

SHIFT WORK AND THE PSYCHOSOCIAL HEALTH OF NURSES

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ABSTRACT

Aim of the study: To understand the impact of shift work on the psychosocial health of nurses.

Material and methods: The study used the method of a diagnostic survey, and the research tool was an original survey questionnaire. The research was conducted in 2020 on a group of 140 nurses working shifts. The obtained data were statistically analysed using the PQStat software.

Results: The results of the study showed that shift work has both positive and negative effects on the family relations and private life of nurses. According to the respondents, the day after working the night shift is not a day off. Shift workers returning from a night shift may be a traffic hazard, but this does not depend on the age of the respondents. Sleep disorders related to shift work do not cause a visible increase in the use of hypnotics among the respondents.

Conclusions: Most of the respondents noticed a deterioration in their health condition since they started working in shifts. With varying frequency after shifts, they felt exhausted, weakened, often irritable, and without energy. It is important to know the differences in the way you balance work and private life. More research is needed to gain a deeper understanding of this phenomenon. Theoretical studies suggest numerous disorders in the health condition of nurses working in shifts and night hours. However, in many cases there are divergent opinions as to the relationship between diseases and this type of work.

Key words: shift work, nurses, psychosocial health.

INTRODUCTION

Social health is a positive dimension of health that is included in the constitutional health definition of the World Health Organization (WHO). It is an individual's ability to cope and act based on various social conditions [1]. A person and their health constitute a whole that affects the functioning of all spheres of life. The social dimension of health relates to their relationships with other people, to their functioning in society, their social interactions, and the roles they play in life. Social health is also expressed in the number and quality of contacts within social networks, the ability to cooperate, maintain good relations with people, and participate in broadly understood social life, and to belong to social groups and derive satisfaction from it. Good social health is not only about maintaining relationships, but also about proper behaviour and adherence to socially accepted standards. All the above-mentioned elements indicate the complexity of this issue and mark an interesting research area [1]. Mental health affects how a person thinks, feels, and acts. It also helps determine how

they deal with stress, relate to others, and make good choices. Mental health is important at every stage of life, from childhood and adolescence to adulthood [2].

Working time as an important element regulating the order and organization of work is defined by Polish legislation. According to the Labour Code, working time is "...the time during which the employee is at the disposal of the employer in the workplace or in another place designated for work" (Art. 128 §1 of the Labour Code). According to the Labour Code, shift work is "performing work according to the agreed working time schedule providing for a change in the time of work by individual employees after a specified number of hours, days, or weeks" (Art. 128 §2 pkt. 1 of the Labour Code). Full-time work is performed 8 hours a day (art. 129 of the Labour Code). Under this system, it is permitted to extend the daily working time to 12 hours (art. 135 of the Labour Code). The extension of the daily working time may only take place provided that the time on other days is reduced at the same time or the number of days off is ensured [3].

Pursuant to the provisions of the Labour Code, it is permissible to apply equivalent working time systems, in which the employer may use a different maximum number of daily working hours, as well as to differently distribute working days to the employee for individual days of the week – depending on the type of work. In the system of equivalent working time – due to the possibility of extending the working time over 8 hours a day, which is related to shorter working hours on other days or more days off – it is necessary to prepare working time schedules for employees, in practice called schedules or work time schedules. On the other hand, shift work includes a work schedule that goes beyond the typical 8-hour working day, with schedules often including an early start of work, shortened working weeks with 12-hour shifts, and night work. The 2005 international classification of sleep disorders estimates that shift work related sleep disorders occur in 2-5% of employees [4]. This disorder is characterized by excessive somnolence and/or a sleep disturbance lasting for at least one month due to an unusual work schedule. Individual shift work tolerance remains a complex issue, influenced by the number of consecutive working hours and shifts, rest periods, and the predictability of work schedules. Sleepiness usually occurs during night shifts and is at its greatest at the end of the night. Impairment of alertness and productivity occurs during periods of increased sleepiness and can seriously endanger the health and safety of workers. Workers suffering from sleep-wake disturbances during shift work may fall asleep unintentionally at work or while driving home after a night shift. Working in abnormal shifts has significant socio-economic effects because it leads to increased risk of accidents, disability of workers, and a threat to public safety, especially at night [4]. Shift work tolerance is a term used to describe the ability to work in a shift system without experiencing negative effects and the resulting consequences for the body. High shift work tolerance was defined as no digestive problems, persistent fatigue, no nervousness, and no sleep disturbance. Shift work tolerance is measured by fatigue, sleepiness, insomnia, anxiety, and depression. Shift work tolerance is influenced by the individual characteristics of a given employee, working hours, working conditions, family and social conditions, and health [5]. Nursing is one of the professions in which a large proportion of its members work in shifts: daytime, afternoon, and night shift 7 days a week. While some nurses are good at dealing with shifting work, many others face serious problems with this form of work. Shift work of hospital nurses may cause tension and stress, disrupt their family life, interrupt normal eating hours, and affect their satisfaction with work [6].

