

SLEEP DISORDERS AMONG WORKERS IN AN ENVIRONMENT WITH HIGH PSYCHOSOCIAL RISK

Marina Samuneva-Zhelyabova¹, Ivaylo Zhelyabov²

¹*Department of Occupational Medicine, Faculty of Public Health
„Prof. Dr. Tz. Vodenicharov”, Medical University—Sofia*

²*Teva Pharmaceuticals*

ABSTRACT

Introduction: Numerous workplaces are related to exposure to high psychosocial risk. Typical example for such employees are the ambulance workers. High proportion of them report serious sleep disorders.

Aim: The aim of our research is to find the frequency of sleep disorders and psychosocial risk factors among ambulance workers and the relationship between them.

Materials and Methods: The study was conducted among 468 workers in 2 emergency healthcare centers. The male participants are 58.3% and 41.7% are female. The distribution by position is: nurses—35.8%, followed by ambulance drivers—26.1%, the doctors are 18.1%, the paramedics—14.2% and the orderlies—5.8%. A sociological method was used—a survey. The statistical methods included descriptive statistics and Chi-square test.

Results: The majority of the participants (70.5%) reported that psychosocial factors like shift work, night shifts, violence, stress, interpersonal conflicts have negative impact on their work. The analysis showed that 69.7% of men and 70.7% of women gave a positive answer to the question. The distribution by position was as follows: 78.8% of paramedics, followed by doctors—73.7%, nurses—71.7%, ambulance workers—67.8%, and orderlies—44.4%. The part of participants who had sleep disorders was 36.3%, from them 35.2% were men and 37.1%—women. The largest is the share of participants with sleep disorders at age over 55 years—41%, according to the distribution by position the majority were physicians—46.4%.

Conclusion: The work of the ambulance workers is stressful, overloaded, and the levels of psychosocial risk factors and sleep disorders among them are high, unhealthy and common. It is necessary to take urgent preventive measures in order to limit them.

Keywords: ambulance workers, psychosocial risk factors, sleep disorders, workers in high psychosocial risk

INTRODUCTION

Numerous workplaces are related to exposure to high psychosocial risk and therefore, a number of researchers have been involved in identifying and assessing psychosocial risk factors (1). Typical example for such employees are ambulance workers. Ambulance personnel face a diversity of stressful events that could potentially be traumatic, putting their health and well-being at risk (2). Emergency medical workers are exposed to a large diversity of situations and have to constantly adapt their actions to the circumstances that they face, making this profession very demanding in several aspects (3). They help critically ill patients and prevent the development of life-threatening complications in severely injured individuals (4). Psychosocial risk factors, together with stress at work, have a significant impact on the health of these workers.

The characteristics of the work of health professionals in emergency healthcare centers define them as working in an environment with extremely high psychosocial risk. The psychosocial factors examined consisted of occupational stressors, sleep disturbance, social conflict, meaning made from the day's challenges, recovery activities, social support, and perceived prosocial impact (5). Emergency medical service (EMS) clinicians are a group of workers where extended shifts, inconsistent shift patterns, poor sleep and fatigue are common (6, 7). Fatigue in the EMS workplace may be related to high patient care loads, demanding work schedules, and associated stress (8). A high proportion of EMS personnel report high levels of work-related fatigue and poor sleep (9).

Good sleep is critical for good health. Epidemiological, clinical, and treatment studies provide strong

support for this proposition. For instance, short sleep duration is associated with increased mortality risk and other important health outcomes (10,11). Sleep deprivation may contribute to the onset of many health issues, including mental health disorders (12,13). Half of EMS workers sleep less than six hours per sleep period and many report poor sleep quality (14). One-third of EMS workers report excessive daytime sleepiness (15) and half report not getting the recovery they need between shifts (16). Instead of Australian study paramedics which work at emergency healthcare centers reported significantly higher levels of depression symptoms, anxiety symptoms, fatigue, posttraumatic stress disorder symptoms, insomnia symptoms, narcolepsy, and significantly poorer sleep quality and general well-being than norms from the general population of Australia and Western countries (17).

