

Impact on nursing personnel's mental health and sleep quality during the COVID-19 pandemic

Impacto na saúde mental e qualidade do sono de profissionais da enfermagem durante pandemia da COVID-19

Impacto en la salud mental y la calidad del sueño de los profesionales de enfermería durante la pandemia de COVID-19

Michele do Rocio Maier¹ ; Carla Cristine Kanunfre¹ 

¹Universidade Estadual de Ponta Grossa, Ponta Grossa, PR, Brazil

ABSTRACT

Objective: to assess the prevalence of depression, anxiety, stress and the sleep quality among nursing professionals during the COVID-19 pandemic. **Method:** this quali-quantitative study was conducted with 104 professionals from a private hospital in Paraná, Brazil, in July 2020. Data were collected using three instruments: the Depression, Anxiety and Stress Scale (DASS-21), the Leeds Sleep Evaluation Questionnaire (LSEQ), and the Pittsburgh Sleep Quality Index (PSQI). **Results:** 48% of the personnel showed signs of depression, 52% signs of anxiety and 52% signs of stress. As for sleep quality, 75% had sleep disorders, and 68% reported insomnia with a mean PSQI of 6.88. **Conclusion:** although the percentage of personnel with sleep and stress disorders was smaller than in the literature, the levels of anxiety, insomnia and depression were higher, corroborating the impact of the pandemic on the mental health of nursing personnel.

Descriptors: COVID-19; Nursing; Mental Health; Sleep; Prevalence.

RESUMO

Objetivo: avaliar a prevalência de depressão, ansiedade, estresse e qualidade do sono de profissionais da enfermagem na pandemia da COVID-19. **Método:** estudo quali-quantitativo realizado com 104 profissionais de um hospital privado do Paraná, Brasil, em julho de 2020. Utilizaram-se três instrumentos para a coleta de dados: Escala de Depressão, Ansiedade e Estresse (DASS-21), Questionário de Avaliação do Sono Leeds (LSEQ) e Índice da Qualidade do Sono de Pittsburgh (PSQI). **Resultados:** foram encontrados 48% sinais de depressão, 52% sinais de ansiedade e 52% sinais de estresse nos profissionais. Quanto à qualidade de sono, 75% da população apresentou distúrbios do sono, 68% relatam insônia com uma média do PSQI de 6,88. **Conclusão:** apesar do percentual de profissionais com distúrbio do sono e estresse apresentarem-se inferiores comparados à literatura, os níveis de ansiedade, insônia e depressão foram maiores, corroborando com o impacto da pandemia na saúde mental de profissionais da enfermagem.

Descritores: COVID-19; Enfermagem; Saúde Mental; Sono; Prevalência.

RESUMEN

Objetivo: evaluar la prevalencia de depresión, ansiedad, estrés y calidad del sueño de profesionales de enfermería en la pandemia de COVID-19. **Método:** estudio cuali-cuantitativo realizado junto a 104 profesionales de un hospital privado en Paraná, Brasil, en julio de 2020. Para la recolección de datos, se utilizaron tres instrumentos: Escala de Depresión, Ansiedad y Estrés (DASS-21), Cuestionario de Evaluación del Sueño de Leeds (LSEQ) y el Índice de Calidad del Sueño de Pittsburgh (PSQI). **Resultados:** se encontraron 48% de signos de depresión, 52% de signos de ansiedad y 52% de signos de estrés en los profesionales. En cuanto a la calidad del sueño, el 75% de la población presentó trastornos del sueño, el 68% refirió insomnio con un PSQI medio de 6,88. **Conclusión:** a pesar del menor porcentaje de profesionales con trastornos del sueño y estrés en comparación con la literatura, los niveles de ansiedad, insomnio y depresión fueron más altos, corroborando el impacto de la pandemia en la salud mental de los profesionales de enfermería.

Descritores: COVID-19; Enfermería; Salud Mental; Sueño; Prevalencia.

INTRODUCTION

The pandemic of the New Coronavirus 2019 (COVID-19) spread rapidly to different parts of the world, requiring the confinement of the population and the implementation of strict sanitary measures to minimize contamination¹.

The quickness of the disease spread has contributed to the collapse of the healthcare system in some countries, resulting in significant shortages of masks, hand sanitizer and respirators. The long working hours of teams of frontline health professionals reflected in significant impacts on mental health and sleep habits¹.

