

Sleep quality assessment in emergency health professionals

Avaliação da qualidade do sono em profissionais de saúde da emergência
Evaluación de la calidad del sueño en profesionales de la salud de emergencia

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Descritores

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Descriptores

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Abstract

Objective: To assess emergency service professionals' sleep quality and its association with the level of fatigue and quality of life.

Methods: A descriptive, cross-sectional and correlational study, carried out in the units of the Mobile Emergency Care Service (SAMU) and in the Emergency Care Unit (ECU), in 2021, with 108 participants. To assess sleep quality, the Pittsburgh Sleep Quality Index, Brazilian version (PSQI-BR), was used; to assess fatigue, the Chalder Fatigue Scale was used, together with the Need for Recovery Scale (NFR); and to assess quality of life, the World Health Organization Quality of Life Brief Version (WHOQOL-bref) was used, and the instruments used were adapted to Portuguese in previous studies. Association tests were applied for statistical analysis, using Pearson's chi-square test, Mann-Whitney U test or Kruskal Wallis and Spearman's correlation. P-values <0.05 were considered significant.

Results: It was identified that 72.2% of participants had poor sleep quality and 75.9% were fatigued. A significant association was observed between sleep quality and fatigue, the need for recovery and quality of life.

Conclusion: It was identified that health professionals working in emergency services have poor sleep quality and life, and high levels of fatigue and need for recovery, which can directly impact their personal and professional activities.

Resumo

Objetivo: Avaliar a qualidade do sono de profissionais dos serviços de emergência e sua associação com o nível de fadiga e qualidade de vida.

Métodos: Estudo descritivo, transversal e correlacional, realizado nas unidades do Serviço de Atendimento Móvel de Urgência (SAMU) e na Unidade de Pronto Atendimento (UPA), no ano de 2021, com 108 participantes. Para avaliação da qualidade do sono, foi utilizado o Índice de Qualidade do Sono de Pittsburgh versão Brasileira (PSQI-BR); para avaliação da Fadiga, foi utilizada a Escala de Fadiga de Chalder, em conjunto com a Escala de Necessidade de Descanso (ENEDE); e para avaliação da qualidade de vida, foi utilizado o *World Health Organization Quality of Life Brief Version (WHOQOL-bref)*, sendo que os instrumentos utilizados foram adaptados para a língua portuguesa em estudos anteriores. Foram aplicados testes de associação para a análise estatística, tendo sido utilizados o Teste Qui-Quadrado de Pearson, o Teste U Mann-Whitney ou Kruskal Wallis e a correlação de Spearman. Valores de $p < 0,05$ foram considerados como significativos.

Resultados: Foi identificado que 72,2% dos participantes apresentaram má qualidade do sono e 75,9% estavam fadigados. Foi observada associação significativa entre a qualidade do sono e a fadiga, a necessidade de descanso e a qualidade de vida.

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Conflict of interest: nothing to declare.

Conclusão: Foi identificado que os profissionais de saúde que trabalham em serviço de urgência e emergência apresentam má qualidade do sono e de vida e níveis elevados de fadiga e necessidade de descanso, o que pode impactar diretamente suas atividades pessoais e profissionais.

Resumen

Objetivo: Evaluar la calidad del sueño de profesionales de los servicios de emergencia y su relación con el nivel de fatiga y calidad de vida.

Métodos: Estudio descriptivo, transversal y correlacional, realizado en las unidades del Servicio de Atención Móvil de Urgencia (SAMU) y en la Unidad de Pronto Atención (UPA), en el año 2021, con 108 participantes. Para evaluar la calidad del sueño, se utilizó el Índice de Calidad del Sueño de Pittsburgh, versión brasileña (PSQI-BR). Para evaluar la fatiga, se utilizó la Escala de Fatiga de Chalder, junto con la Escala de Necesidad de Descanso (ENEDE). Para evaluar la calidad de vida, se utilizó el *World Health Organization Quality of Life Brief Version (WHOQOL-bref)*. Los instrumentos utilizados fueron adaptados al idioma portugués en estudios anteriores. Se aplicaron pruebas de asociación para el análisis estadístico, para lo cual se utilizó la Prueba χ^2 de Pearson, la Prueba U de Mann-Whitney o la prueba de Kruskal-Wallis y la correlación de Spearman. Se consideraron valores de $p < 0,05$ como significativos.

