

Original scientific article / Izvirni znanstveni članek

Sleep deprivation and burnout syndrome among pre-hospital emergency medical service employees in Slovenia: A cross-sectional study

Deprivacija spanja in sindrom izgorevanja med zaposlenimi v predbolnišničnih enotah nujne medicinske pomoči v Sloveniji: presečna raziskava

Marko Vladič¹, Aljaž Kren^{2,3,*}

Key words: sleep; quality; sleep deprivation; burnout; emergency medical services

Ključne besede: spanje; kakovost; pomanjkanje spanja; izgorelost; nujna medicinska pomoč

¹ Community Health Centre Novo mesto, Kandijska cesta 4, 8000 Novo mesto, Slovenia

² Community Health Centre Črnomelj, Delavska pot 4, 8340 Črnomelj, Slovenia

³ University of Novo mesto, Faculty of Health Sciences Novo mesto, Na loko 2, 8000 Novo mesto, Slovenia

* Corresponding author / Korespondenčni avtor: aljaz.kren@gmail.com

The article is based on the diploma work by Marko Vladič *Sleep deprivation among medical service workers in southeast Slovenia* (2019).

ABSTRACT

Introduction: Sleep deprivation and burnout are common in employees who work in shifts, night shifts, overtime as well as those who work under stressful and unpredictable circumstances. The purpose of the study was to explore the quality of sleep, determine burnout level components and investigate the level of these components and their impact on the quality of sleep among employees in pre-hospital emergency medical services.

Methods: A quantitative non-experimental research method was used. Data were collected using a standardized Pittsburgh sleep quality index questionnaire and a standardized Maslach burnout inventory questionnaire. The survey was completed by 204 healthcare professionals. Data were analyzed with univariate and bivariate statistics.

Results: The average Pittsburgh Sleep Quality Index score was 4.97, $s = 3.23$. Poorer quality of sleep is exhibited by female respondents (57.4 %), respondents who are employed in more overloaded pre-hospital emergency service units (52.3 %) and those who work 24 hours or more (67.7 %). Overall, 17.6 % respondents exhibited high emotional exhaustion, 32.8 % exhibited high depersonalization and 9.3 % exhibited low personal accomplishment. A weak correlation was present between sleep quality and emotional exhaustion ($r = 0.381, p < 0.01$), depersonalization ($r = 0.293, p < 0.01$) and personal accomplishment ($r = 0.368, p < 0.01$).

Discussion and conclusion: Healthcare professionals represent a vulnerable group that is subject to poor sleep quality and burnout syndrome, therefore, the need for empowering them in terms of proper sleep hygiene and burnout prevention is indicated.

IZVLEČEK

Uvod: Deprivacija spanja in izgorelost sta pogosta pojava med delavci, ki opravljajo izmensko, nočno, nadurno in stresno delo v nepredvidljivih okoliščinah. Namen raziskave je bil raziskati kakovost spanja, ugotoviti stopnjo komponent izgorevanja in njihov vpliv na kakovost spanja med zaposlenimi v predbolnišnični nujni medicinski pomoči.

Metode: Uporabljena je bila kvantitativna neeksperimentalna metoda raziskovanja. Podatke smo zbrali s standardiziranim vprašalnikom *Pittsburgh sleep quality index* ter s standardiziranim vprašalnikom za izgorelost *Maslach burnout inventory*. Vprašalnika so izpolnili 204 zaposleni v predbolnišnični nujni medicinski pomoči. Podatki so statistično obdelani z uporabo univariantne in bivariantne statistike.