The study of the psychological impact of pandemics and epidemics on health professionals is not new. In the health system crises caused by SARS-CoV-1 (2003) and influenza A - H1N1 (2009), evaluations were carried out on this topic. During the SARS epidemic in 2003, an average of one in four health workers showed sleep problems, and this occurrence was significantly higher than in other occupational groups².

Corresponding author: Michele do Rocio Maier. E-mail: mi.maier@hotmail.com
Scientific Editor: Cristiane Helena Gallasch; Associate Editor: Magda Guimarães de Araujo Faria

In fact, the long hours and work intensity of health professionals have increased during the severe epidemic, resulting in less time to rest, causing psychological suffering².

Among health professionals, nurses represent the largest professional class affected by mental health, as they frequently present symptoms of stress, depression and anxiety related to the perception of their work activities³.

According to the model proposed by Georges Theorell, nursing is subject to a type of work *“classified as high-strain, due to challenging work demands, intense or capable of generating physical and/or psychological overload”*⁴.

The presence of stress is predominant in nurses working in the hospital field, reaching up to 78% of professionals⁵; being one of the causes of absence from work in nursing⁶.

Stress can affect cognitive functioning, concentration level and performance, having a strong association with sleep quality⁷. In a cascade effect, the impact on sleep quality has consequences on the daily life and health of professionals, not only due to functional changes in the immune and nervous system, but also because it exacerbates the onset of cardiovascular and metabolic diseases^{8,9}.

The physical and psychological wear arises from emotional tension and contributes to the appearance of anxiety and depression, because of the fact that these professionals do not devote time to taking care of their quality of life¹⁰.

In this context, the impact on patient care can be observed, due to the drop in the level of attention, forgetfulness and lack of agility arising from mental and physical fatigue. In short, there is a loss of productivity and quality of the service provided, while on the other hand, there is a worrying finding of the professional with a decrease in their physical and mental health conditions¹¹.

With the pandemic, the scenario of tension in professional nursing practice worsens¹². The professional nurse is one of the most vulnerable to manifesting anxiety centered on the concern with the infection having an impact on their mental health^{13,14}. Also, when analyzing the risk of contamination by a workplace, front-line professionals, as they work directly with infected patients, have an increase in anxiety related to their and close family members' possibility of infection, the feeling of tiredness, work overload, which may present the manifestation of post-traumatic stress disorder (PTSD)^{13,14}.

Based on the above, this study aimed to assess the prevalence of depression, anxiety, stress and sleep quality of nursing professionals in a private hospital in Ponta Grossa (PR) in the COVID-19 pandemic.

METHOD

This is a qualitative-quantitative cross-sectional study developed with nursing professionals in July 2020 in a private hospital in Parana, Brazil. The study was approved by the Research Ethics Committee with Human Beings of the institution. All participants signed the informed consent form prior to inclusion in the study.

To determine the sample size of 120 participating individuals, the G Power 3.1 software was used, considering an α level of 0.05 and a power of 0.80. The inclusion criteria for the study were to work as a nursing professional (nurse, nursing technician or nursing assistant) in a hospital institution and may be working in the day or night shifts.

Data collection was carried out through the application of questionnaires transcribed on an online research platform, with the link being sent to the volunteers, a procedure adopted due to issues specific to the current health recommendations, however with adequate instructions for filling them out. The personal data form prepared by the researchers was in line with the literature, and consisted of 23 questions, which involved sociodemographic information and lifestyle habits.

The Depression, Anxiety and Stress Scale (DASS-21) was applied to measure emotional states of depression, anxiety and stress. This instrument consists of 21 items divided into three subscales. The depression subscale assesses: inertia, anhedonia, dysphoria, lack of interest/involvement, self-depreciation and devaluation of life and discouragement. The anxiety subscale assesses the arousal of the autonomic nervous system, musculoskeletal effects, situational anxiety, and subjective experiences of anxiety. The stress subscale assesses difficulty in relaxing, nervous excitement, easy disturbance/agitation, irritability/overreaction, and impatience. The correction of the questionnaire followed a point scale established by Lovibond and Lovibond (1995), with the participant being asked to evaluate how each item was applied to them in the last week¹⁵. It should be noted that the result obtained through this questionnaire has no direct implications for placing participants in diagnostic categories such as the Statistical Diagnostic Manual of Mental Disorders (DSM) and the International Classification of Diseases (ICD). Therefore, classifications are not used for diagnosis, requiring clinical evaluation by a qualified medical professional for this purpose.