Especially deterioration of the sleep-wake cycle in healthy people, may be the main cause of many dis-

eases such as premature mortality, obesity, impaired glucose tolerance, diabetes, mental disorders, anxiety, depression and cancer progression, fatigue and loss of life, and concentration [7].

Shift work causes the natural day-night rhythm to be reversed, and the physiological processes are disrupted, which may cause time debt syndrome. Comparing shift workers with day workers, it was found that shift workers are more exposed to the risk of health loss and dysregulation of processes occurring in various systems of the body [8].

AIM OF THE STUDY

The aim of the research was to understand the impact of shift work on the psychosocial health of nurses.

MATERIAL AND METHODS

The research was carried out using the diagnostic survey method, and the research tool was the original questionnaire. The research was carried out among 140 active nurses working in shifts, including night time, employed in health care facilities in the Lesser Poland Voivodeship. Before starting, each person was informed that participation in the study is voluntary and anonymous, and the results will be used only for research purposes. The inclusion criterion was having more than 1 year of work experience and working in a shift system. On the other hand, people working less than one year and working in an 8-hour system were excluded from the study. Respondents received the questionnaire over the Internet via a social networking site or directly to their e-mail address (January-April 2020). The questionnaire included sociodemographic questions and 14 questions written by the author about the impact of working conditions on the respondents' health. A total of 140 properly completed questionnaires were obtained in return. The obtained data were statistically analysed using PQStat software. To verify the adopted research assumptions, the χ^2 test and Spearman's rho correlation analyses were used. Parametric or non-parametric tests were used to analyse quantitative variables. A significance threshold of $p < 0.05$ was adopted in the analysis. Using the Spearman's rank correlation coefficient, the potential strength and direction of dependence of the 2 analysed features were investigated. The research was carried out in accordance with the requirements of the Helsinki Declaration of 2013.

RESULTS

The number of participants in the study was 140. The study group consisted only of women – nurses working in a 2-shift system 100% ($N = 140$).

The 46-55 age group dominated among the respondents. It constituted 40% of all respondents ($n = 56$). The second largest group was the group of respondents between 25 and 35 years of age (29%, $n = 41$). Twenty-two per cent of people who participated in the study between 36 and 45 years of age ($n = 30$). Seven per cent of the respondents ($n = 10$) declared that they were below 25 years of age. The most numerous group were female respondents with a master's degree (51%, $n = 75$). Higher vocational education (bachelor's degree in nursing) was declared by 39% of the surveyed nurses ($n = 54$), while 10% of the respondents did not have higher education (14 of respondents completed medical secondary school). Among the respondents, 24% ($n = 34$) were people with less than 5 years of work experience. Eighteen per cent of the respondents ($n = 25$) had between 5 and 10 years of work experience. Fourteen per cent ($n = 19$) of the surveyed nurses had between 11 and 20 years of work experience, while 32% of the respondents had 21-30 years of work experience ($n = 45$). Over 31 years of work was declared by 12% of respondents ($n = 17$). Most of the study group (75%) were people who lived with their family ($n = 105$). Sixteen per cent of the respondents ($n = 23$) lived with a partner, while 9% of the respondents ($n = 12$) lived alone.

Forty-five per cent of the surveyed nurses always felt weakened and exhausted after the night shift, 40% of the respondents always felt tired and

lacked energy, and 31% of the respondents reported that several times a week they experienced pain in various parts of the body. One-third of the surveyed nurses said that after the night shift, they always analysed what they had done at work and what they had forgotten to do. Detailed data are presented in Table 1.