AIM

The aim of our research is to explore the of subjective perception and the frequency of sleep disorders and the frequency of subjective perception for psychosocial risk factors among ambulance workers. We will research the relationship between them as well. After that we will study the objective data on diseases caused by sleep disorders and psychosocial risk factors through data from health analyses. Our other aim is to organize measures and activities to limit them.

MATERIALS AND METHODS

A study was conducted among 468 workers in emergency healthcare centers in Bulgaria. Surveys were distributed in 2 district centers, Pazardzhik and Sofia, in the period of 2 years. The respondents from the Sofia region were 58.97% and those from Pazardzhik—41.03%. The male participants were 58.3%, and 41.7% were female. The average age of participants was 50.65 ± 9.45 years. The largest was the share of the surveyed nurses—35.8%, followed by drivers—26.1%, doctors—18.1%, paramedics—14.2%, and orderlies—5.8%. The total length of service was over 10 years for 88% of participants, and 63.6% have been employed in the present position for more than 10 years.

A questionnaire was designed to check the number of answers to the questions related to sleep disorders and with the presence of physical and mental fatigue at the end of the work day. The results of the study were represented by descriptive statistics—absolute (n) and relative (%) frequencies, mean values (mean), and standard deviations (SD). The rela-

tionship between the statements and the demographic characteristics was examined by Chi-square test. Results with significance level $p < 0.05$ were considered statistically significant. Statistical data processing was done by SPSS (Statistical Package for Social Sciences), version 16.

RESULTS

We asked the participants: “Do you think that psychosocial factors like shift work, night shifts, violence, stress, interpersonal conflicts have negative impact for your work?”. The replies to this question showed that 10% of respondents gave a negative answer. Positive answer was given by 70.3%. The distribution by sex showed that 69.7% of the men and 10.7% of the women gave positive answer. Negative answer was given by 8.7% of the men and 11% of the women ($X^2(4)=2.36, p=0.670$) (Fig. 1).

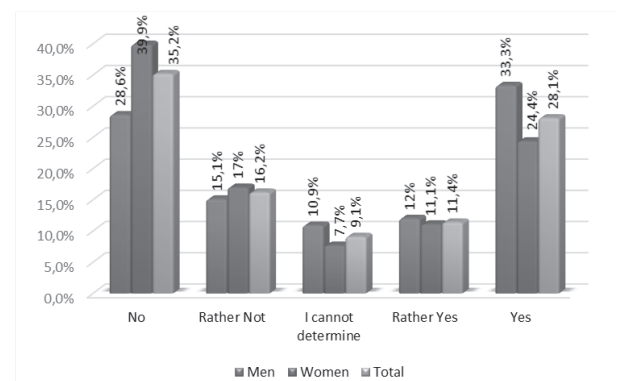


Fig. 1. “Do you think that psychosocial factors like shift work, night shifts, violence, stress, interpersonal conflicts have negative impact for your work?”—distribution by sex

The distribution by job position of replies to the question: “Do you think that psychosocial factors like shift work, night shifts, violence, stress, interpersonal conflicts have negative impact for your work?” showed that positive answer was given by 78.8% of

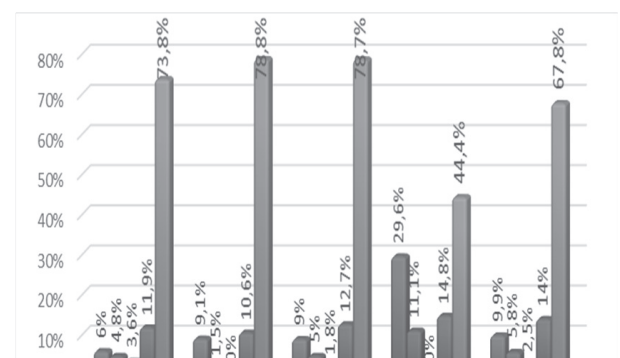


Fig. 2. “Do you think that psychosocial factors like shift work, night shifts, violence, stress, interpersonal conflicts have negative impact for your work?”—distribution by job position

paramedics, 78.7% of nurses, 73.8% of doctors, 67.8% of ambulance drivers, and 44.4% of medical orderlies. Negative answer to the question was given by 29.6% of medical orderlies, followed by ambulance drivers with 9.9%, paramedics with 9.1%, nurses with 9.1%, and doctors with 6% ($p=0.156$) (Fig. 2).