The Pittsburgh Sleep Quality Index (PSQI) provides a valid and standardized measure of sleep quality. This instrument discriminates sleep into 3 categories, good sleep, bad sleep, and sleep disturbance, and comprises seven scores resulting from its components. This questionnaire must be applied in a period of one month, where the answer alternatives are: "no/never during the past month", "less than once a week", "once or twice a week", "three or more times a week"¹⁶. The method adopted to obtain the categorization score followed the model described by Buysse et al. (1988).

The Leeds Sleep Quality Assessment Questionnaire is commonly used to assess insomnia and assess the effectiveness of treatments for insomnia. It contains ten questions belonging to four dimensions of sleep: sleep (GTS), quality of sleep (QOS), awakening from sleep (AFS) and behavior after wakefulness (BFW). The subject responds by marking the score to indicate his/her self-assessment at the time. The score is generated by summing the scores for each dimension, measuring where the respondent scored on the scale¹⁷.

All responses were obtained, as mentioned above, through the online research platform individually, constituting part of the work's database. Regarding data analysis, scores were calculated and duly tabulated in spreadsheets in the Microsoft Office Excel® program (2010). Absolute and relative frequencies were used to describe the variables. LSEQ and PSQI scale scores were expressed as mean and standard deviation. The Shapiro-Wilk and Kolmogorov-Smirnov normality test and Spearman's correlation test were performed using the Prism Graph Pad version 9.2.0 software.

RESULTS

132 nursing professionals who consented to participate in the study by signing the Informed Consent Form were recruited, and of these, only 104 answered all the survey questionnaires, totaling a dropout percentage of 21%. The reasons for giving up were: another job and vacations.

During the period that the study was conducted, the institution where the research was conducted had an average occupation ranging from 58% to 72%, and the inpatient unit for patients with COVID-19 (ICU and inpatient ward) presented the following data on average: (1) Occupancy ranging from 31% to 45%; (2) 71% of admissions were related to patients who tested positive for COVID-19 infection; (3) Death rate of 3.9%; (4) Average hospitalization day of 2.04 patients; (4) Hospital stay 8.3 days in the ICU, and 3.2 days in the infirmary.

The characteristics of the participants are shown in Table 1.

TABLE 1: Absolute frequencies (AF) and relative frequencies (RF %) of the different characteristics of the participating individuals. Ponta Grossa, PR, Brazil, 2020.

Variable		n	f(%)
Age	21 to 30 years old	41	39.4
	31 to 40 years old	36	34.6
	41 to 50 years old	23	22.1
	Over 51 years old	4	3.9
Gender	Female	93	89.4
	Male	11	10.6
Professional category	Nursing Assistant	1	1.0
	Nursing Technician	74	71.1
	Nurse	29	27.9
Shift	Day	89	85.6
	Night	12	11.5
	Intermediate	3	2.9
Number of jobs	1 job	63	60.6
	2 jobs	41	39.4
Journey (hours per shift)	6h	31	29.8
	8h	11	10.6
	12 h	49	47.1
	18h	9	8.7
	24 h	4	3.8
Physical activity	Yes	42	40.4
	No	62	59.6
Medication	Yes	18	17.3
	No	86	82.7
Total		105	100

The sample was characterized by having higher frequencies in the age group between 21 and 30 years old (39.4%), being mostly represented by women (89.4%) and from the professional category of nursing technician (71.1%). Most professionals worked in the day shift (85.6%), with the 12-hour shift being the most prevalent (47.1%). Of the population, 60.6% had only one job and most professionals did not practice physical activity (59.6%) and did not use psychotropic medication (82.7%).

Table 2 shows the results obtained from the participants' assessment of responses to the questionnaire on the Depression, Anxiety and Stress Scale (DASS-21).

TABLE 2: Absolute and relative frequency referring to the Depression, Anxiety and Stress Scale (DASS 21). Ponta Grossa, PR, Brazil, 2020.

	Depression		Anxiety		Stress	
	n	f(%)	n	f(%)	n	f(%)
Normal	54	52	50	48	50	18
Mild	17	16	9	9	15	14
Moderate	20	19	20	19	16	15
Severe	3	3	6	6	15	14
Extremely severe	10	10	19	18	8	8

It was identified that 48% of the sample population had some sign of depression, 52% had some symptom of stress and 52% had symptoms of anxiety.

As for the assessment of Leeds Sleep Quality (LSEQ), the results are shown in Table 3.