Rezultati: Povprečna ocena *Pittsburgh Sleep Quality Indexa* znaša 4,97, $s = 3,23$. Slabšo kakovost spanja ugotavljamo pri anketirancih ženskega spola (57,4 %) in anketirancih, ki so zaposleni v bolj obremenjenih enotah predbolnišnične nujne medicinske pomoči (52,3 %), ter pri tistih, ki opravljajo 24- ali večurno delo (67,7 %). Pri 17,6 % anketirancev ugotavljamo visoko stopnjo čustvene izčrpanosti, 32,8 % anketirancev izkazuje visoko stopnjo depersonalizacije, 9,3 % anketirancev pa nizko stopnjo osebne izpolnitve. Med kakovostjo spanja in emocionalno izčrpanostjo ($r = 0.381, p < 0.01$), depersonalizacijo ($r = 0.293, p < 0.01$) in osebno izpolnitvijo ($r = 0.368, p < 0.01$) ugotavljamo šibko pozitivno povezanost.

Diskusija in zaključek: Zdravstveni delavci predstavljajo ranljivo skupino, ki je podvržena slabi kakovosti spanja in sindromu izgorevanja, zato se nakazuje potreba po njihovem opolnomočenju glede ustrezne higiene spanja ter preprečevanja izgorevanja.



Received / Prejeto: 24. 6. 2020
Accepted / Sprejeto: 17. 10. 2021

Introduction

The potential health impact of insufficient sleep duration was first reported in the 1960s, when a general population survey of over one million adults found that individuals who reported sleeping fewer than 7 hours per night had increased mortality rates compared to those sleeping 7 to 8 hours per night (Hammond, 1964). Sleeping less than 7 hours per night on a regular basis is associated with adverse health outcomes, including weight gain and obesity, diabetes, hypertension, heart disease and stroke, and depression. It also represents an increased risk of death. Sleeping less than 7 hours per night is also associated with an impaired immune function, increased pain, impaired performance, increased number of errors, and greater risk of accidents (Watson et al., 2015). Sleep deprivation is associated with the dysfunction of cardiovascular systems, disturbed metabolism, impaired memory and cognition and it may slow down the response time in unexpected and urgent situations. Moreover, it also affects the quality of communication with patients (Mukherjee et al., 2015; Javaheri et al., 2018).

Numerous studies have found that healthcare professionals perform at less than the recommended 7 hours on average and can, therefore, be exposed to all of the above-mentioned complications and consequences of sleep deprivation. Alshahrani, Baqays, Alenazi, AlAngari, & AlHadi (2017), found that 46 % healthcare shift workers reported that they sleep less than 6 hours which indicates short sleep duration. Adverse effects of insufficient sleep are not limited to an individual level but extend to the community and insufficient sleep of a population is associated with substantial economic losses, and adverse effects on the economic output and labour productivity. It is estimated that up to 680 billion USD is lost each year across five Organisation for Economic Co-operation and Development (OECD) countries due to insufficient sleep (Hafner, Stepanek, Taylor, Troxel, & Van Stolk, 2017).

Shift work has substantial negative effects on long-term health (Honn, Garde, Fischer, & Van Dongen, 2016). Prolonged exposure to shift work, particularly to irregular night shifts, has been associated with an increased risk of depression, higher risks of obesity, migraine, cardiovascular diseases, myocardial infarction, hypertension, diabetes and breast cancer (Brum, Dantas Filho, Schnorr, Bottega, & Rodrigues, 2015; Kuo et al., 2015; Lin et al., 2015; Lee et al., 2017). Another study that was conducted in northern Norway and included 1,968 nurses, showed a connection between night shift work and poor sleep quality (Jensen et al., 2016). Sleep deprivation due to night shift work is associated with poorer general well-being, fatigue and decreased capacity to work (Peršolja, Mišmaš, & Jurdana, 2018).

Sleep deprivation and burnout are widespread in healthcare professionals, affecting not only nurses but also medical students, physicians-in-training, and practicing physicians (Stewart & Arora, 2019). The frontline health workforce is experiencing a high workload and multiple psychosocial stressors which may affect their mental and emotional health, leading to burnout symptoms (Sultana, Sharma, Hossain, Bhattacharya, & Purohit, 2020).

