadi. These findings emphasize the importance of integrating sleep quality education into sleep management strategies.

Keywords:

Physical factors; environmental factors; sleep quality; intermediate room

BACKGROUND

Critical patients are patients with conditions of instability in physiological functions, resulting in hypermetabolic reactions to trauma. Critical patients also experience changes in the body's metabolism, hormonal, immunological, and nutritional homeostasis (Idris et al., 2021). Patients who require intensive care due to failure of perfusion and organ function are referred to as critical patients (Rahmanti, 2021, hal. 12). Patients with more than one medical diagnosis and some diseases are chronic diseases so they need detailed and comprehensive treatment (Rosanti, Arianto, & Barus, 2022). Patients with chronic diseases require a longer hospital stay (Ernawati, Desak Made, Risprawati, Hapipah, & Purqoty, 2021).

As time goes by, the number of critical patients also continues to increase. The World Health Organization (2017) states that the number of critical patients reaches 9.8-24.6% per 100,000 population. The prevalence of critically ill patients in Central Java has also continued to increase, especially in RSUD Dr. Moewardi Surakarta, which experienced an increase in the average number of critical patients per day in 2014-2018. The highest increase with a total addition of 4 patients/day was in 2018, while the average addition of critical patients was 2 patients/day in 2014-2018. Other data regarding the prevalence of critical patients at RSI Sultan Agung Semarang from January to December 2020 were 301 patients and a total of 272 patients died (Puspitasari et al., 2021).

Critically ill patients often experience sleep disturbances (Younis, Hayajneh, & Alduraidi, 2019; (Potter, Perry, Stockert, & Hall, 2017). Previous research showed that 12% of respondents stated that the most felt problem while being treated in the intensive care unit was too short a time to sleep (Romadoni, 2018). For four decades, one of the most serious problems regarding patient sleep has been sleep disruption in critically ill patients (Sundstrøm, Sverresvold, & Solberg, 2021; Romadoni, 2018). Researchers previously reported that critically ill patients often experienced reduced sleep quality and quantity during hospitalization (Younis, Hayajneh, & Alduraidi, 2019; Sundstrøm, Sverresvold, & Solberg, 2021). Research results by Muntham, Chirakalwasan, Arttawejkul, dan Reutrakul, 2020 stated a poor assessment of the patient's sleep quality while being treated in the intensive care unit.

Insufficient quality of sleep in critically ill patients will show symptoms of fatigue, lethargy, and apathy in patients (Spedale, Luciani, Attanasio, Mauro, Alvaro, Vellone, et al., 2021). Decreased quality and quantity of sleep during treatment is characterized by repeated disturbances, loss of circadian rhythms, and less time in restorative sleep (REM) and deep sleep cycles (Sundstrøm, Sverresvold, & Solberg, 2021). There is an increase in the light sleep stage (NREM stage 1) and a decrease in the deep sleep period (REM stage) which is a characteristic of sleep in patients treated in the intensive care unit so that they have poor sleep quality due to frequent disturbances or fragmented sleep time (Hernández, Pejenaute, Ciarrusta, & Viguria, 2018). Previous studies have shown that patients in the ICU spend three times as much time in stage 1 of NREM (light sleep) and spend 1.6 times less time in REM (Kakar, Priester, Wessels, Slooter, Louter, & van der Jagt, 2022).

Changes in physical, psychological and social aspects can occur due to changes in the characteristics and sleep time of critical patients significantly, thereby reducing the quality of life, increasing rehospitalization, developing more serious illnesses thereby increasing the risk of death (Reza, Berawi, Karima, & Budiarto, 2019; Kakar, Priester, Wessels, Slooter, Louter, & van der Jagt, 2022). Disturbances can occur in aspects of cognition, memory, depression, decreased body immunity and the risk of cardiometabolic disease is the impact of the patient's lack of sleep (Spedale, Luciani, Attanasio, Mauro, Alvaro, Vellone, et al., 2021). Other research has shown that the effects of sleep deprivation include decreased growth hormone secretion (repairing damaged cells), decreased glucose tolerance, and increased sympathetic activity which is potentially harmful in recovery (Castren, Axelin, Richards, Mitchell, Vahlberg, & Kilpi, 2022; Hofhuis, Rose, Blackwood, Akerman, McGaughey, Egerod, et al., 2018).

