



Sleep Quality of Operating Room Nurses - a Cross-sectional Study

¹ Monika Lisowski

² Slađana Režić

¹ Clinic for surgery, Surgical ward, UHC Zagreb, Zagreb, Croatia

² Department for Health Care Quality Assurance and Improvement, UHC Zagreb, Zagreb, Croatia

Article received: 20.06.2024.

Article accepted: 28.08.2024.

<https://doi.org/10.24141/2/8/2/2>

Author for correspondence:

Slađana Režić

Department for Health Care Quality Assurance and Improvement, UHC Zagreb, Zagreb, Croatia

E-mail: srezic@kbc-zagreb.hr

Keywords: shift work, nurses, sleep, sleep quality, sleeping

Abstract

Introduction. Sleep is of crucial importance for the psychophysical functioning and health of every person. Nurses who work in operating rooms most often work on call, which significantly affects their sleep quality.

Aim. To determine the quality of sleep among nurses in operating rooms working 24-hour shifts.

Methods. The study is based on a questionnaire on sleep quality (Pittsburgh Sleep Quality Index) that was distributed to nurses in the surgical ward. The sample consisted of 40 employees.

Results. The study was conducted on 40 respondents, most of whom are female. The average age of the respondents was 32.3 years, and the average length of service was 12.1 years. The largest number of respondents had bachelor's degrees in nursing. The results of the questionnaire indicate a significantly reduced quality of sleep.

Conclusion. The quality of sleep was assessed as poor, which indicates the need for interventions that would improve the sleep quality of nurses working on call.

Introduction

Sleep is a part of the biological rhythm in which a natural state of reduced consciousness and a decrease in the function of the nervous system occur. During sleep, most vegetative functions (pulse, blood pressure, body temperature, breathing) decrease, along with muscle activity. At regular intervals, sleep alternates with wakefulness. We divide sleep into two phases: non-REM and REM. Sleep is controlled by the suprachiasmatic nucleus of the hypothalamus, which plays the role of an endogenous clock that regulates the production of melatonin (a sleep-inducing hormone) (1).

Dreaming is an unconscious mental activity that occurs during the REM sleep phase. It manifests itself as dreaming of a visually complex sequence of various events that are perceived as reality. In biological terms, sleep is the time when the central nervous system recovers (2).

Sleep is very important for maintaining our mental and physical health. Nurses' shift work greatly hinders this goal due to irregular sleep. During sleep, the body performs actions that it could not perform during the wake phase, because the body consumes a lot of energy while awake. The body has a system for regulating sleep and wakefulness, which we call the circadian rhythm (3).

Recommended sleep time for a healthy adult is seven to nine hours a day (refers to nighttime sleep). During 24-hour shifts, especially while in the operating room, the period of day and night is often equalized, that is, the body does not know what time of day it is. Such a feeling can also occur during flights to other time zones, when the physiological and biological rhythm is disrupted. Frequent disruption of the sleep rhythm can lead to slower reflexes, overweight, cardiovascular diseases, diabetes and cognitive difficulties. Long-term exposure to irregular sleep also leads to the impossibility of quality sleep (4).

Many studies have proven the negative effects of sleep deprivation in healthcare professionals due to the nature of their work (4). Research conducted on the topic of sleep quality and related errors shows that health professionals with impaired sleep quality are more likely to make medical errors (5).

Physiology of sleep

The human body has a sleep and wakefulness regulation system known as the "biological clock" (6). The main role of the biological clock is to generate circadian rhythms and control the timing of their activity. The circadian rhythm, which comes from the Latin word "circa dies" meaning "around the day", is key to our waking up in the morning and feeling sleepy when it is time to rest. Its 24-hour cycle is responsible for the mental, behavioral and physical changes that accompany our daily rhythms, including sleep cycles, hormone release, body temperature, eating habits and digestion. Circadian rhythms respond to the light and darkness of the environment, and melatonin, a hormone secreted by the pineal gland, plays a key role in this process. It is important to note that high exposure to light at night and insufficient exposure to light during the day can disrupt melatonin synthesis. Shift workers, healthcare workers on call and night shift workers are especially exposed to circadian rhythm disorders, which is related to the nature of their work and its negative impact on the body's natural rhythm (7).