Resultados: Se identificó que el 72,2 % de los participantes presentó una mala calidad de sueño y el 75,9 % tenía fatiga. Se observó una asociación significativa entre la calidad del sueño y la fatiga, la necesidad de descanso y la calidad de vida.

Conclusión: Se identificó que los profesionales de la salud que trabajan en servicios de urgencia y emergencia presentaron mala calidad de sueño y de vida y niveles elevados de fatiga y necesidad de descanso, lo que puede impactar directamente en sus actividades personales y profesionales.

Introduction

Health services with assistance in critical situations reveal the most stressful work environments, since the users assisted are in situations of imminent risk of death or intense suffering. Professionals who work in this area are more vulnerable to occupational stress and illness, due to work characteristics, in addition to being exposed to precarious working conditions, such as lack of human and material resources, work overload, inappropriate physical space, overcrowding and lack of recognition by managers.^(1,2)

In these stressful work environments, there are reports that more than half of professionals have complaints of a sleeping disorder, classifying sleep as unsatisfactory and/or of poor quality, not sufficiently restorative between shifts, therefore becoming a public health issue.⁽³⁾

Sleep is a physiological and vital process for human beings that repairs, conserves energy and protects the body. Sleep deprivation interferes with individuals' physical and mental health, and this damage can seriously affect interpersonal relationships. Increasingly common in the population, sleep disorders can be manifested by poor quality, insomnia, excessive daytime sleepiness, among others.⁽⁴⁾

In this sense, as work activities affect sleep, there is a misalignment of the sleep-wake cycle, contributing to a greater state of fatigue and exhaustion.⁽⁵⁾ Therefore, health professionals may be subject to this misalignment more frequently, due to the character-

istics of these services, evidenced by the high rates of tiredness and unsatisfactory sleep reports.⁽³⁾ The management of this state includes education programs for sleep health awareness aimed at greater safety and health of workers.^(6,7)

During the coronavirus (SARS-CoV) pandemic in 2019 (COVID-19), the general population's health suffered a negative impact, perceived mainly among health professionals in the emergency departments who were working with an unknown disease. This impact had severe consequences on the quality of life of these professionals. Emotional distress, anxiety and poor sleep quality, associated with work stress reported by them, have led to symptoms ranging from inattention, drowsiness, fatigue to impaired work performance and poor quality of life.^(8,10)

Based on the indicated data, it is important to identify sleep disorders in health professionals, especially in those who work in critical situations so that effective interventions can be implemented, aiming at improving the health of this population. Based on this premise, this research aimed to assess the sleep quality of emergency service professionals and its association with the level of fatigue and quality of life.

Methods

This is a descriptive, cross-sectional, exploratory and correlational study, based on the STrengthening the

Reporting of OBServational studies in Epidemiology (STROBE)⁽¹¹⁾ for its description. It was developed in the units of the Mobile Emergency Care Service (SAMU - *Serviço de Atendimento Móvel de Urgência*) and the Emergency Care Unit (ECU) in the municipality of Três Lagoas, in the state of Mato Grosso do Sul, during the year 2021. The municipality has a unit for each service, and both are part of the emergency care network.

The study population consisted of professionals from the nursing team and doctors, who work directly in the care of victims of clinical and traumatic emergencies in these services, working in alternating shifts, with a weekly workload of more than 36 hours. Those who were already undergoing treatment for sleep disorders, using sleep inducers as well as those using benzodiazepines were excluded.

The sample calculation was performed based on a finite sample of professionals working at the data collection sites. Considering a finite population of 163 health professionals, a significance level of 5% and a test power of 95%, a minimum number necessary for the study of 104 participants was obtained, including 108.

For data collection, five questionnaires were used. First, a sociodemographic and health instrument, prepared by the study researchers, was used. For sleep analysis, the Pittsburgh Sleep Quality Index (PSQI-BR), Brazilian version, was used,⁽¹²⁾ an instrument divided into 7 components that assess different facets of sleep, such as subjective quality, latency, duration, habitual efficiency, alterations, use of sleep medication and daytime dysfunction. The final calculation resulted in a global sleep score (1 and 21 points). Scores ≥ 5 points indicate poor sleep quality, and <5 , good sleep quality.