Among the respondents, 70% definitely agreed with the statement that the day after the night shift is not considered a day off. The same number of people believed that since working in shifts they had noticed a deterioration in their health (31% definitely agreed, 39% rather agreed). Shift work disturbed the everyday family life of 59% of respondents (28% strongly agreed, 31% rather agreed, and 11% strongly disagreed with this statement). Detailed data are presented in Table 2.

Most respondents who had been working in the nursing profession between 11 and 20 years answered the question about the deterioration of their health condition since they worked shifts – 64% of respondents rather agreed with this statement and 32% strongly confirmed this. Forty per cent of respondents working in the profession for 5-10 years disagreed with the thesis posed in the question (16% strongly disagreed and 24% rather disagreed). The occurrence of statistically significant differences between the examined work experience intervals and deterioration of health has not been confirmed ($p = 0.29$).

Table 1. Psychosomatic symptoms experienced by the respondents after night shift work

Answers	1.1. You felt weakened and exhausted	1.2. You had ailments (headache, spine, other parts of the body)	1.3. You felt nervous and tense	1.4. You felt general fatigue and a lack of energy	1.5. You could not concentrate; you could not focus your attention	1.6. You got angry and irritated easily	1.7. You analysed what you did and what you forgot to do on call	1.8. You thought about changing your job	1.9. You usually feel lethargic
	[n]								
Always	63	37	32	56	37	39	44	8	39
Several times a week	35	43	37	31	29	27	23	19	26
Several times a month	20	23	21	26	21	21	23	29	22
Once a week	16	25	32	21	34	29	25	33	28
Once a month	5	6	11	3	7	12	15	15	17
Never	1	6	7	3	12	12	10	36	8
	140	140	140	140	140	140	140	140	140
	[%]								
Always	45	26	23	40	26	28	31	6	28
Several times a week	25	31	26	22	21	19	16	14	19
Several times a month	14	16	15	19	15	15	16	21	16
Once a week	11	18	23	15	24	21	18	24	20
Once a month	4	4	8	2	5	9	11	11	12
Never	1	4	5	2	9	9	7	26	6

n – numerical value, % – percentage value

Table 2. Opinions of the respondents about shift work

Answers	The day after working the night shift is not really a day off	Since I have been working in shifts, I have noticed a deterioration of my health (I am more susceptible to various diseases)	My work interferes with my everyday family life	I have less time for out-of-work and social activities	I feel like I have a narrower circle of friends
	[n]				
I strongly agree	98	43	39	48	38
I rather agree	24	54	44	53	49
I rather disagree	9	34	41	26	28
I strongly disagree	9	9	16	13	25
	140	140	140	140	140
	[%]				
I strongly agree	70	31	28	34	27
I rather agree	17	39	31	38	35
I rather disagree	6	24	29	19	20
I strongly disagree	6	6	11	9	18

n – numerical value, % – percentage value

All groups of respondents, broken down by seniority, to a similar degree (over 70%) noticed less time for out-of-work and social activities. Most often people who had less than 5 years of work experience (78%) agreed with this statement. Respondents with work experience of over 31 years felt the least impact of shift work on their non-work and social life – this was what 42% of people reported (6% strongly disagreed with the statement and 36% rather disagreed). The analysis of the 2 test did not reveal any statistically significant differences between the time devoted to physical activity and work experience ($p = 0.68$).

When asked about comfortable conditions at home to rest after work, 85% of respondents indicated that they had such conditions. Among these people, 40% declared that they always had conditions for rest, and 45% that they had conditions for rest, but rarely. The answer that there are no such conditions was given by 15% of the surveyed nurses. On the other hand, all respondents living alone answered that they had comfortable conditions at home in which to rest after work. Most respondents who lived only with a partner declared that they had such conditions (79% always, 18% rarely). Twenty per cent of respondents living with their families did not have such conditions. Statistically significant differences were found between the way of living and the existence of comfortable conditions for rest after work ($p = 0.004$).