Impact of night work on nurses

Emotional exhaustion is a common problem for nurses. Constant stress and emotional demands of patient care can lead to emotional exhaustion, depression, anxiety, which can result in burnout. Burnout can make it difficult for nurses to connect with patients, which negatively affects patient's satisfaction and hospital experience. Another factor that contributes to nurse burnout is heavy workload and long working hours (8).

Nurses must often work multiple shifts in a row, which leads to fatigue and exhaustion. Nurses are required to work during holidays or weekends, which disrupts their personal lives. Tired nurses are more likely to make mistakes. There is also a higher probability of absenteeism from work and leaving the nursing profession (9).

To alleviate the problem of nurse burnout, hospitals can take several steps. Firstly, they can implement scheduling practices that allow nurses adequate rest between shifts. This may include limiting the number of consecutive shifts and ensuring adequate time off between shifts. In addition, hospitals can provide nurses with resources to help them manage stress and emotional exhaustion, such as counseling services and employee assistance programs (10).

The most common health problems associated with sleep problems are cardiovascular disease, hypertension, digestive problems, thyroid problems, obesity, diabetes. The reason for this is that people who work night shifts or 24-hour shifts have a disturbed circadian rhythm. Shift work can be an independent risk factor for sleep quality, diabetes and hypertension (11).

In the study conducted by Slišković, a pattern showing that workers who work outside working hours, i.e. night shifts, develop more health problems over the years than workers who have never worked night shifts is observed (12). According to Sharma et al., research has shown that there is undoubtedly an increased risk of obesity and type 2 diabetes mellitus (12). Karlson, Knutsson and Lindahl report an increased risk of metabolic disorders in shift workers (13).

A study by Hidalgo and colleagues conducted among health professionals shows that an alarmingly large number of physicians and nurses do not engage in a healthy lifestyle, which is related to their way of working (14). Interestingly, the study concluded that health workers are aware of what a healthy lifestyle should be (15).

All the studies that have been carried out show that shift work is associated with psychophysical diseases, and that people who work in shifts in the health-care system are well aware of the risks, i.e. sleep disorders and their consequences.

Aim

To assess the quality of sleep for Operating Room nurses who work 24-hour shifts.

Methods

Participants

The respondents were nurses employed at the Surgical ward of the UHC Zagreb's Surgery Clinic. A total of 40 questionnaires were distributed (the same number as nurses assigned to that workplace), and all 40 were filled out. Only respondents who work 24-hour shifts in their monthly work schedule were included. The research was conducted in December 2021. The average age of the respondents was 32.3 years (range 21-58 years), and the average length of service was 12.1 years (range 1-38 years).

Instrument

The Pittsburgh Sleep Quality Index (PSQI) was used (16). The Pittsburgh Sleep Quality Index assesses the quality and patterns of sleep through a self-report of the subject's habits during the past month. It contains 19 questions divided into 7 subscales: 1. subjective assessment of sleep, 2. transition from full wakefulness to sleep, 3. sleep duration, 4. usual sleep efficiency, 5. sleep disorders, 6. use of sleep medication and 7. daily functioning. The sleep quality score is obtained by summing all seven subscales. Each subscale is scored on a scale from 0 to 3, where 0 indicates no difficulty and 3 indicates great difficulty. The total PSQI score is obtained by summing the scores on the 7 subscales. The score ranges from 0 to 21. A total score greater than 5 indicates poorer sleep quality.

Procedure

The questionnaire was distributed in paper form to nurses at the surgical ward of UHC Zagreb. Respondents submitted their answers in a sealed envelope directly to the researcher. Due to this, the anonymity of the respondents was not fully guaranteed. However, all respondents were aware of this fact and agreed with this method of data collection, which they confirmed by their consent to participate. The consent of the Ethics Committee of UHC Zagreb was obtained for conducting the research. The results are presented in a table using Microsoft Excel.

Results

Demographic data obtained by the respondents is shown in Table 1.