For fatigue analysis, the Chalder Fatigue Scale, Brazilian version,⁽¹³⁾ was used, which measures professionals' level of fatigue in the physical and mental scope, and the Need for Recovery Scale (NFR), Brazilian version,⁽¹⁴⁾ which assesses work-induced fatigue along with the quality of workers' recovery time, indicating a high or low need for recovery. Both scales are composed of 11 questions each, scored using a Likert-type scale.

To assess quality of life, the WHOQOL-bref questionnaire, Brazilian version,⁽¹⁵⁾ was used, which aims to assess individuals' quality of life. The instrument is divided into four domains (physical, psychological, social relations and environment), consisting of 26 questions with answers using a Likert scale, two of which are assessed separately, as they indicate general quality of life issues, while the other 24 assess specific issues.⁽¹⁵⁾

The study complied with Resolution 466/12 of the Brazilian National Health Council, and was approved by the Research Ethics Committee. An interview was conducted by the main researcher, in person, with each participant, in a private room, respecting biosafety standards, due to the pandemic, with an average duration of 30 minutes each interview. Initially, a pre-test questionnaire was applied for each category of professional, in order to align the possible difficulties in the research and increase its effectiveness.

Data were entered into a Microsoft Excel[®] spreadsheet, with double typing to avoid failures and errors in the research results. Afterwards, data were transferred to the Statistical Package for the Social Sciences[®] (SPSS 25.0) program for statistical analysis.

To analyze the associations among sleep quality, fatigue and quality of life, Pearson's chi-square test was performed, among qualitative variables, and the U Mann-Whitney and Kruskal Wallis non-parametric tests, among qualitative variables. and quantitative, in addition to Spearman's correlation, among quantitative variables. Correlation values above 0.9 were considered as very strong, from 0.7 to 0.9 as strong, from 0.5 to 0.7 as moderate correlation, from 0.3 to 0.5 as weak, and less than 0.3, as negligible.⁽¹⁶⁾ A significance value of 5% was considered.

The instruments used in this study underwent internal consistency analysis using Cronbach's alpha coefficient, with values greater than 0.70 being reached, considered the ideal reference value for this reliability coefficient.⁽¹⁷⁾

Results

A total of 108 participants were included in the study. Most professionals were female, and half

of the sample consisted of nursing technicians, of which 53.7% had two or more employments and 47.2% had worked in emergency service units for more than 10 years, according to Table 1. In sleep quality assessment, it was identified that 72.2% had poor sleep quality (Table 1); 75.9% were classified as fatigued; and 67.6% had a high need for recovery (Table 2). Regarding quality of life, all domains of the scale had median scores of 3.6 to 3.9, as shown in Table 3.

Table 1. Sociodemographic characteristics and other variables

Variables	PSQI-BR (n=108)		p-value*
	Good sleep quality (n=30)	Poor sleep quality (n=78)	
Age group			
Between 18 and 35 years	36.7	43.6	
Between 36 and 45 years	36.7	38.5	
Between 46 and 65 years	26.6	17.9	0.584
Sex			
Male	40.0	35.9	
Female	60.0	64.1	0.693
Occupation			
Nursing technician	43.3	52.6	
Nurse	30.0	20.5	
Doctor	26.7	26.9	0.545
Working time in service			
Up to 05 years	40.0	47.4	
More than 05 years	60.0	52.6	0.785
Workload			
Up to 44 hours weekly	16.7	11.5	
From 44 to 80 hours weekly	60.0	66.7	
Mais de 80 hours weekly	23.3	21.8	0.737
Shift			
Day	36.7	41.0	
Night	23.3	33.3	
Rotation	40.0	25.6	0.313

*Pearson's chi-square test; PSQI - Pittsburgh Sleep Quality Index.

Assessing the association between sociodemographic characteristics and sleep quality and fatigue, no significant association was identified, as Tables 1 and 2, however, when analyzing the association with the need for recovery, it was identified that nursing technicians have a low need (p. 0.013) and that those classified as fatigued have a greater need for recovery (p. 0.028).