In the study group, 53% of respondents ($n = 75$) caused a dangerous situation on the road when returning from work after night shift. It happened only once in 32% of respondents. Twenty-one per cent of respondents had such an incident more than once. Forty-six per cent of respondents have never participated in such an event. Out of the group of re-

spondents aged 55 years and over, two-thirds of respondents declared that they had never caused a dangerous situation on the road when returning from work. The lack of similar situations on the road was also noted by 70% of people in the group under 25 years of age. On the other hand, almost every third respondent under 25 years old caused such a situation at least once, and every fifth more than once. The χ^2 test did not show any statistically significant relationships between age groups and the creation of dangerous traffic situations ($p = 0.59$). Spearman's correlation analysis confirmed the lack of relationship between both features

When asked "After returning from work, do you analyse what happened at work?" most of the respondents answered in a positive manner – 46% of the respondents replied that they were always analysing what happened at work, and exactly the same number of respondents said yes, but rarely. Only 9% of the respondents answered no. The most common way of coping with stress among respondents was talking to a colleague. This answer was given by 66% of the respondents. Seventeen per cent of the respondents did nothing in this matter, and only 1% of the respondents indicated that they used the help of a specialist. When asked about the relationship between work and private life, 56% of the surveyed nurses answered that their professional life significantly influenced their private life. All respondents aged 55 years and over stated that their professional life significantly influenced their private life. This answer was indicated the least frequently in the group of respondents under 25 years (40%). Among this age group, less than one-third of respondents indicated no relationship between work and private life. All groups except those aged 55 years and over indi-

cated to a similar extent that they sometimes take their work home. These responses ranged in the age groups mentioned between 23% and 36%. There were no statistically significant differences between age groups and the relationship between work and private life ($p = 0.59$).

Sixteen per cent of the nurses assessed their sleep as bad. The largest group (56%) were respondents who assessed their quality as average. Twenty-four per cent of the respondents had a good sleep, and only 4% described their sleep as very good. The least frequently indicated answer by the respondents in various categories of work experience was very good sleep quality, and most often average. Most often, poor quality of sleep was declared by respondents with work experience of 31 years and more and 11-20 years: 24% and 21%, respectively. When analyzing the results of sleep quality depending on the seniority of the respondents, no more than 8% of them indicated very good sleep quality. In the group of respondents working in the profession for 11-20 years, no one indicated very good sleep quality, and only every fifth respondent indicated good sleep quality. In turn, the greatest number, i.e. over 40% of respondents with less than 5 years of work experience, indicated good or very good quality of sleep. There were no statistically significant differences between individual groups of work experience and sleep quality ($p = 0.74$). The results are shown in Figure 1. Spearman's rank analysis showed a relationship between work experience and sleep assessment ($r_s = 0.07$).

DISCUSSION

Shift work affects many aspects of life. It is often performed during hours usually devoted to sleep, which in turn causes many disorders in the functioning of the body of a psycho-physical nature. Working at night is contrary to the natural rhythm of life and the activity of the social environment. Thus, it makes family and social life difficult.

An inseparable element of life satisfaction is the balance between professional and private life. It is important to be able to set boundaries in line with

your values and goals in order to balance your daily life, deciding what is most important, how much time and energy to put into each area and role in your life. The article by Zużewicz [9] discusses the subject of shift work in a positive way, as a method of reconciling work and private life. This conclusion is inconsistent with the research carried out. The analysis of this study shows that the majority of respondents indicated a role conflict between family, social life, and work. As many as 59% of respondents answered that shift work disturbed them in their everyday family life, while 72% of respondents had less time for out-of-work and social activity due to shift work.

In opposition to the presented results, there have also been studies by Szyszka [10], in which, according to more than half of women (56.3%), work brings more benefits than losses to the family. Only a few women disagreed. However, in the article by Szyszka [10], 55.6% of people expressed a lack of time to organize social meetings, and 54% of the respondents complained about a lack of time for their husband, partner, children, and family life, which partially coincides with our research. There were no statistically significant differences between the age groups and the relationship between work and private life ($p = 0.59$).

The participants of the study by Szymańska-Czechór [11] believe that since they started working in a shift system, they had noticed some changes in the functioning of the organism: Among people working in a shift system for 6-15 years – 96.7%, 16-25 years – 81.8%, and over 25 years – 87.1%. These conclusions were confirmed in our study. Each group representing a given work experience mostly agreed with the statement that since they worked in shifts, they noticed a deterioration in their health. The group with the most numerous (95%) answers were people with 11-20 years of work experience.