Presence of sleep disorders was observed among 36.3% of the participants. Negative answer was given by 33.3%. The distribution of the answers of the question by sex showed that 35.2% of the men and 37.1% of the women gave a positive answer. Negative answer was given by 32.4% of the men and 33.3% of the women ($X^2(4)=1.20, p=0.878$).

Sleep disturbances were present in 31.3% of the respondents aged up to 35 years, 35.2% in the 36–45 age group, 32.8% of those aged 46–55 years, and in 41% of those over 55 years old. A negative answer to the question was given by 21.9% of the respondents aged up to 35 years, 31.8% of those aged 36–45 years, 40% of those in the 46–55 age group, and 28.8% of those over 55 years. In analyzing the relationship between the respondents' age group and the answers to the sleep problem, we found a statistical dependence $p=0.112$ (Fig. 3).

We found the link to suffering from disturbed sleep and both areas to be statistically significant ($X^2(4)=12.612, p=0.013$). The share of respondents giving a positive response from both areas was almost the same—36.3% for the Pazardzhik region and 36.4% for the Sofia region. Negative response was given by 35.8% of the respondents from Pazardzhik region and 31.6% of those from the Sofia region.

When analyzing the distribution of answers to the question, it was noteworthy that 46.4% of physicians suffered from impaired sleep, followed by nurses with 38%, paramedics with 36.9%, ambulance drivers with 28.3%, and orderlies with 22.2%. A negative response was given by 45.8% of drivers and 19% of doctors. In the analysis of the relationship between the position of the workers and the disturbed sleep, we found statistical significance ($X^2(16)=28.851, p=0.025$) (Fig. 3).

We researched the relationship between sleep disorders and the impact of psychosocial risk factors on

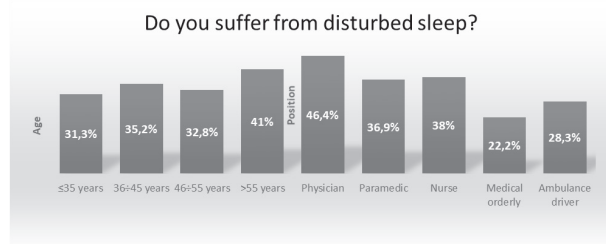


Fig. 3. "Do you suffer from disturbed sleep?"—distribution by age and by position

workers' health. The results showed that 43.3% of the respondents gave a positive answer to both questions, and 55.3% gave a negative answer. Participants who believed that psychosocial factors posed a risk to their physical health but did not suffer from sleep disorders were 30.7%. The share of sufferers of impaired sleep who did not believe that psychosocial factors posed a risk to their physical health was 25.5%. The contingency ratio was 0.308 and the relationship was moderately significant $p<0.001$ (Fig. 4).

The objective data which we used were the data from health analyses—from mandatory routine pre-

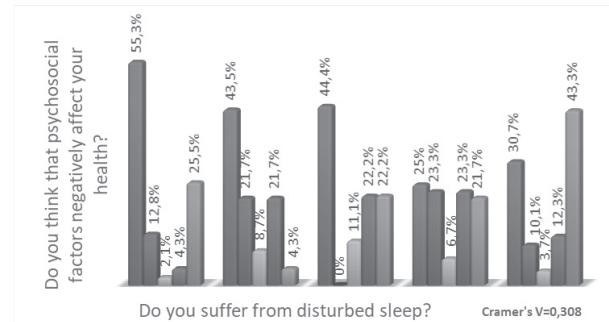


Fig. 4. Relation between sleep disorders and the impact of psychosocial risk factors on workers' health

ventive exams and from temporary incapacity for work for a 5-year period—2015–2019.