It was observed, among the analyzed components of the PSQI-BR instrument, that 29.63% had a greater degree of difficulty in initiating sleep, and this component assesses the sleep latency period. Another observation was that 44.44% had moder-

ate difficulty sleeping, and these signs persisted once or twice a week. It was identified that patients classified as having poor sleep quality had a significant association with fatigue, high need for recovery and lower medians in quality of life domains assessed by the WHOQOL-bref (Table 3). In the assessment between the PSQI score and the scores of quality of life domains, a moderate correlation was identified with the "physical" domain (r -0.510; p<0.001); weak, with the "psychological" domain (r-0.352; <0.001); weak, with the "social relationships" domain (r -0.236; p=0.014); and weak, with the "environment" domain (r-0.495; p<0.001). Regarding the assessment of quality of life, performed using the WHOQOL-bref instrument, questions 01 and 02 were analyzed separately and concern the general assessment of quality of life and health. The two general questions of the instrument showed that 56.48% consider having a good quality of life and 39.81% are satisfied with their health.

Discussion

Emergency services environments have high levels of stress. Therefore, workers in these places experience high physical, mental and emotional stress, since activities carried out in these environments require a high degree of concentration and quick decision-making, in addition to the fact that users of this type of service are at imminent risk of death or intense suffering. Thus, the routine of these professionals often results in poor quality sleep and, consequently, a higher level of fatigue and a high need for recovery.⁽³⁾

Sleep disorders affect a considerable number of individuals around the world, and are of extreme concern due to their direct and indirect consequences for personal and collective health.⁽¹⁸⁾ It is known that more than half of health professionals complain of unsatisfactory or poor quality sleep and/or poor recovery between shifts, and, in recent years, this issue has become a public health issue, due to the large number of workers affected.⁽¹⁹⁾ Juan-García *et al.* assessed nursing professionals' sleep, quality of life and mood in Pediatric Intensive Care Units, demonstrat-

Table 2. Fatigue, Need for Recovery Scale and its variables

Variables	Chalder Fatigue Scale		p-value*	Need for Recovery Scale		p-value*
	Fatigued (n=82)	Non-fatigued (n=26)		High need for recovery (n=73)	Low need for recovery (n=35)	
Age group						
Between 18 and 35 years	40.2	46.2		42.5	40.0	
Between 36 and 45 years	36.6	42.3	0.606	39.7	34.3	0.591
Between 46 and 65 years	23.2	11.5		17.8	25.7	
Sex						
Male	36.6	38.5	0.863	31.5	48.6	0.086
Female	63.4	61.5		68.5	51.4	
Occupation						
Nursing technician	53.7	38.5		41.1	68.6	
Nurse	22.0	26.9	0.388	30.1	8.6	0.013
Doctor	24.4	34.6		28.8	22.9	
Working time in service						
Up to 05 years	41.5	57.7	0.339	48.0	40.0	0.681
More than 05 years	58.5	42.3		52.0	60.0	
Shift						
Day	76.7	23.3		76.7	23.3	0.090
Night	81.8	18.2	0.462	69.7	30.3	
Rotation	68.8	31.3		53.1	46.9	
Workload						
Up to 44 hours weekly	13.4	11.5		61.8	38.2	0.250
From 44 to 80 hours weekly	64.6	65.4	0.967	76.1	23.9	
More than 80 hours weekly	22.0	23.1		57.1	42.9	
Chalder Fatigue Scale						
Fatigued	-	-		73.2	26.8	0.028
Non-fatigued	-	-		50.0	50.0	

* Pearson's chi-square test.

Table 3. Assessment of Pittsburgh Sleep Quality Index and its variables

	PSQI-BR (n=108)							
	Chalder		NFR		"Physical" domain	WHOQOL-bref		
	Fatigued	Fatigued	High need for recovery	Low need for recovery		"Psychological" domain	"Social relationships" domain	"Environment" domain
	%	%	%	%	* Median and quartiles			
Good sleep quality (n=30)	56.7	43.3	53.3	46.7	4.3 (4.1 – 4.6)	4.3 (4.1 – 4.6)	4.3 (4.1 – 4.6)	4.3 (4.1 – 4.6)
Poor sleep quality (n=78)	83.3	16.7	73.1	26.9	3.7 (3.3 – 4.1)	3.7 (3.3 – 4.1)	3.7 (3.3 – 4.1)	3.7 (3.3 – 4.1)
p-value	0.004*		0.050*		<0.001†	<0.001†	<0.001†	<0.001†