TABLE 3: Distribution of scores obtained from the questionnaires: Leeds Sleep Quality Assessment (LSEQ) and Pittsburgh Sleep Quality Index (PSQI) expressed as mean and standard deviation. Ponta Grossa, PR, Brazil, 2020.

Scores	n	Mean	SD	Minimum	Maximum
GTS	104	0.6328	0.21568	0.1	1
QOS	104	0.562	0.22104	0.1	1
AFS	104	0.5755	0.22285	0.1	1
BFW	104	0.6288	0.22117	0.1	1
PSQI	104	6.88	3.53	0	17

Note: GTS - Ease of falling asleep; QOS - Sleep quality perception; AFS - Ease of awakening from sleep; BFW - Integrity of behavior after wakefulness.

The most impacted dimension was the perception of sleep quality, followed by the ease of awakening from sleep. The global score of the Pittsburgh Sleep Quality Index (PSQI) found was 6.88.

In the correlation test between emotional states: depression, anxiety and stress (DASS 21); and the four dimensions of sleep: ease of sleep (GTS), sleep quality (QOS), awakening from sleep (AFS) and behavior after wakefulness (BFW), except for the GTS dimension, all others showed a significant negative association with the emotional states, classified as weak correlations (Table 4).

By expanding the assessment of sleep quality through the results obtained by the PSQI, it was found that 75% of professionals had sleep disorders and 68% with insomnia. Thus, the global Sleep Latency was an average of 36.66 min, where 75.5% of professionals were falling asleep within 30 min and 20.4% taking more than 1 hour to fall asleep. Only 33.7% of individuals had a Sleep Efficiency of up to 84%. Of these, 7.1% had Sleep Efficiency below 65%. Sleep Efficiency reflects the calculation between the effective hours of sleep with the time the person remained in bed to sleep.

Regarding nighttime awakenings, 84% of professionals had sleep interruptions. In stratifying this item, the following reasons were observed: 70% for going to the bathroom, 55% for nightmares, 42% for cold, 28% for heat, 21% for breathing difficulties and 17% for snoring or coughing.

TABLE 4: Spearman's correlation between emotional states: depression, anxiety and stress, with the four dimensions of sleep: ease of sleep (GTS), sleep quality (QOS), awakening from sleep (AFS) and behavior after wakefulness (BFW). Ponta Grossa, PR, Brazil, 2020.

	GTS		QOS		AFS		BFW	
	Mean	± SD	Mean	± SD	Mean	± SD	Mean	± SD
Depression								
Normal	0.66	0.21	0.60	0.21	0.64	0.20	0.68	0.21
Mild	0.62	0.21	0.61	0.20	0.46	0.21	0.66	0.23
Moderate	0.62	0.23	0.46	0.25	0.56	0.26	0.54	0.20
Severe	0.65	0.24	0.45	0.27	0.35	0.20	0.68	0.36
Extremely severe	0.55	0.22	0.49	0.19	0.56	0.19	0.47	0.21
Depression General Total	0.63	0.22	0.56	0.22	0.58	0.22	0.63	0.22
Spearman's r coefficient	-0.1272		-0.2337		-0.2365		-0.285	
P value	0.1983		0.017 *		0.0156 *		0.0034 *	
Anxiety								
Normal	0.68	0.18	0.65	0.21	0.62	0.22	0.66	0.21
Mild	0.55	0.25	0.46	0.18	0.56	0.24	0.63	0.25
Moderate	0.60	0.25	0.53	0.22	0.62	0.24	0.64	0.22
Severe	0.51	0.20	0.42	0.27	0.51	0.22	0.68	0.32
extremely severe	0.62	0.23	0.47	0.19	0.45	0.17	0.52	0.18
Anxiety General Total	0.63	0.22	0.56	0.22	0.58	0.22	0.63	0.22
Spearman's r coefficient	-0.1715		-0.3592		-0.2558		-0.1948	
P value	0.0817		0.0002 *		0.0088 *		0.0476 *	
Stress								
Normal	0.65	0.20	0.63	0.21	0.63	0.20	0.68	0.22
Mild	0.60	0.22	0.58	0.22	0.60	0.21	0.63	0.16
Moderate	0.73	0.24	0.52	0.23	0.50	0.28	0.67	0.24
Severe	0.58	0.17	0.48	0.18	0.52	0.22	0.52	0.17
extremely severe	0.49	0.25	0.37	0.19	0.49	0.24	0.41	0.18
Stress General Total	0.63	0.22	0.56	0.22	0.58	0.22	0.63	0.22
Spearman's r coefficient	-0.1256		-0.3428		-0.2472		-0.3182	
P value	0.204		0.0004 *		0.0114 *		0.001 *	

DISCUSSION

A new acute respiratory syndrome with highly infectious potential caused by a new Coronavirus (SARS-CoV-2) was identified in December 2019, arising in Wuhan Province, China. In March 2020, the World Health Organization (WHO) declared Covid-19 a pandemic¹⁸.