The data from the mandatory health examinations for a 5-year period from two healthcare centers showed that among the discovered diseases at the prophylactic examinations the diseases of the cardiovascular system, of the eye and its appendages, the diseases of the endocrine system, and those of the musculoskeletal system prevailed. It was not an exception for more than one disease to be detected in one employee.

The data from temporary incapacity for work from the emergency healthcare centers (EHCCs) in Pazardzhik and Sofia showed that for the whole period the same share of the diseases with temporary incapacity was observed. Most absences were due to diseases of the respiratory system, followed by diseases of the nervous system and musculoskeletal system, and in third place were diseases of the cardiovascular system.

The differences between the frequency, the number of days of labor loss, and the average duration of the hospital stay can be seen in Table 1 and Table 2. For this period of time the frequency of issuing sick leave in EHCC in Pazardzhik is lower (by about half) compared to that in EHCC in Sofia. The average duration of the sick leave in EHCC Pazardzhik is 2–3 times longer than the average duration in EHCC Sofia concerning the same period of time. The labor

loss in terms of days was not significant, because the workers in EHCC Sofia were three times more numerous than those in EHCC Pazardzhik.

DISCUSSION

Table 1. Data for temporary incapacity for work for EHCC Pazardzhik

	Frequency	Labor Loss (Number of Days)	Average Duration
2015	56.62	3734	26.11
2016	72.51	3165	17.39
2017	61.66	2333	14.58
2018	63.45	2962	18.75
2019	59.72	3191	20.99

Table 2. Data for temporary incapacity for work for EHCC Sofia

	Frequency	Labor Loss (Number of Days)	Average Duration
2015	137.01	2210.6	7.69
2016	176.16	2195	7.74
2017	140.96	1528.5	7.42
2018	140.42	1705.38	7.44
2019	125.09	14829	13.96

Emergency workers have a vital role in our society. Studies have consistently shown that emergency workers are one of the most valued and trusted professional groups (18).

The biggest share of respondents who had sleep disorders is in the age group over 55; also the levels of sleep disorders were higher among physicians. For disturbed sleep, the significant predictors were female gender, age above 49 years, present illness, hectic work, physically strenuous work, and shift work (19). Sleep deprivation can affect short-term memory and performance speed; studies of the neuropsychiatric function in shift workers or night shift workers have shown that attention and cognitive speed decrease in these subjects (20). The sleep, which correlates with high work demands, the inability to stop thinking about work (21) and the need for recovery are stronger predictors of poor mental health than workload.

The analysis of objective data from our study showed high levels of diseases and number of labor day losses. Sleep disorders can lead to an increased risk

of health problems, memory disorders, reduced ability to work. Even those who claim that they do not have difficulty working in shifts in most cases suffer from sleep disorders. The main diseases caused by sleep disorders are: psychiatric diseases, cardiovascular diseases, development of oncological diseases, diabetes, obesity, and others (22,23,24,25,26,27). The psychosocial risk factors are also predictors of these diseases. In our case these factors were mutually intensifying and thus the levels of these diseases were higher.

In a Japanese population, long sleep duration among the elderly with poor sleep quality is associated with a higher risk of mortality linked to cardiovascular disease (22,28). A similar trend was also observed in aged American Indians (22,29). The results of our study confirmed these data. The share of diseases of the cardiovascular system is very large. The data from the temporary working capacity showed that the most numerous were the diseases of the respiratory system, followed by the diseases of the nervous system and in the third place were the diseases of the cardiovascular system. Given that the diseases of the respiratory system include seasonal viral infections, we can conclude that the share of diseases of the cardiovascular system and temporary incapacity are in the forefront.

CONCLUSION

Measurement of psychosocial risk factors and sleep disorders among emergency healthcare workers is challenging. The main purpose of this study was to examine the levels of psychosocial risk factors and the levels of sleep disorders among emergency healthcare workers and the dependence between them, and to propose measures to limit them.

The results from this study suggest that the psychosocial factors and sleep disorders among emergency healthcare workers are at high and unhealthy levels. The measures for health and safety of the emergency healthcare workers should be considered and compliant according to these results. We have prepared preventive measures to limit the psychosocial risk factors like shift work, night shifts, violence, stress, interpersonal conflicts, and sleep disorders among the employees in emergency healthcare centers in Bulgaria.