*Chi-square test; † U-Mann Whitney test; PSQI-BR - Pittsburgh Sleep Quality Index; WHOQOL-bref - World Health Organization Quality of Life Brief Version; NFR - Need for Recovery Scale; Chalder - Chalder Fatigue Scale.

ing that workers who performed their work activities on night shifts showed changes in sleep, with several negative repercussions, such as depression, irritability, decreased self-esteem and mood lability.⁽²⁰⁾

Considering the results of this study, we cannot infer that the scenario of professional performance is the cause of the change in sleep quality, requiring other studies that compare the different scenarios of professional practice, to be able to establish a causal link, although some studies portray a relationship between the work they develop, their health situation and their sleep quality.⁽²¹⁾

It was possible to observe that nurses have poor sleep quality, regardless of the shift they work. Both groups, workers in rotating shifts and fixed shifts, obtained total sleep score scores greater than five, a value that demonstrates that both groups are considered poor sleepers.

Female health professionals are at greater risk of increased tension at work and the presence of sleep disturbance at work, compared to males, according to a study carried out.⁽²²⁾ However, in the present study, this association was not statistically significant with sleep quality.

Studies show that working women have worse sleep quality when compared to men, due to hormonal factors, greater household responsibilities and professional and financial concerns.^(23,24) A study observed a worsening of fatigue in health professionals who work night shifts in an emergency service as well as a decrease in sleep quality.⁽²⁴⁾ This reality, perceived in these professionals' daily lives, despite the breaks during shift work, maintains irregular hours of recovery, not establishing, therefore, a healthy sleeping routine, impairing the sleep-wake cycle and all the functions that compete with it.

Most patients were fatigued and in need of recovery, and these data are corroborated by a study carried out to assess the prevalence of fatigue among nurses working with patients with COVID-19 in China. In this study, it was found that participants had higher scores in physical and mental fatigue, with a statistically significant negative correlation being observed between nurses' fatigue and the frequency of the weekly night shift.⁽⁸⁾

Fatigue has negative consequences in a wide range of life domains: 50 to 60% of professionals reported negative effects of fatigue on their life outside of work in relation to mood at home, physical health, family life, hobbies, interests and social life; more than 40% reported a negative impact on mental health and negative impacts on work, including a drop in productivity, satisfaction and quality; 25% of professionals reported a negative impact on safety in going to and from work; and 15% were concerned about their job security. The difference between genders was perceived in physical health, with women being more likely to report a negative effect of fatigue on physical health (59.3%).⁽²⁵⁻²⁷⁾

The present study found an association between sleep quality, fatigue and the need for recovery, i.e., that poor sleep quality triggers fatigue and drowsiness, which can have repercussions on failures in the performance of their functions efficiently and on the result of work productivity.⁽¹⁷⁾ Such data are consistent with a study that points out that the high level of fatigue at work stands out as one of the great villains with regard to health.⁽²⁶⁾ Occupational fatigue depreciates workers' quality of life and, there-

fore, health situation, and its significance is recognized, for instance, in triggering sleep disorders.

It was identified, in this study, that the worse the sleep quality, the lower the quality of life in the assessed domains, i.e., sleep quality can directly impact quality of life in several aspects of life, mainly due to lack of recovery, leading to high levels of fatigue. Research carried out with emergency professionals suggests that the quality of life of these health professionals is lower, because work routine leads to the emergence of sleep disorders, increased alertness, changes in the sleep-wake cycle and increased daytime sleepiness.⁽²⁷⁾ Moreover, these professionals are subject to considerable psychological stress and fatigue, which has a major impact on all aspects of their lives, including detrimental effects on learning and clinical performance, which is a risk to both practitioner and patient safety.⁽²⁸⁻³⁰⁾

The present study was carried out in the context of the COVID-19 pandemic, and, despite advances in treatment and vaccination coverage during data collection, health professionals were under a high level of work stress, leading to higher levels of anxiety and fear, as identified in a systematic review with meta-analysis that included 35 studies, identifying a high level of anxiety in health professionals, especially in the nursing category and females.⁽²⁸⁾