As of July 22, 2020, there were already 14 765 256 confirmed cases in 216 countries around the world and 612 054 deaths according to the WHO. In Brazil, in this same period, 2 227 514 cases were confirmed, with more than 82 thousand deaths being registered, with a fatality rate of 3.7%¹⁹.

In this scenario, according to the Ministry of Health, until July 8, 2020, 786 417 suspected cases and 173 400 confirmed cases were reported in health professionals in Brazil, with nursing technicians and assistants (34.4%) and nurses (14.8%) being the most affected. Nursing technicians and assistants also registered a higher percentage of severe cases that required hospitalization (35.6%), and a higher percentage of deaths (42.0%)¹⁹.

This perception of risk negatively impacted nursing professionals, considering the high dissemination and mortality of COVID-19 among them. Therefore, nursing showed a greater predisposition to mental suffering¹⁹.

An integrative literature review of a quantitative and descriptive nature describes that, among the main psychosocial problems found in nursing teams working on the front lines against Covid-19, those that obtained the highest number of citations were anxiety preceded by depression, stress and sleep disorders²⁰.

In a study conducted in Minas Gerais, out of the 490 professionals who participated in the survey in July 2020, the public consisting of 59.6% nurses and 40.4% nursing technicians; 30.4% of respondents had a diagnosis of some mental disorder in the last 12 months, and of these, 38.0% had symptoms of moderately severe or severe depression and the presence of symptoms of Burnout Syndrome was present in 62.4% of professionals²¹.

The impacts on the mental health of health professionals reported during the COVID-19 pandemic included, in addition to depression, the presence of stress, anxiety and insomnia, with the prevalence of anxiety varying between 23.0% and 44.6%, that of stress between 27.4% and 71.5%, with a percentage of insomnia of 34.0%²².

In this study, it was observed that the results obtained among professionals corroborate the prevalence of stress found in the literature (52%), but the prevalence of anxiety (52%) and the insomnia rate (68%) were higher than the references cited.

There is evidence that a high level of stress at work is associated with sleep problems²³. Some studies have shown that people with insomnia can develop anxiety and depression²⁴ and people with anxiety or depression experience insomnia²⁵.

The prevalence of sleep disorders in nursing professionals described in the literature varies between 57% and 87.7%, and in this study a percentage of 75% was found within the reported values²⁶.

The risk factors found in the literature for sleep disorders in nurses were: female gender, working in the emergency room and ICU, many years of service, working frequently in the night shift, professional status, employment relationship and low quality of life²⁷.

Added to these risk factors, there are reports in the literature that individuals under the age of 29 years old showed a higher rate of affective disorder and insomnia when compared to individuals with older ages and with a longer period of service. The evidence is probably justified by the lack of experience and knowledge, which generate a greater degree of concern and, consequently, psychological distress²⁸. It is important to emphasize that, in this study, this age group corresponded to 39% of the sample. And the prevalent presence of women may have been influenced by the predominant character of females in health professions.

The sleep quality of nursing professionals during the COVID-19 pandemic was also studied in relation to sleep duration and latency. In the literature, the mean sleep duration reported is 5.71 hours and the mean sleep latency is 33.49 minutes²⁹. Thus, this study found higher values, with mean sleep duration being 6.3 hours and mean sleep latency 36.6 minutes.

Among other reports about the quality of sleep, it is noted that professionals reported difficulty initiating sleep (76%), difficulty maintaining sleep or morning awakening (81%), nightmares (45%) and use of hypnotics (19%), respectively. Among these, 60% had poor sleep quality, 46% had symptoms of depression and 40% reported symptoms of anxiety³⁰.

As previously mentioned, 84% of professionals presented sleep interruption for some reason at the beginning of this study. However, in the literature, there is a report that normally a third of individuals have sleep interrupted for some reason, not necessarily related to mental disorders, where the difficulty in staying asleep at night can happen due to the need to use the bathroom and the feeling of cold^{31,32}.

