

Analysis of Sleep Disorder Occurrence among Anaesthesiology Nurses Employed in Operating Theatres and Intensive Therapy Wards — a Prospective, Comparative Study Design using the Athens Insomnia Scale

Analiza zaburzeń snu wśród personelu anestezyjologicznego pracującego na bloku operacyjnym i oddziałach intensywnej terapii — badanie prospektywne, porównawcze z wykorzystaniem Ateńskiej Skali Bezsenności

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Abstract

Introduction. Good quality of sleep and feeling well are important issues for health and employee productivity especially for people with highly demanding jobs. Nursing personnel have to confront with significant mental and physical challenges. Shift work can lead to many health problems including: anxiety, insomnia, obesity or high blood pressure.

Aim. The study examined the occurrence of sleep disorders among nursing personnel employed in operating theatres and intensive therapy units.

Material and Methods. The study was prospective, comparative and descriptive nature. The project was carried out between January 1st and April 31st 2019. The study covered 180 medical personnel employed in Anaesthesiology and Intensive Therapy Departments in five different hospitals. Data were collected on the basis of a standardised tool of the Athens Insomnia Scale (AIS) as well as an original interview questionnaire.

Results. The study showed that 65.6% (N=118) of respondents experienced sleeping problems, manifested by frequent awakenings at night. For more than forty-five percent (45.6%; N=82) of nurses, the time of their sleep is not sufficient, and more than 60% (N=109) of respondents feel sleepiness. The in-depth analyses provide a statistically significant dependence between the quality of sleep and the use of sleeping drugs ($Z=-1.95$; $p=0.050$).

Conclusions. A nursing personnel working in the intensive therapy and operating room theatre wards suffer from sleep disorders related to insomnia; the symptoms of insomnia in this professional group include awakening at night and sleepiness during the day; male nurses have a far better quality of sleep compared to females nurses. (JNNN 2022; 11(3):105–113)

Key Words: sleep disorder, nurse, shift work, operating theatre, intensive therapy, the Athens Insomnia Scale

Streszczenie

Wstęp. Dobra jakość snu i dobre samopoczucie są ważnymi kwestiami dla zdrowia i wydajności pracowników, szczególnie zaś w przypadku osób wykonujących bardzo wymagające zawody. Personel pielęgniarstwa musi stawić czoła poważnym wyzwaniom psychicznym i fizycznym. Praca zmianowa może prowadzić do wielu problemów zdrowotnych, w tym: lęku, bezsenności, otyłości czy wysokiego ciśnienia krwi.

Cel. W pracy zbadano występowanie zaburzeń snu wśród personelu pielęgniarstwa zatrudnionego na salach operacyjnych i oddziałach intensywnej terapii.

Materiał i metody. Badanie miało charakter prospektywny, porównawczy, opisowy. Projekt był realizowany od 1 stycznia do 31 kwietnia 2019 roku. Badaniem objęto 180 pracowników medycznych zatrudnionych na Oddziałach Anestezjologii i Intensywnej Terapii w pięciu różnych szpitalach. Dane zebrano na podstawie wystandaryzowanego narzędzia Ateńskiej Skali Bezsenności (AIS) oraz autorskiego kwestionariusza wywiadu.

Wyniki. Badanie wykazało, że 65,6% (N=118) respondentów miało problemy ze snem, objawiające się częstymi wybudzeniami w nocy. Dla ponad 45% pielęgniarek (45,6%; N=82) czas ich snu był niewystarczający, a ponad 60% (N=109) badanych odczuwało senność. Pogłębione analizy dostarczały statystycznie istotnej zależności pomiędzy jakością snu a zażywaniem środków nasennych ($Z=-1,95$; $p=0,050$).

Wnioski. Personel pielęgniarstwa pracujący na oddziałach intensywnej terapii i sali operacyjnej cierpi na zaburzenia snu związane z bezsennością; objawy bezsenności w tej grupie zawodowej obejmują budzenie się w nocy i senność w ciągu dnia; pielęgniarki płci męskiej mają znacznie lepszą jakość snu niż pielęgniarki płci żeńskiej. (PNN 2022;11(3):105–113)

Słowa kluczowe: zaburzenia snu, pielęgniarka, praca zmianowa, sala operacyjna, intensywna terapia, Ateńska Skala Bezsenności

Introduction

With fastening modernization and increasing life demands, sleep become an important global public health issue influencing millions of people [1]. Poor sleep quality may lead to unpleasant consequences such as: work related accidents or injuries, depression, low job satisfaction and burnout, irritability, memory loss, obesity, increased risk for heart attack or stroke [2–5]. Sleep restrictions might have also direct effect on high mortality [6]. Most of adults spend an average of eight hours of sleep [7]. Many reports showed that approximately 10–13.6% of people suffered from chronic sleep disorders [8].