It is known that the use of integrative and complementary practices significantly improves sleep quality.⁽³¹⁾ Thus, once a poor sleep pattern is verified, compliance with such practices is suggested, in order to improve sleep quality among health professionals. Another study observed that the online intervention to follow up on a Cognitive Behavioral Therapy program was successful for sleep problems. The authors claim that this result is due to the fact that workers, in shifts, are able to participate, regardless of the time and place of work. This resource can be widely used, since the irregularity in schedules reflects this population.⁽²⁹⁻³¹⁾

As for the limitations of this study, during data collection, it was observed that the number of questions made the interview long for participants, who were at work, being considered a limitation. Another important limitation was the irregularity of sleeping times, reported by the participants, making it difficult

to complete the sleep instrument. Moreover, some associations, identified as the professional category of nursing, do not present a strict explanation, requiring further investigation studies, mainly in relation to the level of stress, burnout and other variables.

However, even with the limitations and difficulties, it was possible to provide participants with an immediate reflection on the quality of each one's sleep, and, in the long term, the results may produce information that positively contributes to emergency professionals' lives.

Conclusion

Health professionals who work in emergency services, environments that can be highly stressful, had poor sleep quality, fatigue, a high need for recovery and poor quality of life. The measurement of sleep and quality of life of these professionals is relevant to support the implementation of easily accessible and low-cost actions, such as integrative health practices, beneficial measures for this population.

Collaborations

Azambuja VA, Pena SB, Pereira FH, Santos VB and Santos MA contributed to the project design, data analysis and interpretation, article writing, relevant critical review of intellectual content and approval of the final version to be published.

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References

- Oliveira AP, Oliveira AL, Prado RM, Vasconcelos AM, Silva JC, Oliveira JC. O esgotamento físico dos enfermeiros no setor de urgência e emergência: revisão integrativa. *Nursing (São Paulo)*. 2019;22(251):2839–43. Review.
- Teixeira GS, Silveira RC, Mininel VA, Moraes JT, Ribeiro IK. Quality of life at work and occupational stress of nursing in an emergency care unit. *Texto Contexto Enferm*. 2019;28:e20180298.
- Mountfort S, Wilson J. EMS Provider Health And Wellness. [Updated 2022 Sep 26]. In: StatPearls. Treasure Island (FL): StatPearls Publishing; 2023 [cited 2023 June10]. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK493236/>
- Siegel JM. Sleep function: an evolutionary perspective. *Lancet Neurol*. 2022;21(10):937–46.
- Kancherla BS, Upender R, Collen JF, Rishi MA, Sullivan SS, Ahmed O, et al. Sleep, fatigue and burnout among physicians: an American Academy of Sleep Medicine position statement. *J Clin Sleep Med*. 2020;16(5):803–5.
- Barger LK, Runyon MS, Renn ML, Moore CG, Weiss PM, Conde 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;22(Sup1):58–68. Review.
- Carvalho VP, Barcelos KA, Oliveira EP, Marins SN, Rocha IB, Sousa DF, et al. Poor Sleep Quality and Daytime Sleepiness in Health Professionals: Prevalence and Associated Factors. *Int J Environ Res Public Health*. 2021;18(13):6864.
- Zhan YX, Zhao SY, Yuan J, Liu H, Liu YF, Gui LL, et al. Prevalence and Influencing Factors on Fatigue of First-line Nurses Combating with COVID-19 in China: a descriptive cross-sectional study. *Curr Med Sci*. 2020;40(4):625–35.
- Khan HR, Ashraf F, Ullah I, Tahir MJ, Dominari A, Shoib S, et al. Cross-cultural prevalence of sleep quality and psychological distress in healthcare workers during COVID-19 pandemic. *Brain Behav*. 2021;11(11):e2383.
- Sahebi A, Abdi K, Moayedi S, Torres M, Golitaleb M. The prevalence of insomnia among health care workers amid the COVID-19 pandemic: an umbrella review of meta-analyses. *J Psychosom Res*. 2021;149:110597. Review.
- Malta M, Cardoso LO, Bastos FI, Magnanini MM, Silva CM. STROBE initiative: guidelines on reporting observational studies. *Rev Saude Publica*. 2010;44(3):559–65.
- Bertolazi AN, Fagundes SC, Hoff LS, Dartora EG, Miozzo IC, Barba ME, et al. Validation of the Brazilian Portuguese version of the Pittsburgh Sleep Quality Index. *Sleep Med*. 2011;12(1):70–5.
- Cho HJ, Costa E, Menezes PR, Chalder T, Bhugra D, Wessely S. Cross-cultural validation of the Chalder Fatigue Questionnaire in Brazilian primary care. *J Psychosom Res*. 2007;62(3):301–4. doi: 10.1016/j.jpsychores.2006.10.018
- Moriguchi CS, Alem ME, van Veldhoven M, Coury HJ. Cultural adaptation and psychometric properties of Brazilian Need for Recovery Scale. *Rev Saude Publica*. 2010;44(1):131–9.
- Fleck MP, Louzada S, Xavier M, Chachamovich E, Vieira G, Santos L, et al. Aplicação da versão em português do instrumento abreviado de avaliação da qualidade de vida “WHOQOL-bref”. *Rev Saude Publica*. 2000;34(2):178–83.
- Mukaka MM. Statistics corner: A guide to appropriate use of correlation coefficient in medical research. *Malawi Med J*. 2012;24(3):69–71.
- Purim KS, Guimarães AT, Titski AC, Leite N. Sleep deprivation and drowsiness of medical residents and medical students. *Rev Col Bras Cir*. 2016;43(6):438–444.
- Ganesan S, Magee M, Stone JE, Mulhall MD, Collins A, Howard ME, et al. The Impact of Shift Work on Sleep, Alertness and Performance in Healthcare Workers. *Sci Rep*. 2019;9(1):4635.