Healthcare professionals often experience heavy workload, strict organisational regulations, and insufficient time to cope with occupational challenges, a rapidly evolving knowledge base, and a lack of interpersonal support in everyday life (De Simone, Vargas, & Servillo, 2021). These challenges often lead to "emotional exhaustion," when a person feels overwhelmed and lacks the energy to accomplish a task. "Depersonalisation" may follow emotional exhaustion, where a person may cynically treat others as objects. Also, a diminished sense of self-efficacy and competence affect the emotional wellbeing of an individual. Thus, emotional exhaustion, depersonalisation, and a decreased sense of personal accomplishments characterise burnout, which is a growing concern of the healthcare community globally (Sultana et al., 2020). A systematic review found that burnout scores for emotional exhaustion ranged from 31 % to 54.3 %, depersonalisation from 17.4 % to 44.5 %, and low personal accomplishment from 6 % to 39.6 % among doctors in the UK (Imo, 2017). Another meta-analytic review found that 11.23 % of participating nurses experienced burnout globally (Woo, Ho, Tang, & Tam, 2020). Recent studies have shown that poor sleep quality and sleep deprivation also affect emotional empathy. Paramedics who have been involved in the job for at least 3 years already show signs of loss of empathic ability and emotional burnout. This effect is mostly due to the poor quality of sleep of paramedics due to their shift work rather than depression or previous traumatic experience (Guadagni, Burles, Ferrara, & Iaria, 2014; Guadagni, Cook, Hart, Burles, & Iaria, 2018).

Aims and objectives

The aim of the study was to explore the quality of sleep among employees in pre-hospital emergency medical services, determine the recurrence of burnout in connection to three components (emotional exhaustion, depersonalization and personal accomplishment), and to investigate the impact of the level of these components on sleep quality. Therefore, three research questions were presented:

- What is the quality of sleep among employees in pre-hospital emergency medical services?
- What is the level of emotional exhaustion, depersonalization and personal accomplishment among employees in pre-hospital emergency medical services?

- How is the level of emotional exhaustion, depersonalization and personal accomplishment associated with sleep quality?

Methods

A descriptive and causal non-experimental method of empirical research was used. A structured self-administered questionnaire was the chosen research instrument.

Description of the research instrument

Data were collected by using a standardized self-administered questionnaire divided into three sections. The first section covered sociodemographic data (sex, age, education, children under 6, body mass index), professional characteristics (type of organizational unit, experience in emergency medical services, work rhythm, night shift napping) and lifestyle (smoking of tobacco, alcohol consumption).

The second part evaluated sleep deprivation using the Pittsburgh Sleep Quality Index (PSQI), which is an effective instrument used to measure the quality and patterns of sleep in older adults. It differentiates "poor" from "good" sleep by measuring seven areas: subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleeping medication and daytime dysfunction over the last month. The respondent self-rates each of these seven areas of sleep. Scoring of answers is based on a 0 to 3 scale, where 3 reflects the negative extreme on the Likert scale. A global sum of 5 or greater indicates a "poor" sleeper. The PSQI has internal consistency and a reliability coefficient (Cronbach's alpha) of 0.83 for its seven components. Reliability coefficient of Slovenian PSQI version was 0.82 for its seven components.

The last section evaluates burnout syndrome using the Slovenian version of the Maslach Burnout Inventory (MBI) questionnaire (Lamovec, 1994). The MBI-HSS consists of 22 items that measure burnout in terms of emotional exhaustion (EE) (nine items), depersonalization (DP) (five items) and personal accomplishment (PA) (eight items). It also has two scales: Frequency and Intensity. Frequency is measured on a seven-point Likert's scale anchored by never (0) and every day (6). The scores can range from 0 to 54 on the EE subscale, from 0 to 30 on the DP subscale, and from 0 to 48 on the PA subscale. Intensity is measured on an eight-point Likert's scale anchored by barely noticeable (0) and very strong (7). The scores can range from 0 to 63 on the EE subscale, from 0 to 35 on the DP subscale, and from 0 to 56 on the PA subscale. Higher mean scores on the EE and DP subscales correspond to higher levels of burnout, whereas lower mean scores on the PA subscale correspond to higher levels of burnout (Maslach & Jackson, 1996). Internal consistency was estimated by Cronbach's coefficient

alpha ($n = 1.316$). The reliability of the subscales was as follows: 0.90 for EE, 0.79 for DP, and 0.71 for PA (Maslach, Jackson, Leiter, Schaufeli, & Schwab, 1986). Internal consistency of the Slovenian version of MBI was 0.90 for EE, 0.76 for DP, and 0.76 for PA.