Sleep hygiene consists of a number of factors, such as an adequate number of sleep hours (4 to 10 hours daily), a timetable of night relaxation, time needed to fall asleep, frequency of waking and wellbeing after awake [9]. Nursing personnel have to deal with significant and increasing physical and mental strains. The irregular working patterns of nurses lead to sleep and wakefulness disorders in this professional group, due to the improper regulation of circadian rhythms. The most frequently confirmed problems are insomnia or drowsiness during the day [10]. There is a medical condition distinguished in medical terminology, a so-called shift-work sleep disorder, which is characterised by insomnia during sleep in the day and excessive sleepiness during work at night. Persons who work in a shift system commit mistakes at work more often and have a higher disease index. Shift work has also an explicitly negative impact on family and social bonds [11].

Most of the nursing personnel work rotating shift works [12]. That kind of work system is very often defined as atypical because it influences many physiological

processes like misaligned central and peripheral rhythms and suppression of melatonin levels at night [13]. Other types of work organization systems, are three rotating shift systems, two scheduled work systems, one day shift or even ten-hour shift. Most of the nursing personnel in polish hospitals works on a two rotating shift system. It is characterized by two 12-hour shifts (day and night). Nurses start work at 7.00 a.m. or 7.00 p.m. On average, they work in one shift for one day. After two days of work, there should be two days off. That kind of system is accepted by a significant number of nursing staff due to the fewer amounts shifts per month (12 shifts on average) compared to the three-shift system. Sometimes, especially in the area of operating room theatre, nursing personnel work only day shifts [14].

An intensive care units, as well as operating room theatre with the anaesthesia and post-anaesthesia care stations, are under the Regulations of the Minister of Health and Social Policy of 6 December 2016 [15] and the Recommendation of the Polish Association of Anaesthesiology and Intensive Care Medicine [16]. Those recommendations describe in detail the work organization structure in the area of anaesthesiology and intensive care units, equipment and human resources. They also give direct information about patients' admission criteria [16]. According to the Regulation by the Minister of Health, an anaesthesiology nurse, employed either in an intensive therapy ward or an operating theatre in Poland, is a nurse who has completed a qualification course or specialization in anaesthesiology nursing and intensive care or is doing a specialization study [15]. Despite shared working condition requirements in an intensive therapy ward, they are significantly different from work in an operating theatre. The main tasks of

an anaesthesiology nurse in an operating theatre include the operation of specialist medical equipment necessary for anaesthetizing a patient, cooperating in and providing safety when laying a patient on an operating table, cooperating with an anaesthesiologist in the course of anaesthetizing and during the introduction to anaesthetizing, fulfilling instructions received from doctors, observing the condition of a patient during the whole anaesthetizing process, and transporting a patient to the Intensive Post-Anaesthetizing Monitoring Room. As regards the work of an anaesthesiology nurse in an Intensive Therapy Ward, their main tasks focus on providing prevention, diagnostic, medical and rehabilitation services to patients who are often in a life-threatening condition, which includes the failure of one or several organs/systems [15–18]. In both the above-mentioned cases, 24 h care is necessary, including at night, which prevents the proper rest and regeneration of the body.

The purpose of the study was to analyse the occurrence of sleep disorders among nursing personnel employed as anaesthesiology nurses in intensive therapy wards (ICU) and operating theatres at randomly selected hospitals.

Material and Methods

Design of the Study

The research project was multicentre and had a descriptive, comparative nature. The project was carried out between January 1st and April 31st 2019. Consents were obtained from the directors of particular facilities. Each participant was informed that study was anonymous, and that its results would be used only for scientific purposes. The respondents gave their oral consents to participate in the study and then they completed the questionnaire and handed over to the main researcher.