For 24 hours, each individual experiences a cyclical rhythm called the circadian rhythm. The circadian rhythm, including the individual daily wake-sleep cycles, is different from one another (Potter, Perry, Stockert, & Hall, 2017). Factors that affect the patient's sleep cycle in the hospital cause sleep disturbance so that the patient does not sleep at his usual time (Sayed, Ahmed, & Soliman, 2022). The altered sleep-wake cycle in patients will reduce the quality of sleep because the biological rhythms of sleep are related to the physiological functions of the body (Reza, Berawi, Karima, & Budiarto, 2019). Failure to maintain sleep-wake cycles affects a person's overall health. Reducing and controlling factors associated with decreased sleep quality in critical patients plays an important role in improving health, recovery, and regulating the central nervous system which is effective in reducing stress so as to reduce length of stay (Sayed, Ahmed, & Soliman, 2022).

Preliminary study results in the HCU of RSUP Dr. Kariadi Semarang, the number of patients increased from 227 patients in 2021 to 268 patients in 2022. Meanwhile, the phenomenon of patient sleep quality at the HCU RSUP Dr. Kariadi Semarang 40% of patients with poor sleep quality and the rest have good sleep quality. Of the 10 patients sampled in the preliminary study, 40% of patients perceived physical factors as severe disturbances and the remaining 60% perceived physical factors as moderate disturbances. Then on environmental factors, 40% of patients perceive environmental factors as moderate disturbances and 60% of patients consider environmental factors as mild disturbances that affect the patient's sleep. Whereas on the factor of nursing procedures 100% of patients perceive nursing procedures as a mild level of disturbance. This can be interpreted that physical factors, environmental factors, and nursing procedure factors are factors of sleep disturbance in patients and HCU patients at RSUP Dr. Kariadi Semarang has a risk of poor sleep quality.

Although only 40% of patients have poor sleep quality and nursing procedure factors are perceived by 100% of patients as a mild disturbance factor, sleep is a basic need for every individual and is very important and functions as a natural healing mechanism that can optimize the patient's healing period, but in critical patients have the potential to experience sleep pattern disturbances which are influenced by several factors, including disease response factors, environmental factors and nursing actions. Supported by previous data and research regarding the sleep disturbance factors of

critical patients in the intensive care unit, it is important to conduct research on the factors related to the sleep quality of patients at the HCU RSUP Dr. Kariadi Semarang so that in the future the managers or health service providers can control the factors that disturb the patient's sleep. Paying attention to the patient's sleep pattern and time, reducing or overcoming disease response, modifying the HCU room environment can support the sleep needs of critical patients and reduce other factors that interfere with critical patient sleep as an effort to improve the sleep quality of critical patients.

OBJECTIVE

To determine the relationship between disease response factors, environmental factors, and nursing procedure factors on the sleep quality of patients.

METHODS

This cross-sectional study was conducted from March to May 2023 at HCU RSUP Dr. Kariadi Semarang, Indonesia. It was conducted in strict adherence to the relevant guidelines and regulations, and the Institutional Review Board of the RSUP Dr. Kariadi, Semarang reviewed and approved the protocol (No. 1432/EC/KEPK-RSDK/2023). The study's targeted population was carefully selected, focusing on namely patients undergoing treatment at HCU ≥ 24 hours who signed informed consent with composmentis awareness (GCS = 15) and cooperative. We excluded patients not having visual and hearing impairments. The study's required sample size was calculated using a purposive sampling technique with a 95% confidence interval, resulting in a ample of 50 patients.