		N	%
Gender	Female	28	70
	Male	12	30
Level of education	Secondary level	15	37.5
	Bachelor of nursing	20	50
	Master of nursing	5	12.5
Years of work experience	1-10	10	25
	11-20	17	42.5
	21-30	10	25
	31 and more	3	12.5

The quality of sleep is shown through 7 subscales of the PSQI questionnaire.

Subjective sleep quality

Subjective sleep quality is assessed by question number 9 (PSQI) "During the past month, how would you rate your overall sleep quality?".

Most respondents answered "relatively" (shown in Table 2).

9. During the past month, how would you rate your overall sleep quality?	Number of respondents	%
Very good	3	7.5
Relatively good	10	25
Relatively bad	22	55
Very bad	5	12.5

Latency of falling asleep

The latency of falling asleep is assessed by two questions: question 2 and question 5a. Answering question 2 (PSQI) "During the past month, how long (in minutes) did it usually take you to fall asleep each night?", most respondents said it takes them about 31 to 60 minutes to fall asleep. Answering question

5a, most respondents answered that at least once or twice a week they could not fall asleep during the first 30 minutes (shown in Table 3).

2. During the past month, how long (in minutes) did it usually take you to fall asleep each night?	Number of respondents	%
15 minutes	10	25
16-30 minutes	12	30
31-60 minutes	18	18

5a. During the past month, how often did you have trouble sleeping because you were not able to fall asleep within 30 minutes?	Number of respondents	%
Not during the past month	5	12.5
Less than once a week	4	10
Once or twice a week	16	40
Three or more times a week	15	37.5

Sleep duration

Question number 4 (PSQI) «During the past month, how many hours of actual sleep did you get at night? (This may be different than the number of hours you spent in bed)» was answered by most respondents as sleeping 4 to 5 hours during the night (shown in Table 4).

4. During the past month, how many hours of actual sleep did you get at night? (This may be different than the number of hours you spent in bed)	Number of respondents	%
4-5 hours	18	45
5-6 hours	12	30
6-7 hours	10	25

Sleep efficiency

The results are obtained based on the answers to questions 1, 3, 4. Sleep efficiency is calculated by dividing the number of hours slept by the total hours spent in bed. To the question 1 (PSQI) "During the past month, what time did you usually go to bed at night?", the largest number of respondents answered

they went to bed between 11 and 12 p.m. To the question 3 (PSQI) "During the past month, what time did you usually get up in the morning?" as many as 28 respondents (70%) answered that they got up at between 5 and 6 in the morning. To the question 4. (PSQI) "During the past month, how many hours of actual sleep did you get at night? (This may be different than the number of hours you spent in bed), most respondents answered that they slept between 4 and 5 hours during the night (shown in Table 5).

Trouble sleeping

The answers to question 5 (PSQI) "During the past month, how often did you have trouble sleeping because you...?" show that many respondents had difficulty sleeping (shown in Table 6).

Taking sleep medication

Answering question 6 (PSQI) "During the past month, how often did you take medicine to help you sleep (prescribed or "over the counter")?", most respondents (29 or 72.5%) answered that they did not take any sleep medication (shown in Table 7).

Daytime functioning

This topic is covered by the answers to questions 7 and 8. In terms of question 7 (PSQI) "During the past month, how often did you have trouble staying awake while driving, eating, or engaging in social activity?",

as many as 31 respondents (77.5%) answered that they had difficulty staying awake less often than once a week. To the question 8. (PSQI) "During the past month, how much of a problem has it been for you to keep up enough enthusiasm to get things done?", 21 respondents (52.5%) answered that they experienced certain difficulties (shown in Table 8).