Sample

According to the database of the Main Chamber of Nurses and Midwives for 2002–2016 [19], the estimated number of nursing staff who had qualification in anaesthesiology and intensive care nursing in the North Pomeranian Region was 304. To estimate sample size we use The Roasoft software [20]. Based on the confidence level 95% and 5% margin of error the calculated sample of the representative group was 170. The final collected sample was 180 respondents. The group was larger than expected, within response rate higher than 50%.

Data Collection

We invite anaesthesiology and intensive care nurses employed in the operating theatre, post-anaesthesia recovery units and intensive care units from the few hospitals in the North Pomeranian Region, Tricity. Each participant was informed that the research was anonymous, and that its results would be used only for scientific purposes. Research assistant distributed the research packet to each ward according to the number of nurses working there at the time of study. Every packet consisted — information letter, socio-demographic questionnaire and Athens Insomnia Scale. The follow-up method was done to collect questionnaires.

Participants

The study group included 180 nurses employed in anaesthesiology (operating and post anaesthesia recovery room) and intensive care units in hospitals. Nurses worked 12 hours rotating shift system and one every day shift 7.35 — which start from 7.00 till 14.35. Participants who did not met the following exclusion criteria did not participate in the study: profession other than nurse, lack of consent from the hospital management, lack of consent to participate in the study, work in a different medical area than anaesthesiology and ICU.

Research Tool

The authors analysed the literature, carried out a diagnostic study, and applied a statistical method. The research tool was a standardised questionnaire of the Athens Insomnia Scale (AIS) as well as an original Individual interview questionnaire that included questions about: sex, marital status, education, service period, ward profile, working system, number of hours worked per week, and number of workplaces.

Questions included in the second standardised AIS concerned symptoms related to sleep and functioning during the day. The tool assessed 8 criteria, including: falling asleep, awakening at night, waking up in the morning, the total time of sleep, mood during the following day, mental and physical condition on the following day, and sleepiness during the day. Each statement was assessed by the respondent on a scale from 0 to 3 points. The maximum number of points available was 24. A result of 6 and more points indicates a high probability of insomnia. The AIS questionnaire is a tool validated in Poland [21]. The authors have agreed on the use of the scale in the Polish project.

Ethical Approval

All procedures performed in studies involving human participants were in accordance with the ethical standards of the Bioethical Committee for the Scientific Research of the Medical University of Gdańsk (NKBBN/26/2019) and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Data Analysis

Statistical calculations were carried out using the IBM SPSS 23 statistical package as well as an Excel 2016 spreadsheet. Quality variables were presented with numbers and percentage values, while quantity variables were characterised with an arithmetic average and a standard deviation. The significance of differences between more than two groups was checked using the Kruskal–Wallis non-parametric test, and the significance of differences between two groups with the t-Student test and the U Mann–Whitney test. In order to verify the force and direction, the Spearman correlation test was applied. For quality variables, the Chi-Quadrat test was utilised. In all calculations, the significance level was accepted at $p < 0.05$.

Results

The study was carried out on 180 respondents, including a dominant group of female nurses, constituting 87.2% (N=157). The largest group were persons above 40 years old (N=7; 3.88%). The obtained minimum value was 22 years, and the maximum 63 years. The average age of respondents was about 40, with a standard deviation of $SD \pm 10.30$. An analysis of the education of the respondents showed that 32.8% (N=59) completed a specialization in anaesthesiology nursing and intensive care, 28.3% (N=51) completed a qualification course in anaesthesiology nursing and intensive care, and 38.9% (N=70) of respondents had no required education or were doing post-graduate education.

Most surveyed personnel, 79.4% (N=143), worked in a 12-hour shift system of duties. Other respondents, i.e. 20.6% (N=37), worked in a single shift system. The structure of employment revealed that 43.3% (N=78) of nurses were employed in intensive care wards, while 49.5% (N=89) in operating theatres, including 7.2% (N=13) solely and exclusively in a recovery room.