Description of the research sample

The study included 204 respondents. Most of them (66.7%) were male. The majority (54.4%) were between 25 and 39 years old. Nursing staff comprises the largest occupational group (75.4%). More than half (53.4%) have had experience in emergency medical services at ≤ 10 years. 60.8% of respondents are overweight. 72.5% of respondents do not have children or their children are older than 6 years. Smokers represented 32.8% and alcohol users represented 48% of the professionals surveyed. The majority (83.8%) perform shift work, 63.7% work 24 hours or more, if necessary. Most (85.8%) respondents can take a nap during night shift. 75% of respondents are employed in emergency medical units with a higher workload.

Description of the research procedure and data analysis

Before conducting the research, we obtained an official consent from the Department of Medicine – University of Pittsburgh for applying the Pittsburgh Sleep Quality Index. The Maslach Burnout Inventory (MBI) is freely available online for research purposes. The linguistic equivalence of the questionnaire for pre-hospital emergency medical service employees was established via translation and back translation by two independent bilingual professional translators. The translators were informed about the purpose of the instrument. Finally, the questionnaire was reviewed by a panel of experts consisting of a language teacher and two experts in the analysed field to determine whether the concepts expressed in Slovene and English conveyed the same meaning.

We informed the heads of individual units of nineteen pre-hospital emergency medical services about the manner and purpose of conducting the research. We also obtained all the necessary permits to conduct the research in individual health centres in Slovenia. Questionnaires in printed form were sent to the heads of individual units who then distributed them to employees in pre-hospital emergency medical services in accordance with a prior agreement regarding the target population. Respondents returned the questionnaire into an envelope equipped with a stamp and the researcher's address. Participation in the survey was voluntary and the questionnaire was anonymous.

The study was conducted from 1 February to 31 May 2019. The analysis was conducted by using SPSS ver. 20 (IBM, SPSS Inc., Chicago, IL, USA). In addition

to the basic descriptive statistics, Chi Square test was applied to identify any significant differences between the demographic / work-related characteristics of the sample in conjunction with sleep quality. To identify any significant differences between burnout in terms of EE, DP, PA and demographic / work-related characteristics and burnout in terms of EE, DP, PA Chi Square test or Likelihood Ratio was applied. Pearson correlation analysis was applied to determine the relationship between sleep quality and burnout in terms of EE, DP, PA. Statistical significance was set at $p < 0.05$.

Results

As depicted in Table 1, none of the studied variables, such as basic socio-demographic or work-related characteristics, were significantly associated with sleep quality. The global PSQI score was 4.97 ($s = 3.23$). However, the observed sample indicates that 48.5 % of respondents have poor sleep quality ($n = 99$) and that women (57.4 %) sleep more poorly than men (44.1 %). Most registered nurses commonly experience poor sleep quality (40.4 %) followed by medical technicians

Table 1: Comparison of the pre-hospital emergency medical services personnel with good ($n=105$) and poor ($n=99$) sleep quality according to the Pittsburgh Sleep Quality Index (PSQI)

Tabela 1: Primerjava zaposlenih v predbolnišnični nujni medicinski pomoči z dobro ($n=105$) in slabo ($n=99$) kakovostjo spanja glede na Pittsburgh Sleep Quality Index (PSQI)