REFERENCES

1. Khaghanizadeh, M., Ebadi, A., and Rahmani, M. The study of relationship between job stress and quality of work life of nurses in military hospitals. *Journal Mil Med* (2008). 10 (3), 175-184;
2. Oliveira A. C., Neto F., Teixeira F., Maia A., Working in prehospital emergency contexts : Stress, coping and support from the perspective of ambulance personnel, *International Journal of Workplace Health Management*, Volume 12, Number 6, 2019, pp. 469-482(14), <https://doi.org/10.1108/IJWHM-01-2019-0004>;
3. Davison C., Cotrim T.P., Gonçalves S. (2019) Analysis of Socio-Demographic, Lifestyle and Psychosocial Risk Factors Among a Sample of Portuguese Emergency Medical Technicians. In: Cotrim T., Serranheira F., Sousa P., Hignett S., Albolino S., Tartaglia R. (eds) *Health and Social Care Systems of the Future: Demographic Changes, Digital Age and Human Factors*. HEPS 2019. *Advances in Intelligent Systems and Computing*, vol 1012. Springer, Cham. https://doi.org/10.1007/978-3-030-24067-7_8;
4. Ward CL, Lombard CJ, Gwebushe N. Critical incident exposure in South African emergency services personnel: prevalence and associated mental health issues. *Emerg Med J*. 2006;23:226–231. doi: 10.1136/emj.2005.025908;
5. Hruska B., Barduhn M. S., Dynamic psychosocial risk and protective factors associated with mental health in Emergency Medical Service (EMS) personnel, *Journal of Affective Disorders*, Volume 282, 2021, Pages 9-17, ISSN 0165-0327, <https://doi.org/10.1016/j.jad.2020.12.130>;
6. Bauder B: Safety fears rise with city's use of overtime. *Pittsburgh Tribune-Review*. 2012, Pittsburgh, PA: The Tribune-Review Publishing Company, B1-B7;
7. Patterson PD, Weaver MD, Frank RC, Warner CW, Martin-Gill C, Guyette FX, et al. Association Between Poor Sleep, Fatigue, and Safety Outcomes in Emergency Medical Services Providers. *Prehosp Emerg Care*. 2012 Jan-Mar;16(1):86-97. (PubMed) (Crossref);
8. Boudreaux E, Jones GN, Mandry C, Brantley PJ. Patient Care and Daily Stress Among Emergency Medical Technicians. *Prehosp Disaster Med*. 1996 Jul-Sep;11(3):188-93; discussion 193-4. (PubMed) (Crossref);
9. Barger LK, Runyon MS, Renn ML, Moore CG, Weiss MP, Condlie JP, et al. Effect of Fatigue Training on Safety, Fatigue, and Sleep in Emergency Medical Services Personnel and Other Shift Workers: A Systematic Review and Meta-Analysis. *Prehosp Emerg Care*. 2018 Feb 15;22(sup1):58-68. (PubMed) (Crossref);
10. Cappuccio FP, D'Elia L, Strazzullo P, Miller MA. Sleep Duration and All-Cause Mortality: A Systematic Review and Meta-Analysis of Prospective Studies. *Sleep*. 2010 May; 33(5):585-92. (PubMed) (Crossref);
11. Itani O, Jike M, Watanabe N, Kaneita Y. Short Sleep Duration and Health Outcomes: A Systematic Review, Meta-Analysis, and Meta-Regression. *Sleep Med*. 2017 Apr;32:246-56. (PubMed) (Crossref);
12. Fernandez-Mendoza, J.; Vgontzas, A.N. Insomnia and its impact on physical and mental health. *Curr. Psychiatry Rep*. 2013, 15, 418. (Google Scholar) (CrossRef) (PubMed);
13. Khan W. A. A., Conduit R., Kennedy G. A., et al, Sleep and Mental Health among Paramedics from Australia and Saudi Arabia: A Comparison Study, *Clocks & Sleep* 2020, 2(2), 246-257; <https://doi.org/10.3390/clockssleep2020019>;
14. Caruso CC. Negative Impacts of Shiftwork and Long Work Hours. *Rehabil Nurs*. 2014 Jan-Feb;39(1):16-25. (PubMed) (Crossref);
15. Pirrallo RG, Loomis CC, Levine R, Woodson BT. The Prevalence of Sleep Problems in Emergency Medical Technicians. *Sleep Breath*. 2012 Mar;16(1):149-62. (PubMed) (Crossref);
16. Patterson PD, Buysse DJ, Weaver MD, Callaway CW, Yealy DM. Recovery Between Work Shifts Among Emergency Medical Services Clinicians. *Prehosp Emerg Care*. 2015 Jul-Sep;19(3):365-75. (PubMed) (Crossref);
17. Khan W. A. A., Conduit R., Kennedy G. A., Jackson M. L., The relationship between shift-work, sleep, and mental health among paramedics in Australia, *Sleep Health*, Volume 6, Issue 3, 2020, Pages 330-337, ISSN 2352-7218, <https://doi.org/10.1016/j.sleh.2019.12.002>;
18. Risks to health and safety at work in the health sector, Guide to Prevention and Good Practices European Commission Directorate-General for Employment, Social Affairs and Inclusion Department B. ISBN 978-92-79-26822-9 doi:10.2767/77477 © European Union, 2013 /in Bulgarian/;
19. Akerstedt T, Fredlund P, Gillberg M, Jansson B. Work Load and Work Hours in Relation to Disturbed Sleep and Fatigue in a Large Representative Sample. *J Psychosom Res*. 2002 Jul;53(1):585-8. (PubMed) (Crossref);
20. Sofianopoulos S, Williams B, Archer F. Paramedics and the effects of shift work on sleep: a literature review. *Emerg Med J*. 2012;29:152-155;
21. Akerstedt T. Shift Work and Disturbed Sleep/Wakefulness. *Occup Med (Lond)*. 2003 Mar;53(2):89-94. (PubMed) (Crossref);