The average score of the PSQI of nursing professionals reported in the literature was between 7.32 and 8.48, being higher than that found in this study, even in the face of the COVID-19⁹ pandemic. In this study, the global score was 6.88, showing a score close to the threshold value for poor sleep quality (>5)¹⁶.

The results reported suggest that health professionals who worked in hospital care during the COVID-19 pandemic had a greater impact on levels of anxiety, insomnia and depression. This context requires attention to the mental health of workers, as one can cite the Influenza pandemic in 2003, where in the most affected countries health professionals who were not adequately treated manifested persistent symptoms of insomnia, depression and anxiety for up to two years after the end of the crisis and had their quality of life reduced.

CONCLUSION

Although the questionnaires were applied at a time when professionals did not have a high work demand at the beginning of the pandemic, we can say that there were already symptoms of stress, anxiety, depression and poor sleep quality. As evidenced, 75% of professionals had sleep disturbance, 52% signs of anxiety, 52% signs of stress, 68% with insomnia and 48% had some sign of depression. Regarding the percentage of professionals with sleep and stress disorders, this study showed lower levels compared to the literature. However, regarding the levels of anxiety, insomnia and depression, the levels are higher than those mentioned in the literature, corroborating the impact of the pandemic on the mental health of nursing professionals.

Thus, it is essential to identify the symptoms of depression and anxiety so that the unfavorable outcomes of the pandemic scenario can be minimized, with psychological support and psychiatric and/or psychotherapeutic follow-up being essential to ensure long-term mental health.