Variables / Spremenljivke	n (%)		χ^2	p
	Good / Dobro (PSQI<5)	Poor / Slabo (PSQI≥5)		
Gender			3.179	0.075
Male	76 (37.3)	60 (29.4)		
Female	29 (14.2)	39 (19.1)		
Occupation			2.457	0.293
Medical technician	45 (22.1)	32 (15.7)		
Registered nurse	37 (18.1)	40 (19.6)		
Physician	23 (11.3)	27 (13.2)		
Experience in EMS			0.001	0.977
5–10 years	56 (27.5)	53 (26.0)		
>10 years	49 (24.0)	46 (22.5)		
Body mass index			0.003	0.960
Normal Range	41 (20.1)	39 (19.1)		
Overweight	64 (31.4)	60 (29.4)		
Children < 6 years			0.136	0.712
Yes	30 (14.7)	26 (12.7)		
No	75 (36.8)	73 (35.8)		
Tobacco smoking			0.196	0.658
Yes	33 (16.2)	34 (16.7)		
No	72 (35.3)	65 (31.9)		
Alcohol consumption			0.163	0.686
Alcohol abstinence	56 (27.5)	50 (24.5)		
Non-abstinence	49 (24.0)	49 (24.0)		
Type of work			0.570	0.450
Work only day shift	15 (7.4)	18 (8.8)		
Work rotating shift	90 (44.1)	81 (39.7)		
24 hour shift or more			1.299	0.254
Yes	63 (30.9)	67 (32.8)		
No	42 (20.6)	32 (15.7)		
Night shift napping (hours)			0.692	0.406
With napping	88 (43.1)	87 (42.6)		
Without napping	17 (8.3)	12 (5.9)		
Type of organizational unit			3.461	0.063
Small	32 (15.7)	19 (9.3)		
Big	73 (35.8)	80 (39.2)		

Legend / Legenda: n – number / število; % percentage / odstotek; χ^2 – Chi Square test / Hi kvadrat test; p – statistical significance / statistična značilnost

(32.3 %) and finally physicians (27.3 %). Poor sleep quality is exhibited by 67.7 % of respondents who work 24 hours a day. Respondents who have a nap during night shift work, report a better quality of sleep (50.3 %). In conclusion, we have found that more respondents who are employed in more overloaded emergency medical service units have a poorer quality of sleep (52.3 %) compared to those who work in less overloaded emergency medical services (37.3 %).

As observed in Table 2 and 3, female healthcare professionals exhibited a higher EE ($\bar{x} = 3.09, s = 0.72$) compared to males ($\bar{x} = 2.65, s = 0.69, p = 0.012$). Moreover, female employees exhibited a higher DP

($\bar{x} = 3.36, s = 0.75$) compared to males ($\bar{x} = 2.99, s = 0.79, p = 0.038$). On the other hand, male employees exhibited a lower PA ($\bar{x} = 2.54, s = 0.81$) compared to females ($\bar{x} = 2.80, s = 0.66, p = 0.012$).

Physicians were the most affected by a high level of EE ($\bar{x} = 3.18, s = 0.81, p = 0.050$) and DP ($\bar{x} = 3.36, s = 0.77, p = 0.025$). Medical technicians were mostly affected by a low level of PA ($\bar{x} = 2.48, s = 0.71, p = 0.024$). Employees who have worked in emergency medical services for more than 10 years, exhibited a higher EE ($\bar{x} = 2.85, s = 0.76$) compared to employees who have been working in the same field for less than 10 years ($\bar{x} = 2.75, s = 0.70, p = 0.039$).