Table 5. Sleep efficiency

1. During the past month, what time did you usually go to bed at night?	Number of respondents	%
22.00 - 23.00	8	20
23.00 - 24.00	22	55
24.00 - 01.00	10	25
3. During the past month, what time did you usually get up in the morning?	Number of respondents	%
5.00 - 6.00	28	70
6.00 - 7.00	9	22.5
7.00 - 8.00	3	7.5
4. During the past month, how many hours of actual sleep did you get at night? (This may be different than the number of hours you spent in bed)	Number of respondents	%
4 - 5 hours	18	45
5 - 6 hours	12	30
6 - 7 hours	10	25

Table 6. Trouble sleeping

5. During the past month, how often did you have trouble sleeping because you...?	Not during the past month N (%)	Less than once a week N (%)	Once or twice a week N (%)	Three or more times a week N (%)
were not able to fall asleep within 30 minutes	5 (12.5)	4 (10)	16 (40)	15 (37.5)
woke up in the middle of the night or early morning	3 (7.5)	5 (12.5)	21 (52.5)	11 (27.5)
had to get up to use the bathroom	0	32 (80)	8 (20)	0
could not breathe comfortably	11 (27.5)	28 (70)	1 (2.5)	0
coughed or snored loudly	7 (17.5)	13 (32.5)	11 (27.5)	9 (22.5)
felt cold	6 (15)	17 (42.5)	17 (42.5)	0
felt hot	6 (15)	17 (42.5)	17 (42.5)	0
had bad dreams	9 (22.5)	13 (32.5)	18 (45)	0
felt pain	4 (10)	20 (50)	16 (40)	0

Table 7. Taking sleep medication

6. During the past month, how often did you take medicine to help you sleep (prescribed or "over the counter")?	Number of respondents	%
Not during the past month	29	72.5
Less than once a week	9	22.5
Once or twice a week	2	5
Three or more times a week	0	0

Table 8. Daytime functioning

7. During the past month, how often did you have trouble staying awake while driving, eating, or engaging in social activity?	Number of respondents	%
Not during the past month	2	5
Less than once a week	31	77.5
Once or twice a week	7	17.5
Three or more times a week	0	0

8. During the past month, how much of a problem has it been for you to keep up enough enthusiasm to get things done?	Number of respondents	%
No problem at all	4	10
Only a very slight problem	12	30
Somewhat of a problem	21	52.5
A very big problem	3	7.5

Total sleep scale

Based on the PSQI scores, seven individual results are obtained, each of which can range from 0 (no difficulty) to 3 (great difficulty). By adding up the individual results, the total number of points is obtained (in range from 0 to 21). A higher score means worse sleep quality. Our results show that the total number of PSQI index points of all individual amounts to 12.

Table 9. Individual scores for the seven subscales of the PSQI

PSQI subscales	Result span	Individual results
1. Subjective sleep quality	0-3	2
2. Latency of falling asleep	0-3	2
3. Sleep duration	0-3	3
4. Sleep efficiency	0-3	1
5. Trouble sleeping	0-3	2
6. Taking sleep medication	0-3	0
7. Daytime functioning	0-3	2
8. Total (PSQI index)	0-21	12

Discussion

Chang et al. obtained data that nurses who work night shifts have worse sleep quality than nurses who work morning shifts (17). The data obtained in our research concurs with this data. Most respondents (55%) rated their sleep quality as 'relatively bad'. These data are completely opposite to those obtained in a study conducted at UHC Osijek, where the subjects assessed the quality of their sleep as 'very good' (15). In her research, Srdar also obtained information that the largest number of respondents rated their sleep as 'very good' (18).

In our study, the latency of falling asleep was prolonged by 31-60 minutes, compared to the study from Osijek, where the data obtained showed that 10-15 minutes were enough for most respondents to fall asleep (15).

The most significant data obtained from the study refer to the amount of sleep of the respondents. The majority of respondents in our study sleep 4 to 5 hours or less, and similar data was obtained by Srdar, who states that most respondents sleep between 5 to 6 hours (18). The literature states that an adult needs 6 to 8 hours of sleep for normal functioning (6).

Research has shown that sleep problems, especially the length of sleep, affect the daily functioning of an individual, the work-life balance, and lead to a number of health problems (19).

In our study, 77% of respondents stated that they had difficulties in daily functioning, such as maintaining alertness while driving, during meals or socializing. Also, difficulty is manifested in completing daily activities they started, as well as a lack of energy. Similar results were obtained by Brazilian researchers Palhares de Castilho et al. One of the conclusions of their research is that the respondents were mostly female and that difficulties in daily functioning and lack of energy can be attributed to the fact that women participate more in family and household duties to the detriment of their own sleep and rest (20).