The questionnaire prepared for the study consisted of two parts. The first part was prepared by the study's authors, and the second part was the PSQI questionnaire. The first part of the questionnaire consisted of the demographic and clinical variables, including age, biological sex, marital status, type of job, medical diagnose, medication. We used the Indonesian-translated version of The Richards-Campbell Sleep Questionnaire (RCSQ) and the Sleep Disorder Factors Questionnaire (KFGT) with an internal consistency reliability of of 0.741 and 0.89. We used this tool as it is reliable and validated, having been tested in the intensive care population in many studies. The informed consent form was explained to the patients and signed before the questionnaire was provided. The data were collected from patients and the questionnaire that patients hospitalized at HCU were to fill out was distributed and explained. Analyses were performed using SPSS. Data were demonstrated by mean and SD or number and percentage for numerical and categorical variables, respectively. The normality of the data was tested using the P-Plot residual, and the data were found to be normally distributed. Bivariate analysis using Spearman's rank test. All p-values less than 0.05 were considered statistically significant.

RESULTS

Table 1 Characteristics of respondents

Respondent Characteristics Data	f(50)	%	Mean	SD
Age			52,52	10,632
18-27 years	2	4		
28-37 years	2	4		

Respondent Characteristics Data		f(50)	%	Mean	SD
Age	38-47 years	7	14		
	48-57 years	22	44		
	58-68 years	16	32		
	> 68 years	1	2		
Gender	Male	22	44		
	Female	28	56		
Work	Civil servant	7	14		
	Self-employed	11	22		
	Civil servant pension	3	6		
	Farmer	4	8		
	Doesn't work	25	50		
Medical diagnosis	<i>Stroke hemorrhagic</i>	8	16		
	<i>Stroke non-hemorrhagic</i>	16	32		
	Brain tumor	8	16		
	Intracranial tumor	7	14		
	Intracranial bleeding	1	2		
	Encephalopathy	1	2		
	Epilepsy	4	8		
	Ovarian cancer	1	2		
	Meningoencephalitis	1	2		
	Cephalgia	1	2		
Medication	Pneumonia	1	2		
	Hemothorax	1	2		
	Analgesic	38	76		
	Sedative	32	64		

The results of the analysis showed that most of the respondents were aged 48-57 years, namely 22 respondents (44%) with an average age of 53 years. Female gender as a large part of the respondent's gender (56%). In the demographic data of the type of work of the respondents, some respondents did not work (50%). Data on medical diagnoses in patients showed that medical diagnoses in patients at HCU were dominated by stroke diagnoses, namely 32% had non-hemorrhagic stroke as the most common type of diagnosis followed by hemorrhagic stroke and brain tumors in 16% of the total respondents. Medication received by 76% of respondents received analgesic therapy and 64% received sedative therapy or sedatives.

Table 2 Sleep Quality of HCU Patients

Sleep quality	n	%	Mean ± SD
Very good	0	0	2,54 ± 0,542
Good	28	56	
Poor	21	42	

Sleep quality	n	%	Mean ± SD
Very poor	1	2	

Descriptive analysis of the sleep quality of patients undergoing HCU care showed that most of the patients had good sleep quality (56%), but the rest had poor sleep quality for almost half of the patients (42%) and very poor sleep quality in 1 patient (2%).

Table 3 Spearman Rank Test Results

Independent variable	Sig. (2-tailed)	Correlation coefficient
Physical factors	0,000	0,843
Environmental factors	0,000	0,766
Nursing procedure factors	0,002	0,425

The results of the analysis of physical factor data and sleep quality of patients undergoing treatment at the HCU on 50 respondents showed a significant relationship with the sig. 0.001 (sig. <0.05). The relationship shown between physical factors and nursing procedure factors shows a strong relationship (p value = 0.84).