Table 2: Level of emotional exhaustion, depersonalization and personal accomplishment among emergency medical services personnel

Tabela 2: Stopnja emocionalne izčrpanosti, depersonalizacije in osebne izpolnitve zaposlenih v predbolnišnični nujni medicinski pomoči

Maslach burnout inventory / Maslach vprašalnik izgorelosti	Emotional exhaustion / Čustvena izčrpanost			Depersonalization / Depersonalizacija			Personal accomplishment / Osebna izpolnitev		
	Low / Nizko	Moderate / Zmerno	High / Visoko	Low / Nizko	Moderate / Zmerno	High / Visoko	Low / Nizko	Moderate / Zmerno	High / Visoko
n	5	163	36	7	130	67	19	159	26
%	2.5	79.9	17.6	3.4	63.7	32.8	9.3	78	12.8

Legend / Legenda: n – number / število; % - percentage / odstotek

Table 3: Relationship between demographic and occupational characteristics and Maslach Burnout Inventory subscale

Tabela 3: Odnos med demografskimi in poklicnimi karakteristikami ter izgorelostjo na treh dimenzijah

Parameter / Spremenljivka	Emotional exhaustion / Čustvena izčrpanost		Depersonalization / Depersonalizacija		Personal accomplishment / Osebna izpolnitev	
	χ^2	p	χ^2	p	χ^2	p
Gender	8.821	0.012	6.520	0.038	8.773	0.012
Age	4.120	0.660	10.164	0.118	6.064	0.416
Occupation	9.438	0.051	11.127	0.025	11.252	0.024
Experience in EMS	6.467	0.039	5.922	0.052	1.987	0.370
Body mass index	0.178	0.195	0.787	0.675	1.632	0.442
Children under 6 years	8.194	0.017	1.291	0.524	4.610	0.100
Tobacco smoking	9.072	0.011	6.185	0.045	1.325	0.516
Alcohol consumption	0.947	0.623	4.984	0.083	2.682	0.262
Shift duty	1.199	0.549	2.223	0.329	4.629	0.099
24 hours shift or more	1.191	0.551	7.942	0.019	9.760	0.008
Night shift napping	4.967	0.083	2.697	0.260	0.664	0.717
Organizational unit	11.439	0.003	7.136	0.028	3.529	0.171

Legend / Legenda: % - percentage / odstotek; χ^2 – Chi Square test / Hi kvadrat test; p – statistical significance / statistična značilnost

Respondents with children under the age of 6 exhibited a lower rate of EE ($\bar{x} = 2.56, s = 0.61$) compared to those without children or with children older than 6 ($\bar{x} = 2.89, s = 0.75, p = 0.017$). Smoking EMS professionals exhibited a higher rate of EE ($\bar{x} = 2.95, s = 0.70$) and DP ($\bar{x} = 3.30, s = 0.67$) compared to non-smokers (EE $\bar{x} = 2.72, s = 0.74, p = 0.011$), (DP $\bar{x} = 3.02, s = 0.84, p = 0.045$).

Respondents who were working 24 hour shifts or more exhibited a higher rate of DP ($\bar{x} = 3.20, s = 0.72$) and exhibited a higher level of PA ($\bar{x} = 2.67, s = 0.73$) compared to respondents who did not perform such work (DP $\bar{x} = 2.96, s = 0.89, p = 0.019$) (PA $\bar{x} = 2.55, s = 0.84, p = 0.008$).

Finally, we conclude that respondents employed in more overloaded emergency medical service units exhibited a higher rate of EE ($\bar{x} = 2.88, s = 0.75$) and DP ($\bar{x} = 3.19, s = 0.81$) compared to respondents who are employed in less overloaded emergency medical service units (EE $\bar{x} = 2.54, s = 0.60, p = 0.003$) (DP $\bar{x} = 2.87, s = 0.69, p = 0.034$).

Examination of the relationship between the variables revealed a significant relationship between sleep and burnout scores. A statistically significant positive relationship was observed between PSQI and emotional exhaustion ($r = 0.381, p < 0.01$), depersonalization ($r = 0.293, p < 0.01$) and personal accomplishment ($r = 0.368, p < 0.01$).