Srdar's data also point to difficulties in daily functioning after shift work. Difficulties relate to maintaining alertness while driving or engaging in social activities, as well as mood swings (18).

Another study, carried out in Turkey, confirms that workers who do shift work are more often tired, sleepy, which leads to reduced concentration during daily activities, as well as during the performance of work tasks. All the above aggregates to an increased amount of workplace errors and is associated with more needlestick injury incidents (21).

The largest percentage (72%) of our respondents does not take sleeping pills, while Srdar obtained different information. Her data shows that a quarter of the respondents use sleeping pills, on medical advice or on their own, with varying frequency (one part of the respondents less than once a week while another part of the respondents uses sleeping pills several times a week) (18).

The instructions state that a score above 5 indicates unsatisfactory sleep quality (16). Looking at the overall PSQI index, our data results in a score of 12, which indicates unsatisfactory sleep quality. Similar data was obtained by Srdar, who obtained a score of 6 for respondents who work shifts (18). In her research on the quality of sleep at CH Merkur, Radinović obtained a score of 5 for respondents who work in shifts, compared to score less than 5 for respondents who only work the morning shift, which indicates satisfactory sleep quality (22).

Conclusion

The total PSQI score of 12 points obtained through the study points to an unsatisfactory sleep quality of nurses working in operating rooms. The most important data show that 55% of respondents rate their sleep quality as "mostly bad", that their sleep duration generally lasts 4-5 hours, and that they have certain difficulties in daily functioning.

Care must be taken when interpreting the results because this is a small sample of respondents in a single hospital. However, attention should be paid to the impact that sleep quality has on the functioning of nurses and certain interventions should be undertaken at the organizational level.