The results of Spearman's rank test analysis showed that environmental factors had a significant relationship to the sleep quality of patients in HCU with a sig. 0.001 (sig. <0.05). The strength of the relationship between environmental factors and the patient's sleep quality is a very strong relationship with a p value of 0.77. The relationship shown from nursing procedure factors with sleep quality is significant (sig. 0.002). The strength of the relationship between factors of nursing procedures and sleep quality of patients is a sufficient correlation (p value = 0.43).

DISCUSSION

The results showed that the average age of the respondents was 52.52 years. According to the Ministry of Health of the Republic of Indonesia, the average age of respondents is included in the early elderly. In line with research by Nugroho, Nugroho, Abdurrahman, Faisal, Afdhal, dan Rochana (2022) which shows that almost half of the respondents (43%) are categorized as late adults undergoing treatment in the ICU. Another study by Sari, Walandani, dan Setianingsih (2022) showed that most ICU patients as subjects were aged 46-55 years with a frequency of 9 (29%). The results of this study are also supported by Iman Waruwu, Novalinda Ginting, Telaumbanua, Amazihono, dan Putra Alfrain Laia (2019) which explained that the highest number of respondents who were used as research subjects in the ICU room was in the age range of 27-55 years as many as 5 respondents (41.7%). While on the other hand, the results of previous studies explained that the ages of respondents who were research subjects in the Intensive Care Unit (ICU) room ranged in age from 41-65 years as many as 18 respondents (60%).

Research results by Fitri, Amalia, dan Juanita (2022) explained that increasing age causes physiological decline and increases non-communicable diseases as well as a decrease in immunity so that at that age patients are more susceptible to infection. Diseases suffered in line with the addition of age will reduce the quality of one's sleep. However, another opinion states that the productive age group or those aged 40 and

over will easily fall asleep because they are tired of working and doing other activities that have an impact on increasing sleep hours.

The number of women is more dominating than men in this study with a percentage of 56%. Another study that showed similarities to this study with the result that more women were treated in the ICCU room compared to male patients with a frequency of 16 respondents (53%) (Romadoni, 2018). The research results are also comparable to the results of research by Sari, Walandani, dan Setianingsih (2022) The results showed that the number of female respondents was greater than the number of male respondents (61.3%) who were treated in the ICU. Likewise with the results of research by Rosanti, Arianto, dan Barus (2022) which was carried out on critical patients, namely the majority of respondents were women as many as 106 respondents (63.5%).

Research by Fitri, Amalia, dan Juanita (2022) which states that women will experience worse sleep quality than men. This happens because of hormonal changes during menopause where the hormones progesterone and estrogen have receptors in the hypothalamus so that they have a direct impact on circadian rhythms in women. In research journals conducted by Iriyani, Safei, Basri, Rachman, dan Dahliah (2022) explained that in women with the termination phase towards menopause increases the incidence of nocturnal hot flashes, mood disorders, and breathing disorders during sleep which will reduce the quality of sleep in women.

In contrast, the results of research by Alsulami, Rice, dan Kidd (2019) states that women will experience additional slow wave sleep so that the quality of sleep in women will be better than men. Another study by Romadoni (2018) explained that women have a higher ability to manage pain and stress than men so that women's sleep quality will be better. Supported by research results by Harisa, Syahrul, Yodang, Abady, dan Bas (2022) explained that in men it is possible to have poor sleep quality due to a decrease in the hormone testosterone at night which causes a decrease in sleep efficiency and reduced slow wave sleep time.

Some of the patients who were respondents did not work. This research is supported by previous research by Puspitasari, Mardiyono, dan Sudiarto (2021) shows the results of respondents not having a job (28.6%). This is consistent with the results of the study by Sari, Walandani, dan Setianingsih (2022) which shows the results of data on the employment status of the most patients undergoing treatment in the ICU were not working as many as 13 subjects (41.9%).