Discussion

None of the studied variables, such as basic socio-demographic or work-related characteristics, were significantly associated with sleep quality. Similar results were also obtained by Mcdowall, Murphy, & Anderson (2017), who in their study and similarly, did not establish any significant association with basic socio-demographic variables and work-related characteristics except shift work. The mean global PSQI score of the total sample was 4.97 ($s = 3.23$). Overall, 48.5 % of the sample had a global PSQI score > 5 , indicating a disturbance in sleep quality. In terms of gender, women appeared to have a higher PSQI global score (5.58, $s = 3.06$) compared to men (4.66, $s = 3.28$) although these differences were not significant; however, we have found that more women than men have poor sleep quality. In a general population sample ($n = 9284$) Hinz et al. (2017), found that females reported more sleep problems than males. Cash et al. (2020) conducted a research on 17522 EMS personnel and found that about two-thirds of the sample reported poor sleep quality (64 %) with a mean PSQI global score of 7.3 ($s = 0.04$). Women compared to men, in both the BLS (basic life support) and ALS (advanced life support) groups, had a higher prevalence of poor sleep quality and higher mean PSQI global scores. Furthermore, women ALS respondents reported the highest prevalence of poor sleep.

The study has not found statistically significant differences between BMI and sleep quality, but we have found that as many as 60.8 % of respondents are overweight, of which 29.4 % report poor sleep quality (PSQI ≥ 5). Park, Jung, Oh, McIntyre, & Lee (2018) in their cross-sectional study ($n = 107718$) found that short sleep duration and poor sleep quality are more positively associated with obesity across BMI than underweight.

Regarding the type of work: day shift ($\bar{x} = 4.75, s = 2.07$), rotating shift ($\bar{x} = 5.01, s = 3.41$), 24 hour shift ($\bar{x} = 5.15, s = 3.14$) and sleep quality, no statistically significant differences were found. However, we have found that more than two thirds of respondents who perform 24-hour work have poor sleep quality. Mcdowall et al. (2017) found that shift work is significantly associated with poor sleep quality, while Guyette, Morley, Weaver, Patterson, & Hostler (2013) identified 50 % of both 12-hour and 24-hour shift subjects as having poor sleep quality and identified no changes in cognitive performance following 12- and 24-hour shifts.

The prevalence of moderate to severe burnout reported in our study in 3 principal components EE, DP and PA were 97.5 % and 96.4 % and 9.3 % respectively, which are not in accordance with the findings of other previous studies conducted elsewhere. Research conducted in four tertiary care hospitals in South India among EMD professionals ($n = 105$), reported that 64.8 % of respondents had moderate to high levels of EE, 71.4 % had moderate to high levels of DP and 73.3 % had moderate to low perception of personal accomplishment, which is quite high in comparison to other studies (Wilson et al., 2017). Li, Cheng, & Zhu (2018) in a meta-analysis study found that the total prevalence for EE, DP, and PA was 40.5 %, 44.3 % and 42.7 %, respectively. The most recent Medscape report indicates that emergency medicine is the fifth most burned-out specialty (Peckham, 2019 cited in Stehman, Testo, Gershaw, & Kellogg, 2019), to which our research also leads, as we have found that EMS physicians are the most affected by a high level of emotional exhaustion and depersonalization compared to medical technicians and registered nurses. Similar findings are cited by Moukarzel et al. (2019), who found that physicians exhibited high emotional exhaustion, high depersonalization and a low sense of personal accomplishment in comparison to paramedics and administrative / technical staff. In our study, we have found that medical technicians are the most affected by low level of personal accomplishment.

There were no statistically significant effects on the variable of "work only day shift and rotating shift" and on EE, DP and PA, but we have found a statistically significant effect on the variable of "24 hour shift or more". People performing such work exhibit a higher rate of DP and have a lower level of PA compared to

respondents who do not perform such work. Two significant cross-sectional studies by Stimpfel et al. (2013) with respectively large sample sizes ($n = 22275$ nurses and $n = 3710$ nurses) from the US pointed out that when nurses work 13 hour shifts or longer, the odds of them reporting job dissatisfaction and burnout were higher than in those working eight hours. In their cross-sectional survey that included 31,627 registered nurses across 12 European countries, Dall'Ora et al. (2015) found that nurses working shifts of ≥ 12 h were more likely to experience burnout than nurses working shorter hours (≤ 8), in terms of emotional exhaustion, depersonalization and low personal accomplishment. Schooley, Hikmet, Tarcan, & Yorgancioglu, (2016) found a statistically significant effect between work shift and EE but not affecting DP and PA. Analysis of work shift on EE with POST HOC tests resulted in statistically significant differences between those who work only 24-h shifts and those who work both day shifts and night rotations.