References

1. Spavanje. In: Opća i nacionalna enciklopedija (20 books), book 18. Zagreb: Večernji list d.d.; 2007. p. 246. Croatian.
2. San. In: Opća i nacionalna enciklopedija (20 books), book 17. Zagreb: Večernji list d.d.; 2007. p. 282. Croatian.
3. Evans JA. Collective timekeeping among cells of the master circadian clock. *J Endocrinol.* 2016;230(1):R27-49. doi: 10.1530/JOE-16-0054.
4. Maquet P. The role of sleep in learning and memory. *Science.* 2001;294(5544):1048-52. doi: 10.1126/science.1062856.
5. Lu M, Ruan H, Xing W, Hu Y. Nurse burnout in China: a questionnaire survey on staffing, job satisfaction, and quality of care. *J Nurs Manag.* 2015;23(4):440-7. doi: 10.1111/jonm.12150.
6. Kuštek I. Neurobiologija spavanja [Graduate thesis]. Zagreb: University of Zagreb, Faculty of Science, Department of Biology; 2010. Croatian.
7. Lee A, Galvez JC. Jet lag in athletes. *Sports Health.* 2012;4(3):211-6. doi:10.1177/1941738112442340.
8. Eastman CI, Liu L, Fogg LF. Circadian rhythm adaptation to simulated night shift work: effect of nocturnal bright-light duration. *Sleep.* 1995;18(6):399-407. doi: 10.1093/sleep/18.6.399.
9. Vidaček S, Radošević-Vidaček B. Smjenski rad i sigurnost. *Sigurnost.* 1997;39:295-304. Croatian.
10. Kolektivni ugovor za djelatnost zdravstva i zdravstvenog osiguranja, Narodne novine 29/2018. Available from: https://narodne-novine.nn.hr/clanci/sluzbeni/2018_03_29_604.html Croatian.
11. Sambolec M, Železnik D. Sindrom izgaranja medicinskih sestara/tehničara u radu s infektivnim bolesnicima Burnout syndrom among medical professionals working with infectious patient. *Sestrinski glasnik.* 2018;23(1):5-9. <https://doi.org/10.11608/sgnj.2018.23.002> Croatian.
12. Martinko, J. Profesionalno sagorijevanje na poslu nastavnika u obrazovanju odraslih. *Andragoški Glasnik.* 2010;4(2):99-110. Croatian.
13. Slišković A. Problemi rada u smjenama. *Arh Hig Rada Toksikol.* 2010;61:465-77. Croatian.
14. Albarran P, Hidalgo-Hidalgo M, Iturbe-Ormaetxe I. Schooling and adult health: Can education overcome bad early-life conditions? *Working Papers. Serie AD*;2017. doi: <http://dx.medra.org/10.12842/WPAD-2017-09>
15. Nađ V. Učinci smjenskog rada kao pretkazatelj poremećaja sna i odmora medicinskih sestara/tehničara [Graduate thesis]. Osijek: University of Josip Juraj Strossmayer, School of Medicine; 2013. Croatian.
16. Buysse DJ, Reynolds CF 3rd, Monk TH, Berman SR, Kupfer DJ. The Pittsburgh Sleep Quality Index: a new instrument for psychiatric practice and research. *Psychiatry Res.* 1989;28(2):193-213. doi: 10.1016/0165-1781(89)90047-4.
17. Chang WP, Peng YX. Influence of rotating shifts and fixed night shifts on sleep quality of nurses of different ages: a systematic literature review and meta-analysis. *Chronobiol Int.* 2021;38(10):1384-96. doi: 10.1080/07420528.2021.1931273.
18. Srdar B. Povezanost kvalitete sna i kvalitete života kod medicinskih sestara/tehničara u smjenskom radu [Graduate thesis]. Osijek: University of Josip Juraj Strossmayer, School of Medicine; 2017. Croatian.
19. Smith CS, Robie C, Folkard S, Barton J, Macdonald I, Smith L, et al. A process model of shiftwork and health. *J Occup Health Psychol.* 1999;4(3):207-18. doi: 10.1037//1076-8998.4.3.207.
20. Palhares de Castilho V, Corrente JE, Matsubara BB. Association between sleep quality and quality of life in nursing professionals working rotating shift. *Rev Suade Publica.* 2014;48(4):594-601.
21. Demir Zencirci A, Arslan S. Morning-evening type and burnout level as factors influencing sleep quality of shift nurses: a questionnaire study. *Croat Med J.* 2011;52(4):527-37. doi: 10.3325/cmj.2011.52.527.
22. Radinović A. Utjecaj smjenskog radana pažnju kod medicinskih sestara i poremećaji cirkardijarnih ritmova spavanja i budnosti [Graduate thesis]. Split: University of Split, University Department of Health Studies; 2018. Croatian.

KVALITETA SPAVANJA MEDICINSKIH SESTARA ZAPOSLENIH U OPERACIJSKIM DVORANAMA - PRESJEČNA STUDIJA

Sažetak

Uvod. Spavanje je ključno i važno za psihofizičko funkcioniranje i zdravlje svake osobe. Medicinske sestre i medicinski tehničari koji rade u operacijskim dvoranama najčešće rade u dežurstvima, što znatno utječe na njihovu kvalitetu spavanja.

Cilj. Utvrditi kvalitetu spavanja medicinskih sestara i tehničara zaposlenih u operacijskim dvoranama koji rade u 24-satnim dežurstvima.

Metode. Istraživanje se temelji na upitniku o kvaliteti spavanja (*Pittsburgh Sleep Quality*) koji je distribuiran medicinskim sestrama i tehničarima s odjela kirurških operacija. Uzorak je činilo 40 zaposlenika.

Rezultati. Istraživanje je provedeno na 40 ispitanika od kojih je većina ženskog spola. Prosječna dob ispitanika je bila 32,3 godine, a prosječna duljina radnog staža je bila 12,1 godinu. Najveći broj ispitanika bili su prvostupnici sestrinstva. Rezultati na upitniku ukazuju na znatno smanjenu kvalitetu spavanja.

Zaključak. Kvaliteta spavanja procijenjena je lošom, što ukazuje na potrebu za intervencijama koje bi poboljšale kvalitetu spavanja medicinskih sestara koje rade u dežurstvima.

Ključne riječi: smjenski rad, medicinske sestre, spavanje, kvaliteta spavanja