Sleep disturbances are a common side effect of shift work. Insomnia is not only a problem with falling asleep but also with staying asleep. According to the research by Andrzejewska [12], insomnia affects every fourth person working in the nursing profession. It was shown there that the problem of insomnia did not concern almost 75% of people. This has not been confirmed by the presented results. The analysis of our own research shows that 91% of respondents had difficulty falling asleep, with varying frequency, and 95% with maintaining sleep continuity. However, the article by Kietbasa [13] presents the results of their research, which are partially consistent with the results of the authors' own research. According to this study, 10-95% of night shift workers suffer from sleep disorders, and up to 35-55% of night-only workers.

There is a relationship between the way of living and the existence of comfortable conditions for rest after work ($p = 0.004$), but the statistical analysis

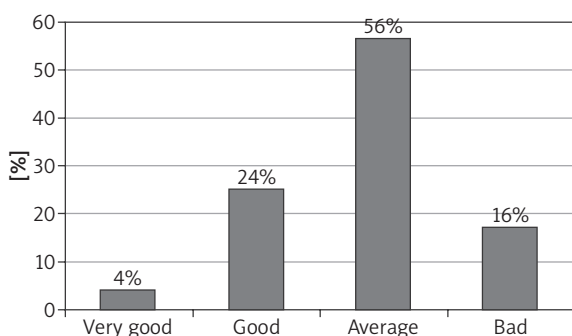


Figure 1. The respondents' opinion on the quality of their sleep

did not find any significant differences between the way of living and the decision to sleep after the shift ($p = 0.75$).

The results show that work has a negative impact on their health and well-being. Most of the respondents noticed a deterioration in their health condition since they started working in shifts. With varying frequency after shifts, they felt exhausted, weakened, often irritable, and without energy. Despite such ailments, over a quarter of the respondents never thought to change their job. This may be because they see the positive aspects of this type of work and the benefits that allow them to continue to do the work in such a system. An example may be better organization of their private time because of the way they work, as 68% of people declared.

The overwhelming majority (as many as 70% of respondents) definitely agreed with the statement that the day after working the night shift is not really a day off. Vitale [14] showed similar conclusions. Most of those interviewed there said they had to spend the day off to recover after working a night shift. This was described by interviewees as a “lost day” or a “recovery day”.

Many people return from work by their own means of transport – most often driving a car. Stress, lack of sleep, and the lack of night rest increase the fatigue of the body and contribute to creating dangerous situations on the road, risking the loss of safety for themselves and other road users. More than half (53%) of respondents admitted that when returning from work it caused a dangerous situation on the road, and 32% of people declared that it happened only once. In total, 85% of the respondents violated road safety due to difficulties in concentrating and staying conscious after a night shift. The study conducted by Vitale [14] drew similar conclusions. Nurses reported falling asleep while driving a car on the way back from a night shift, others admitted falling asleep while waiting at a red light. The effects of exhaustion were felt even when the journey home was short. The χ^2 test did not show any significant statistical relations between age groups and the creation of dangerous traffic situations ($p = 0.59$). A meta-analysis of 24 original studies from 2019 showed that shift work is associated with a change in psychophysical homeostasis and a decrease in employee productivity. It is an obstacle in social and family relationships, and it is also a risk factor for stress, sleep disorders, metabolic disorders, diabetes, cardiovascular diseases, and breast cancer [15]. Gómez-García *et al.* concluded that shift nurses were less confident in their competence to educate patients to take up self-care after discharge from hospital. The most commonly reported nursing negligence concerned nursing care plans. The same studies also found differences in Global Sleep Quality assessment between day and night

shift workers [16]. However, a study by McDowall has shown that low-quality sleep is often associated with both shift and non-shift nurses. Therefore, both groups reported a high level of sleep quality self-esteem, but shift work itself was an independent risk factor for poor sleep [17].

The limitation of the presented research is the small size of the sample and its homogeneity (one gender and profession). This limits the possibility of generalizing the results of the presented research to the population of all shift workers. On the other hand, the strength of this study is the topic of the relationship between work and family among nurses working in a shift system, in particular regarding night work.