To our knowledge, this is the first study that has investigated the relationships between sleep quality and burnout in connection to three components (EE, DP, PA) among pre-hospital emergency medical services personnel in Slovenia. There is a strong relationship between sleep and emotion. Sleep, for instance, is critical for emotional regulation and the maintenance of psychological health (O'Leary, Bylisma, & Rottenberg, 2017; Palmer & Alfano, 2017). In several cross-sectional studies, EE was related to subjective sleep complaints and subjective sleep quality (Brand et al., 2010; Pagnin et al., 2017; Wolf & Rosenstock, 2017). In their cross-sectional study, Giorgi, Mattei, Notarnicola, Petrucci, & Lancia (2018) found that sleep quality showed a significantly positive correlation with the mean values of the total burnout scores and its relative dimensions, which is in accordance with our findings (EE $r = 0.381$, $p < 0.01$, DP $r = 0.293$, $p < 0.01$, PA $r = 0.368$, $p < 0.01$). On the other hand, Chaves & Shimizu (2018) and Aydin Sayilan, Kulakaç, & Uzun (2020) found statistically significant positive relationship between PSQI and EE ($r = 0.480$, $r = 0.234$) and DP ($r = 0.370$, $r = 0.174$) scores, but there were no significant differences between PSQI and PA ($r = -0.007$, $r = -0.084$). Dilek et al. (2019) found no significant relationship between PSQI and DP ($r = 0.169$) or PA ($r = 0.099$) in emergency medical assistants. A generalization of the research is not possible.

Limitations of the research include the occasional selection of research institutes and a smaller sample. The research should be conducted on a larger, representative sample of employees in pre-hospital emergency medical services. Research on the impact of sleep deprivation or burnout on family relationships among pre-hospital emergency service staff conducted in the future would be relevant.

Conclusion

Pre-hospital emergency service workers represent a vulnerable group who are prone to sleep deprivation and burnout syndrome. In the future, the implementation of appropriate strategies for the prevention of harmful effects of shift work, night shift work and full-time work should be considered. Also, employees should be empowered regarding their sleep hygiene and burnout prevention.

Conflict of interest / Nasprotje interesov

The authors confirm that there are no known conflicts of interest associated with this publication. / Avtorji izjavljajo, da ni nasprotja interesov.

Funding / Financiranje

The study received no funding. / Raziskava ni bila finančno podprta.

Ethical approval / Etika raziskovanja

The study was conducted in accordance with the Helsinki-Tokyo Declaration (World Medical Association, 2013) and the Code of Ethics for Nurses and Nurse Assistants of Slovenia (2014). / Raziskava je pripravljena v skladu z načeli Helsinško-Tokijske deklaracije (World Medical Association, 2013) in v skladu s Kodeksom etike v zdravstveni negi in oskrbi Slovenije (2014).

Author contributions / Prispevek avtorjev

MV conceptualized, designed and conducted the study. AK conceptualized and designed the study, statistical analysis and interpreted the data. He is the author's second supervisor and consultant. / MV je zasnoval, oblikoval in izvedel raziskavo. AK je kot avtorjev somentor in svetovalec zasnoval in oblikoval raziskavo ter izvedel statistično analizo in interpretacijo rezultatov.

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Citirajte kot / Cite as:

Kren, A., & Vladič, M. (2021). Sleep deprivation and burnout syndrome among pre-hospital emergency medical service employees in Slovenia: A cross-sectional study. *Obzornik zdravstvene nege*, 55(4), 243–252. <https://doi.org/10.14528/snr.2021.55.4.3052>