If it is related to the results of the patient's medical diagnosis, the respondent's not working, it may be the impact of the patient's illness so that it has a physical impact, decreased cognitive function, and motor function which has an impact on the limitations of activities that can be carried out (Helda et al., 2022). In addition, the reason for patients who may lose their jobs because of brain disease will experience psychological disorders that cause the patient's emotions to be unstable, supported also by physical limitations in activities that can reduce the patient's quality of life.

Sleep and work are related according to research by Harisa, Syahrul, Yodang, Abady, dan Bas (2022) that is, if a person works, it will increase activity so that it affects the intensity, duration, and frequency of muscles which of course affects the quality of one's sleep. In line with research by Iriyani, Safei, Basri, Rachman, dan Dahliah (2022) explained that the quality of sleep is influenced by the intensity of work activities where someone with low, medium, and high work activity intensity but does not reach fatigue will improve one's sleep quality. Physical activity affects sleep quality through saving energy, increasing body temperature and the central nervous system, and reducing anxiety (Iriyani et al., 2022).

This study shows that the majority of respondents' medical diagnoses were non-hemorrhagic strokes with a total of 16 respondents (32%). Most of the respondents had brain problems because the research was carried out in the Rajawali 1A Room of RSUP Dr. Kariadi Semarang which is a stroke unit room according to the official website of RSUP Dr. Kariadi Semarang. The stroke unit in Rajawali 1A Room also serves as a class III HCU room at RSUP Dr. Kariadi Semarang.

Symptoms are very complex in stroke patients resulting in impaired memory, inability to concentrate, emotional instability, and fatigue. As the control center for all orders given to the body, brain damage will also have an impact on changes in sleep patterns in stroke patients. Stroke patients, especially ischemic stroke, experience various sleep disturbances that depend on the neurological deficit they experience. Sleep Disorder Breathing (SDB) which is often found in stroke patients is Obstructive Sleep Apnea Syndrome (OSAS) (more than 50%) which is caused by interference with the respiratory center in the brainstem or paralysis in the bulbar/pseudobulbar region. Circadian Rhythm Disorder or Sleep Wake Disorder (SWD) is another sleep disorder that can occur in stroke patients and can affect 20% to 40% of stroke sufferers and insomnia associated with impaired nerve impulses to the suprachiasmatic nucleus.

Almost all respondents (76%) in this study received analgesic therapy and most of the respondents (64%) received sedative therapy. The analgesics that patients got were paracetamol, ketorolac, ibuprofen, and some patients received opioid-type analgesics. The sedatives used are beta-blockers and anti-convulsant. The use of sedation and analgesia in patients in the intensive care unit is provided to relieve anxiety, discomfort, and pain management in patients during invasive diagnostic and therapeutic procedures. Reducing pain is very important because the effects can have an impact on the physiology and psychology of the patient (Millizia, 2018).

Giving sedative therapy is assessed from two sides. Research results by Martinez, Poulter, Seneviratne, Chrimes, Havill, Balogh, et al. (2022) stated that patients who received sedative therapy had good sleep quality at 51.8% of respondents. But in contrast to research by Carrera-Hernández, Aizpitarte-Pejenaute, Zugazagoitia-Ciarrusta, dan Goñi-Viguria (2018) which states that there is no relationship between the administration of benzodiazepine drugs with the patient's sleep quality. This happens because benzodiazepines only reduce the time it takes to fall asleep but suppress REM sleep so that the benefits of REM sleep as a natural healing mechanism do not work as expected. Another study by I. Sari, Hafifah, dan Choiruna (2021)

explained that the hypnotic drug class affects the sleep phases of NREM III and IV and suppresses REM sleep wherein the stages of NREM III, NREM IV, and REM sleep are very beneficial in healing and cell growth.