19. Weaver MD, Vetter C, Rajaratnam SM, O'Brien CS, Qadri S, Benca RM, et al. Sleep disorders, depression and anxiety are associated with adverse safety outcomes in healthcare workers: A prospective cohort study. *J Sleep Res.* 2018;27(6):e12722.
20. Juan-García C, Plaza-Carmona M, Fernández-Martínez N. Análise do sono no setor de enfermagem de emergência. *Rev Assoc Med.* 2021;67(6):862–7.
21. Lajoie P, Aronson KJ, Day A, Tranmer J. A cross-sectional study of shift work, sleep quality and cardiometabolic risk in female hospital employees. *BMJ Open.* 2015;5(3):e007327.
22. D'Ettorre G, Pellicani V, Greco M, Mazzotta M, Vullo A. Assessing and managing the shift work disorder in healthcare workers. *Med Lav.* 2018;109(2):144–50.
23. Lee KA. Self-reported sleep disturbances in employed women. *Sleep.* 1992;15(6):493–8.
24. Anvekar AP, Nathan EA, Doherty DA, Patole SK. Effect of shift work on fatigue and sleep in neonatal registrars. *PLoS One.* 2021;16(1):e0245428.
25. Dahlgren A, Tucker P, Gustavsson P, Rudman A. Quick returns and night work as predictors of sleep quality, fatigue, work-family balance and satisfaction with work hours. *Chronobiol Int.* 2016;33(6):759–67.
26. Rosado IV, Russo GH, Maia EM. Produzir saúde suscita adoecimento? As contradições do trabalho em hospitais públicos de urgência e emergência. *Cien Saude Colet.* 2015;20(10):3021-32.
27. Barger LK, Runyon MS, Renn ML, Moore CG, Weiss PM, 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;22(Suppl 1):58-68. Review.
28. Gómez-García T, Ruzafa-Martínez M, Fuentelsaz-Gallego C, Madrid JA, Rol MA, Martínez-Madrid MJ, Moreno-Casbas T; 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(8):e012073.
29. Skinner N, Dorrian J. A work-life perspective on sleep and fatigue--looking beyond shift workers. *Ind Health.* 2015;53(5):417-26.
30. Silva DF, Cobucci RN, Soares-Rachetti VP, Lima SC, Andrade FB. Prevalência de ansiedade em profissionais da saúde em tempos de COVID-19: revisão sistemática com metanálise. *Cien Saude Colet.* 2021;26(2):693-710.
31. Retzer L, Feil M, Reindl R, Richter K, Lehmann R, Stemmler M, et al. Anonymous online cognitive behavioral therapy for sleep disorders in shift workers-a study protocol for a randomized controlled trial. *Trials.* 2021;22(1):539.