A detailed analysis of the number of workplaces in which medical personnel work showed that 48.9% (N=88) of them had a single workplace, 47.2% (N=85) worked in two workplaces, and 2.8% (N=5) were employed in three places. Nurses who declared employment in

Table 1. Socio-demographic characteristic of the studied group

Variable	N	%
Gender		
Women	157	87.2
Men	23	12.8
Marital status		
Single	48	26.7
Married	105	58.3
Divorced	17	9.4
Widow/widower	10	5.6
Education		
Registered Nurse (RN)	72	40
Bachelor of Sciences in Nursing	65	36.1
Master of Sciences in Nursing	43	23.9
Clinical education		
Specialization in the field of anaesthesiology and intensive care	59	32.8
Qualification course	51	28.3
Non	70	38.9
Shift working		
Rotating 12-hour shift	143	79.4
Single shift	37	20.6
Employment status		
<40 hrs/week	70	38.9
>40 hrs/week	110	61.1
Type of working unit		
Intensive Care Unit	78	43.3
Operating room theatre	89	49.5
Postanesthesia recovery unit	13	7.2
Number of employment establishments		
1	88	48.9
2	85	47.2
3	5	2.8
4	2	1.1
The use of sleeping pills		
Yes	11	6.1
No	169	93.9

four places constituted 1.1% (N=2). The average length of service was about 19 years, with a standard deviation of $SD \pm 11.54$. Another aspect examined in the study was the number of hours worked per week. 61.1% (N=110) of respondents worked for more than 40 hours a week. 93.9% (N=169) of respondents said they did not use any sleeping drugs, and only 6.1% (N=11) took them to improve the quality of their sleep and to fall asleep. The detailed socio-demographic characteristics of the study group are presented in Table 1.

The Athens Insomnia Scale (AIS)

Subsequently, the respondents were asked 8 questions concerning sleep induction, awakening during the night, the quality of sleep, sleepiness, awakening in the morning and at night as well as their sense of well-being during the following day, and their physical and mental functioning after rest. The vast majority of respondents report the incidence of awakening during the night as a minor problem (N=92, 51.1%) and considerably serious problem (N=57, 37.1%). Although nearly 50% of respondents reported that they wake up in the morning at the proper time, many nurses evaluate their total sleep duration on slightly (N=75, 41.7%) and markedly insufficient level (N=50, 27.8%) (Table 2).

Table 2. The Athens Insomnia Scale — detailed characteristic of answers

Variable	N		%	
	1	2	3	
Sleep induction (time it takes you to fall asleep after turning of the lights)				
No problem		88		48.8
Slightly delayed		46		25.6
Markedly delayed		36		20.0
Very delayed or you did not sleep at all		10		5.6
Awakening during the night				
No problem		24		13.3
Minor problem		92		51.1
Considerably problem		57		31.7
Serious problem or you did not sleep at all		7		3.9
Final awakening earlier than desired				
Not earlier		90		50.0
A little bit earlier		66		36.7
Markedly earlier		19		10.6
Much earlier or you did not sleep at all		5		2.7
Total sleep duration				
Sufficient		48		26.7
Slightly insufficient		75		41.7
Markedly insufficient		50		27.8
Very insufficient or you did not sleep at all		7		3.8
Overall quality of sleep (no matter how long you slept)				
Satisfactory		48		26.7
Slightly unsatisfactory		75		41.7
Markedly unsatisfactory		50		27.8
Very unsatisfactory or you did not sleep at all		7		3.8

Table 2. Continued

	1	2	3
Sense of well — being during the day			
Normal		68	37.8
Slightly decreased		77	42.8
Markedly decreased		32	17.7
Very decreased		3	1.7
Functioning (physical and mental) during the day			
Normal		85	47.2
Slightly decreased		82	45.6
Markedly decreased		10	5.6
Very decreased		3	1.6
Sleepiness during the day			
None		15	8.3
Mild		109	60.6
Considerable		52	28.9
Intense		4	2.2

The average result on the AIS scale was $M=7.83$ with a standard deviation of $SD\pm 4.33$. The result of 0 points was obtained by 3 persons, while the maximum of 23 points by 1 respondent. Most respondents were in the range of 10 to 12 points (Figure 1). The study showed that only 34.4% (N=62) of respondents had a good quality of sleep. As many as 65.6% (N=118) of medical