The results showed that most of the respondents had good sleep quality (56%) and the rest had poor and very bad sleep quality. In line with research by Lin, Cheng, Wei, dan Wang (2022) who stated that the sleep quality of 117 patients in the intensive care unit had an RCSQ value of 59.9 which was defined as good sleep quality, but in this study compared to the sleep quality of patients at home it was much better than the sleep quality of patients undergoing treatment in the intensive care unit. Backed by research Muntham, Chirakalwasan, Arttawejkul, dan Reutrakul (2020) presented the results of a study regarding the quality of sleep of patients in the ICU using the RCSQ questionnaire with a total average value of 56.4 ± 5.17 with a good interpretation of sleep quality, but in a study by Muntham, Chirakalwasan, Arttawejkul, dan Reutrakul (2020) also compared with the use of earplugs and eye masks in patients to improve the patient's sleep quality and the results were higher RCSQ scores than patients who were not given earplugs and eye masks.

In contrast to the results of research conducted by Alsulami, Rice, dan Kidd (2019) who presented the results of his research that patients in the ICU had poor sleep quality with an RCSQ value of 34.5 ± 5.60 in 381 research subjects. The difference in the results of this study is because the subjects in the research were conducted by Alsulami, Rice, dan Kidd (2019) are patients who are in the ICU with intubation and ventilator use. During the use of the ventilator, the patient feels afraid because of the clinical interventions given during the use of the ventilator and the sound of the alarm is felt to be disturbing by the patient while sleeping. Another study by Locihovi, Axmann, ziakovi, serkovi, dan cernochovi (2020) also not in line with the current study, in this study the total average value of the RCSQ perceived by 20 subjects was 47.6 ± 24.4 which was indicated as poor sleep quality. In his research, it was stated that Body Mass Index (BMI) has an influence on the quality of sleep of patients and is related to obesity. Poor sleep quality is significantly related ($p < 0.001$) to BMI. BMI in the sample studied was 29.2 ± 6.0 which was categorized as pre-obese, so the results showed that sleep quality was poor. Meanwhile, in this study BMI was not used as one of the factors examined in the quality of sleep of patients and it is possible that BMI was one of the factors why research by Locihovi, Axmann, ziakovi, serkovi, dan cernochovi (2020) and this study has inconsistent results.

Research by Aydın Sayılan, Kulakaç, dan Sayılan (2021) mentioned that the 111 patients who were research subjects had very poor sleep quality with an average RCSQ value of 25.10 ± 13.17 . Research by Suparti dan Suroso, (2018) shows that the noise level at the research site reaches 66.52 dB (SD = 6.16 minimum = 52, maximum = 78), 63.05 dB at night and 70.00 dB during the day. This value exceeds the standard value set by WHO of 35-40 dBA during the day and 30-40 dBA at night (Suparti & Suroso, 2018). In the study conducted by the researchers this time there was no noise level measurement at the research site, it is possible that different noise levels will result in different sleep quality as well so that the research by Aydın Sayılan, Kulakaç, dan Sayılan (2021) also contrary to the results of research by researcher.

Contrary to research by I. Sari, Hafifah, dan Choiruna (2021) which describes as many as 25 of the 31 respondents who underwent a research sample at the Ulin Banjarmasin ICCU had poor sleep quality. The variables studied were the same as the research conducted by the researcher, namely, the physical factors suffered by the patient, environmental factors, and nursing procedure factors. However, there are also differences in variables, namely the anxiety factor which is not included in the variable of this study. The study showed that 83.9% of patients experienced anxiety and 80.6% were affected by side effects from medication. Research by I. Sari, Hafifah, dan Choiruna (2021) showed a relationship between anxiety and the effects of medication with the patient's sleep quality ($p < 0.005$). Anxiety occurs because of pressure from illness and pressure from the new environment so that in the end it will increase fear. On research by I. Sari, Hafifah, dan Choiruna (2021), respondents received diuretic class drugs such as Spironolactone and Furosemide, statin groups such as Atorvastatin, beta blocker groups, and hypnotics groups which have side effects, namely sleep disturbances by suppressing the NREM phases III and IV, reducing REM sleep stages, increasing sleep time during the day, and causing long-term sleep disturbances.