22. Gulia K. K., Kumar V. M., Sleep disorders in the elderly: a growing challenge, *Psychogeriatrics*, The official journal of the Japanese psychogeriatric Society, Volume 18, Issue 3, May 2018, Pages 155-165, <https://doi.org/10.1111/psyg.12319>;
23. Moraes W, Piovezan R, Poyares D, Bittencourt LR, Santos-Silva R, Tufik S. Effects of aging on sleep structure throughout adulthood: a population-based study. *Sleep Med* 2014; 15: 401– 409;
24. Peppard PE, Young T, Barnet JH. Increased prevalence of sleep-disordered breathing in adults. *Am J Epidemiol* 2013; 177: 1006– 1014;
25. Akbaraly TN, Jaussent I, Besset A et al. Sleep complaints and metabolic syndrome in an elderly population: the three-city study. *Am J Geriatr Psychiatry* 2015; 23: 818– 828;
26. Strand LB, Carnethon M, Biggs ML et al. Sleep disturbances and glucose metabolism in older adults: the cardiovascular health study. *Diabetes Care* 2015; 38: 2050– 2058;
27. Silber MH. Autoimmune sleep disorders. *Handb Clin Neurol* 2016; 133: 317– 326.
28. Suzuki E, Yorifuji T, Ueshima K et al. Sleep duration, sleep quality and cardiovascular disease mortality among the elderly: a population-based cohort study. *Prev Med* 2009; 49: 135– 141;
29. Sabanayagam C, Shankar A, Buchwald D, Goins TR. Insomnia symptoms and cardiovascular disease among older American Indians: the Native Elder Care Study. *J Environ Public Health* 2011; 2011: 964617.

Address for correspondence:

*Marina Samuneva-Zhelyabova
Department of Occupational Medicine
Faculty of Public Health
„Prof. Dr. Tz. Vodenicharov“
Medical University—Sofia
8 Byalo More St
Sofia
e-mail: msamuneva@gmail.com*