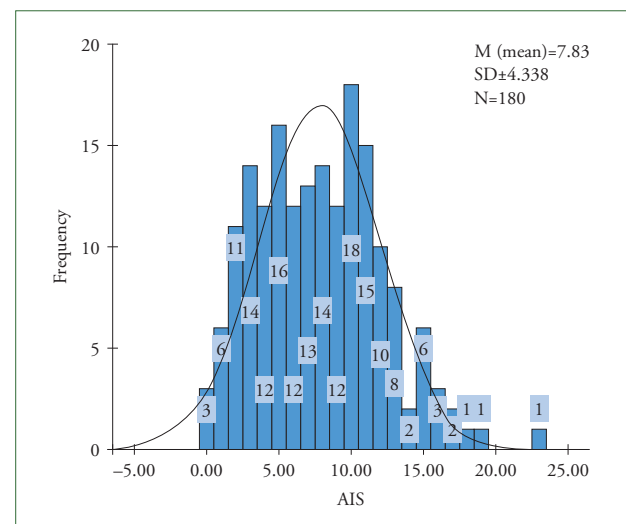


Figure 1. The distribution of the score points within The Athens Insomnia Scale

personnel suffered from sleep disorders (Figure 2). The study with the U Mann–Whitney test did not confirm a dependence between shift work and the occurrence of insomnia ($Z=-1.15$; $p>0.05$). However, the in-depth analyses provide a statistically significant dependence between the quality of sleep and the use of sedative drugs

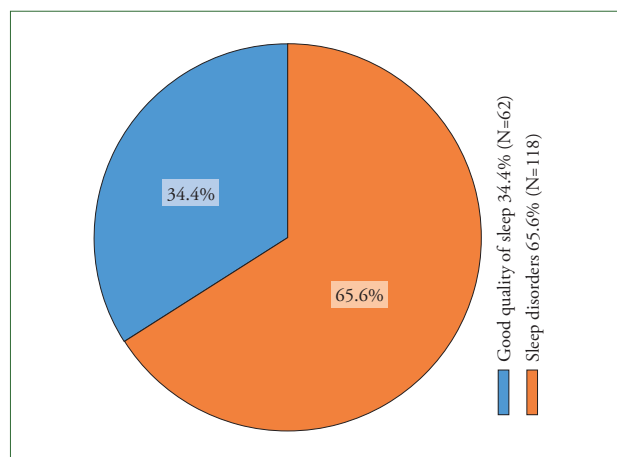


Figure 2. The quality of sleep among nursing personnel within the The Athens Insomnia Scale

($Z=-1.95$; $p=0.050$). It was confirmed that persons who take sleeping pills have worse sleep quality compared to the group that does not use any medication. A similar dependence was shown between the quality of sleep and gender ($Z=-1.74$; $p=0.053$). Men assessed the quality of their sleep much better than women. Further analyses with the parametric t-student test did not confirm the relationship between sleep disorders and the number of working places ($t(171)=1.55$; $p>0.05$) or the profile of the ward where nurses worked: an operating theatre ($t(178)=1.35$; $p>0.05$), intensive therapy ($t(177)=1.30$; $p>0.05$) (Table 3).

Table 3. Indicators for insomnia occurrence

Variable	N	M	SD	Statistic Z	p-value
Shift working					
Rotating 12 hour	143	6.08	4.52		
Single shift	37	7.08	3.46	1.15	0.250*
Gender					
Female	157	8.06	4.34		
Male	23	6.30	4.09	1.74	0.053*†
The use of sleeping pills					
Yes	11	9.81	2.71	1.95	0.050*†
No	169	7.70	4.39		

*Mann–Whitney U test, significance level $p<0.05$; †significance of differences between the variables; N — sample size; M — mean; SD — standard deviation

Discussion

There are a great many stimuli that adversely affect the functioning of the body. A nurse cares for a patient 24 h and holistically, contributing to saving a patient's life. However, because of hard work, they are often exposed to occupational diseases. Sleep disorder is listed among occupational burdens in the work of a nurse.

This problem is quite common, which results, among other causes, from a large number of duties. This situation results both from shortages of personnel and retirement in this group of medical staff. Another equally frequent problem is overtime work under civil-law contracts or working in several workplaces, which certainly disrupts the proper hygiene of sleep and rest. Observations to date clearly show that proper hygiene of sleep and rest contributes to better and more effective work and improves the capacity to focus, which is an important element of work in this highly specialised and stressful field [22–27].

Working in Healthcare Centres involves providing 24 hour and continuous care. Therefore, the working system of nurses in Poland involves 12-hour shifts at day and night or working in a single-shift system of duty that lasts 7 hours and 35 minutes [28]. The conducted study showed that the vast majority of respondents worked in a shift rotating system. The presented results are similar to other foreign researchers [29–31]. Choi and et al. (2020) suggested that sleep disturbances are more frequent in shift workers [32]. Moreover, a different shift schedules could be a determinant of depressive mood and anxiety symptom [31–34].