A significant relationship was shown between physical factors and sleep quality in patients undergoing treatment at the HCU (sig. < 0.05). A patient is referred to as a critical patient if the patient's condition has the potential for dysfunction in one or more organs which results in a response from the patient's illness (Bahrudin, 2018; Suwardianto et al., 2017). Physical factors that can cause pain, including symptoms of disease, post-traumatic or postoperative injuries, sleep disturbances and derivations, and immobility. In critically ill patients, pain can arise because of the illness or because of the installation of tools that help the body function in treatment or healing. According to the theory described above, the results of the study also show that physical factors in HCU patients arise from the symptoms of the patient's illness.

Supported by research results by Lewandowska, Mędrzycka-Dąbrowska, Kwiecień-Jaguś, dan Czyż-Szypenbejl (2019) explained that pain as a physical factor affects the sleep quality of patients undergoing treatment in the intensive care unit. Pain felt by patients includes pain due to surgery, medical intervention, and the installation of intravenous lines which are very necessary in treatment. Another study by Calisanie dan Prayoga (2023) explained that patients who were receiving treatment in the intensive care unit complained of pain as a factor disturbing sleep. Hypoxemia can occur due to decreased lung vital capacity because of the pain felt by the patient. These changes will force the body to compensate by increasing the frequency of breathing so that oxygen needs can be met. An increase in the frequency of breaths or shallow breaths can disturb sleep. Another study by Noviyanti, Sutrisna, dan Kusmiran (2020) states that not only physical discomfort causes pain but also that pain can arise due to mood problems such as anxiety or depression. However, in some diseases, pain forces the patient to sleep in an unusual position. Another thing might happen because of changes that can cause a person to have problems with the patient's sense of security.

Associated with the most diagnoses in patients, namely non-hemorrhagic stroke, followed by hemorrhagic stroke and brain tumors in patients who were sampled in the study, physical factors that arise such as pain, headaches, and dizziness are

manifestations of the patient's disease. According to research by Sanjaya dan Kurniawan (2022) explained that the symptoms experienced by patients with stroke were sorted from the highest frequency, namely headaches, nausea, vomiting, and dizziness. shoulder, hand, and joint pain are complex problems in patients with stroke. Discussion of research by Dananjoyo, Tama, Malueka, dan Asmedi (2019) explained that the prevalence of headaches in brain tumor patients ranged from 32.2% -71% and signs of other neurological symptoms such as seizures and nausea and vomiting. It was further explained that larger tumors with increased contrast and displacement that cause increased intracranial pressure on the brain increase the pain of non-specific headaches.

According to research by Kusuma dan Anggraeni (2019) mentioned that increased intracranial pressure can cause headaches. Headache due to increased intracranial pressure caused by stretching of the intracranial structures and inadequate brain tissue perfusion resulting in metabolism from aerobic to anaerobic. The perception of patients who are treated in the intensive care unit can perceive a threat to the life and well-being of the patient and result in fear, anxiety and sleep disturbances, and discomfort (Muslimah et al., 2019).

The results of the data analysis showed a significant relationship between environmental factors and sleep quality in HCU patients with a strong correlation ($p=0.766$). The experience of patients who are treated in the intensive care unit is very different from the usual ward environment and this can disrupt the patient's sleep pattern because the patient feels uncomfortable (Nugroho et al., 2022). In more detail about environmental factors that affect patient sleep, including noise, too bright light, too hot or cold temperatures, sounds of medical equipment, sounds of medicine trolleys, and telephone ringing sounds.

Research by Aydın Sayılan, Kulakaç, dan Sayılan (2021) concluded that the noise level in the ICU affects sleep adequacy. Another study by Younis, Hayajneh, dan Rubbai (2020) who explained that environmental factors affect the patient's sleep, including noise, conversation sounds, and telephone ringing. Research by Nugroho, Nugroho, Abdurrahman, Faisal, Afdhal, dan Rochana (2022) argues that noise is the most frequently complained of by patients because it can disturb the comfort of patients in the intensive care unit. Another study by Delaney, Currie, Huang, Lopez, dan Van Haren (2018) from the patient's statement that the noise from the staff at the nursing station is the main source of noise that disturbs the patient's comfort.