CONCLUSIONS

Shift work has a negative impact on the psychosocial health of nurses.

Most of the respondents noticed a deterioration in their health condition since they started working in shifts. With varying frequency after shifts, they felt exhausted, weakened, often irritable, and without energy.

In the opinion of the respondents, the day after working the night shift is not really a day off.

Shift work has both positive and negative effects on the family relationships and private lives of nurses.

There is a relationship between the way of living and the existence of comfortable conditions for rest after work, but no correlation was found between the way of living and the decision to sleep after the shift.

Disclosure

The authors declare no conflict of interest.

References

1. Walentyłowicz-Moryl K. Społeczny wymiar zdrowia. *Relacje. Studia z nauk społecznych* 2016; 1: 71-82.
2. WHO Nursing and Midwifery Progress Report 2008-2012. http://www.who.int/hrh/nursing_midwifery/NursingMidwiferyProgressReport.pdf
3. Fąfara A, Binkowska-Bury M, Januszewicz P. Nocna opieka pielęgnarska – przegląd wybranych problemów pielęgnarskich i pacjentów. *Probl Pielęg* 2015; 23: 520-526.
4. Boivin DB, Boudreau P. Impacts of shift work on sleep and circadian rhythms. *Pathol Biol* 2014; 62: 292-301.
5. Saksvik-Lehouillier I, Bjorvatn B, Hetland H, et al. Individual, situational and lifestyle factors related to shift work tolerance among nurses who are new to and experienced in night work. *J Adv Nurs* 2013; 69: 1136-1146.
6. Ferri P, Guadi M, Marcheselli L, et al. The impact of shift work on the psychological and physical health of nurses in a general hospital: a comparison between rotating night shifts and day shifts. *Risk Manag Healthc Policy* 2016; 9: 203-211.
7. Serin Y, Acar Tek N. Effect of circadian rhythm on metabolic processes and the regulation of energy balance. *Ann Nutr Metab* 2019; 74: 322-330.
8. Zużewicz K. Skutki zdrowotne pracy w niefizjologicznym rytmie. *Zesz Nauk SGSP* 2017; 62: 127-139.

9. Zużewicz M, Zużewicz K. Chronobiologiczne aspekty ryzyka zdrowotnego u pracowników zmianowych nocnych. *Bezpieczeństwo Pracy* 2016; 4: 12-17.
10. Szyszka M. Kobiety między domem a pracą. Oczekiwane wsparcie i instrumenty polityki rodzinnej na rzecz godzenia ról zawodowych z rodzinnymi. *Studia nad Rodziną UKSW* 2015; 1: 135-153.
11. Szymańska-Czechór M, Kędra E. Ocena wpływu pracy zmianowej na stan zdrowia personelu pielęgniarskiego wybranego podmiotu leczniczego-dane jakościowe (część II). *Probl Pielęg* 2017; 25: 191-196.
12. Andrzejewska K, Snarska K, Chorąży M, et al. Występowanie zaburzeń snu wśród personelu pielęgniarskiego. *Medycyna Ogólna i Nauki o Zdrowiu* 2018; 24: 126-132.
13. Kielbasa Ł, Szatkowski B, Wejman M. Wpływ zmianowego systemu pracy na bezpieczeństwo i zdrowie pracownika – zagrożenie czy normalne zjawisko? *Zeszyty Naukowe Politechniki Poznańskiej. Organizacja i Zarządzanie* 2017; 72: 99-116.
14. Vitale S, Jessica Varrone-Ganesh J, Vu M. Nurses working the night shift: Impact on home, family and social life. *J Nurs Educ Pract* 2015; 5: 70-78.
15. Rosa D, Terzoni S, Dellafiore F, Destrebecq A. Systematic review of shift work and nurses' health. *Occup Med* 2019; 69: 237-243.
16. Gómez-García T, Ruzafa-Martínez M, Fuentelsaz-Gallego C, et al.; SYCE and RETICEF Group. Nurses' sleep quality, work environment and quality of care in the Spanish National Health System: observational study among different shifts. *BMJ Open* 2016; 6.
17. McDowall K, Murphy E, Anderson K. The impact of shift work on sleep quality among nurses. *Occup Med* 2017; 67: 621-625.