An own studies analysis shows that almost half of the nurses are employed in two workplaces. Working in several workplaces is related to data that concern the number of working hours per week. 61.1% of respondents work for more than 40 hours per week, which is due to working in two or more workplaces. According to the guidelines of the Act of 15 April 2011 on therapeutic activity, weekly working time in a healthcare centre should not exceed 37 hours and 55 minutes. The working time of a nurse in a healthcare centre during the day should be 7 hours and 35 minutes; however, due to the nature of the work, this is extended to 12 hours per day [35].

One of the questions asked in the study concerned the problem of taking sedative drugs in order to improve the quality of one's sleep. The detailed analyses showed that the vast majority of nurses did not take any sleeping pills. Only 6.1% of respondents declared taking such pharmaceuticals. The study clearly showed that persons who took these medicines had a worse quality of sleep than persons who did not take such drugs. The presented results are similar to the findings of a study carried out in a hospital in Campinas, Brazil. It showed a connection between stress, the quality of sleep, and the use of sleep pharmacotherapy. 203 medical employees took part in the study there, including 17.7% of nurses who took sleeping pills. It was proven that nurses who used pharmacotherapy suffered from drowsiness during the day, changes in sleep quality, and

delays in the time of sleep, and had a higher level of stress than persons who did not take any sleeping drugs. The studies may suggest that taking drugs is not an effective therapy against sleep disorders [36].

The conducted project showed that nurses working in conditions such as in Intensive Therapy Wards and Operating Theatres suffer from major problems due to insomnia. A detailed analysis showed that 65.6% of respondents had a sleep disorder. An analysis of eight criteria related to sleep and the functioning of respondents during the day showed that almost half of those polled fell asleep quickly, and waking up during the night. The sleeping time of respondents was seen as clearly insufficient, and its quality for almost half of respondents was determined as minimally satisfactory. Although many respondents complained about sleepiness during the day, they did not have any signs of disrupted physical and mental functioning after awakening. An own studies analysis was very similar to the results of studies in Tesal'a. In a group of 174 nurses working in paediatric, psychiatric, surgery and internal diseases wards, almost 50% suffered from sleeping problems. It was also shown that the problem of insomnia concerns mostly young people. The average age obtained in the AIS was 10 points, which was similar to the own studies results [37]. Similar results were also achieved by Chinese researchers. In a study on 124 nurses from psychiatric and rehabilitation wards, they showed that almost 90% of respondents were not satisfied with the quality of their sleep. They also presented the findings that age and marital status increased the frequency of sleep disorder occurrence, while the working system was not connected to the occurrence of insomnia [34]. The presented results are different from the Polish results of a study on a group of 179 female and male nurses at the University Clinical Hospital in Białystok. The average result in the AIS was 8 points. The interpretation of results shows that the problem of insomnia occurred more often among men. It was shown that 25% of respondents suffered from insomnia. However, similarly to own studies, no statistically significant differences were observed between insomnia and age, the number of workplaces, or the ward specialization [33].

Sleep disorders and low quality of sleep are common problems in the group of professional nurses, both in Poland and in other countries all over the world. Despite the significant deficit of nursing personnel, no prophylactic strategy to treat sleep disorders in this professional group has been developed to date.

Conclusions

The following conclusions can be reached based on an analysis of the material collected: nursing personnel working in intensive therapy and anaesthesiology wards suffer from sleep disorders related to insomnia; the symptoms of insomnia in this professional group include awakening at night and sleepiness during the day; male nurses have a far better quality of sleep compared to females.

Implications for Nursing Practice

Sleep disorders and low quality of sleep are common problems in the group of professional nurses and midwives, both in Poland and in other countries all over the world. Despite the significant deficit of nursing personnel, no prophylactic strategy to treat sleep disorders in this professional group has been developed to date. It would be worth working on a guideline dedicated to the medical personnel to prevent them from insomnia occurrence. The hospital managers and decedents should work on the screening program to detect early health and psychological problems. Low quality of sleep can be an important early sign of such problems. Our research showed that better quality of sleep has males nurses compare to females. The nursing profession in most of the countries is a mainly feminized. The medical institution and health policymakers should take into consideration the popularize nursing job among the male population, who have a much better quality of sleep even though they work in the day-night rotation shifts.

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