Sounds that cause noise from activities or the environment in the intensive care unit cause psychological disturbances to the patient and cause anxiety and fear so that the patient feels disturbed when the patient is asleep (Serap & Gursel, 2021). An increase in stress response can affect a person's circadian clock, thereby negatively impacting sleep cycles (Gulam et al., 2019). The noise level in the intensive care unit must meet the standards set by WHO, namely 35-40 dBA during the day and 30-40 dBA at night where there will be encephalographic changes if there is noise above this value so that the patient will not feel disturbed sleep. and affect physiological healing and psychological improvement.

Other environmental factors reported by patients to interfere with comfort are lighting that is too bright and cold temperatures. In line with research by Miranda, Lira, Gollaz, Cortés, Zuloaga Del Valle, García, et al. (2020) namely in the results of his research stated that one of the environmental factors that bothered patients was the lighting factor. Research by Kalal, Kumar, Rana, dan Kothari (2022) supports the results of this study, namely that environmental factors that can also interfere with patients' sleep patterns are lighting. Melatonin, which is produced by the pineal gland, greatly affects a person's waking and sleeping conditions. During the day this hormone will be secreted less than at night according to the intensity of light received by the human eye. This hormone is one of the reasons for sleep disturbances. Light intensity levels below 500 Lux in 20 minutes will be enough to suppress the secretion of the hormone melatonin (Delaney et al., 2018). In addition to light, the temperature of the environment can also affect the patient's wake-sleep pattern which disrupts the slow wave restorative sleep phase and the REM stage (Delaney et al., 2018).

The results of data analysis in this study showed that there was a significant relationship between factors of nursing procedures and sleep quality of HCU patients at RSUP Dr. Kariadi Semarang with sufficient relationship strength. According to research by Alsulami, Rice, dan Kidd (2019) states that multiple factors can disturb the patient's sleep, one of which is clinical intervention as an external factor. In line with research by I. Sari, Hafifah, dan Choiruna (2021) which states that factors of nursing procedures disturb the sleep of patients in the ICCU at 77.4% of respondents. Supported by research results by Delaney, Currie, Huang, Lopez, dan Van Haren (2018) which states that clinical care factors are one of several factors that can interfere with sleep.

Nursing interventions given to patients can cause anxiety. Anxiety will increase the hormones catecholamine, glucagon, and cortisol through the sympathetic nerves resulting in a decrease in the stage IV cycle of NREM sleep and not achieving REM sleep (Calisanie & Prayoga, 2023). Nurses are considered to lack education about sleep physiology, interventions, training, and limited understanding of sleep in patients so that nursing interventions often disturb patients' sleep (Sundstrøm et al., 2021). On research by Sundstrøm, Sverresvold, dan Trygg Solberg (2021) that nursing interventions in supporting good sleep patterns in patients are only based on subjective experience and do not use research results so as not to achieve optimal sleep in patients.

CONCLUSION

The mean age of the sample is 52.52 years and is classified as early elderly. There were more female respondents (56%) than male respondents (44%) and some respondents (50%) did not work. The most common medical diagnosis experienced by patients was non-hemorrhagic stroke (32%). Most of the patients received medical therapy with sedatives (64%) and analgesics (76%). There is a significant relationship between physical factors (sig. 0.001), environmental factors (sig. 0.001), and nursing procedure factors (sig. 0.002) on the quality of the patient's sleep. A very strong relationship was shown in physical factors (p value 0.84) and environmental factors (p value 0.77) on the quality of sleep of patients at the HCU Dr. Kariadi Semarang. Meanwhile, the nursing procedure factor showed an adequate relationship with p value of 0.43.

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