REFERENCES

1. Stelnicki AM, Carleton RN, Reichert C. Nurses' mental health and well-being: COVID-19 impacts. *Can J Nurs Res* [Internet]. 2020 [cited 2021 Mar 20]; 52(3):237-9. DOI: <https://doi.org/10.1177/0844562120931623>.
2. Lee SM, Kang WS, Cho AR, Kim T, Park JK. Psychological impact of the 2015 MERS outbreak on hospital workers and quarantined hemodialysis patients. *Compr Psychiatry* [Internet]. 2018 [cited 2021 Mar 20]; 87:123-7. DOI: <https://doi.org/10.1016/j.comppsy.2018.10.003>.
3. Mealer M, Burnham EL, Goode CJ, Rothbaum B, Moss M. The prevalence and impact of post-traumatic stress disorder and burnout syndrome in nurses. *Depress Anxiety*. [Internet]. 2009 [cited 2021 Mar 20]; 26(12):1118-26. DOI: <https://doi.org/10.1002/da.20631>.
4. Rocha PR, David HMSL. Patterns of alcohol and drug consumption in health care professionals: a portrait of students of lato sensu courses in a public institution. *MAD, Rev. Eletrônica Saúde Mental Álcool Drog.* [Internet]. 2015 [cited 2021 Oct 28]; 11(1):42-8. DOI: <http://dx.doi.org/10.11606/issn.1806-6976.v11i1p41-48>.
5. Ratochinski CMW, Powlowytsch PWM, Grzelczak MT, Souza WC, Mascarenhas LPG. Stress in Nursing Professionals: A Systematic Review. *Revista Brasileira de Ciências Sociais RBCS* [Internet]. 2016 [cited 2021 Oct 28]; 20(4):341-6. DOI: 10.4034/RBCS.2016.20.04.12.
6. Fernandes MA, Soares LMD, Silva JS. Work-related mental disorders among nursing professionals: a Brazilian integrative review. *Rev Bras Med Trab* [Internet]. 2018 [cited 2021 Oct 28]; 16(2):218-24. DOI: 10.5327/Z1679443520180228.
7. Almojali AI, Almalki SA, Allothman AS, Masuadi EM, Alaqeel MK. The prevalence and association of stress with sleep quality among medical students. *J Epidemiol Global Health* [Internet]. 2017 [cited 2021 Oct 28]; 7(3):169-74. DOI: <https://doi.org/10.1016/j.jegh.2017.04.005>.
8. Choi E-M, Lee K-S. Effects of Aroma inhalation on Blood Pressure, Pulse Rate, Sleep, Stress, and Anxiety in Patients with Essential Hypertension. *J Korean Biol Nurs Sci* [Internet]. 2012 [cited 2021 Oct 28]; 41-8. DOI: <http://dx.doi.org/10.7586/jkbns.2012.14.1.41>.
9. Niu SF, Chung MH, Chen CH, Hegney D, O'Brien A, Chou KR. The effect of shift rotation on employee cortisol profile, sleep quality, fatigue, and attention level: a systematic review. *J Nurs Res* [Internet]. 2011 [cited 2021 Oct 28]; 19(1):68-81. DOI: <https://doi.org/10.1097/jnr.0b013e31820c1879>.
10. Domingos T, Braga EM. Massage with aromatherapy: effectiveness on anxiety of users with personality disorders in psychiatric hospitalization. *Rev esc enferm USP* [Internet]. 2015 [cited 2021 Oct 28]; 49(3):450-6. DOI: <https://doi.org/10.1590/S0080-623420150000300013>.
11. Sturm H, Rieger MA, Martus P, Ueding E, Wagner A, Holderried M, et al. Do perceived working conditions and patient safety culture correlate with objective workload and patient outcomes: a cross-sectional explorative study from a German university hospital. *PLoS One*. [Internet] 2019 [cited 2021 Oct 28]; 14(1):e0209487. DOI: <https://doi.org/10.1371/journal.pone.0209487>.
12. Greenberg N. Mental health of health-care workers in the COVID-19 era. *Nat Rev Nephrol* [Internet]. 2020 [cited 2021 Oct 28]; 16(8):425-6. DOI: <https://doi.org/10.1038/s41581-020-0314-5>.
13. Maunder R. The experience of the 2003 SARS outbreak as a traumatic stress among frontline healthcare workers in Toronto: lessons learned. *Philos Trans R Soc B Biol Sci* [Internet]. 2004 [cited 2021 Oct 28]; 359(1447):1117-25. DOI: <https://doi.org/10.1098/rstb.2004.1483>.
14. Tam CW, Pang EP, Lam LC, Chiu HF. Severe acute respiratory syndrome (SARS) in Hong Kong in 2003: stress and psychological impact among frontline healthcare workers. *Psychol Med* [Internet]. 2004 [cited 2021 Oct 28]; 34(7):1197-204. DOI: <https://doi.org/10.1017/s0033291704002247>.
15. Lovibond SH, Lovibond PF. *Manual for the Depression Anxiety and Stress Scales*. 2nd Ed. Sydney: Psychology Foundation, 1995.
16. Mollayeva T, Thurairajah P, Burton K, Mollayeva S, Shapiro CM, Colantonio A. The Pittsburgh sleep quality index as a screening tool for sleep dysfunction in clinical and non-clinical samples: a systematic review and meta-analysis. *Sleep Med Rev* [Internet]. 2016 [cited 2021 Oct 28]; 25:52-73. DOI: <https://doi.org/10.1016/j.smrv.2015.01.009>.
17. Parrott AC, Hindmarch I. The Leeds sleep evaluation questionnaire in psychopharmacological investigations—a review. *Psychopharmacology (Berl)* [Internet]. 1980 [cited 2021 Oct 28]; 71:173-9. DOI: <https://doi.org/10.1007/BF00434408>.
18. World Health Organization. *Coronavirus disease (COVID-19)* [Internet] 2020. [cited 2021 Oct 28]. Geneva: WHO. Disponível em: <https://www.who.int/emergencies/diseases/novel-coronavirus-2019>.
19. Brasil. Ministério da Saúde (Br). *Coronavírus Brasil* [Internet] 2020 [citado 2021-10-28]. Geneva: WHO. Disponível em: <https://covid.saude.gov.br/>
20. Paes CLA, Ferreira IP, Gouveia AO, Santos VRC. The psychosocial problems and the mental health of the nursing staff in transcending the postpandemic of Covid-19. *Research, Society and Development* [Internet]. 2021 [cited 2021 Oct 28]; 10(4):e54610414533. DOI: <http://dx.doi.org/10.33448/rsd-v10i4.145331>.
21. Santos KMR, Galvão MHR, Gomes SM, Souza TA, Medeiros AA, Barbosa I R. Depression and anxiety in nursing professionals during the covid-19 pandemic. *Escola Anna Nery* [Internet]; 2021 [cited 2021 Oct 28]; 25(spe):e20200370. DOI: <https://doi.org/10.1590/2177-9465-EAN-2020-0370>.
22. Pappa S, Ntella V, Giannakas T, Giannakoulis VG, Papoutsis E, Katsaounou P. Prevalence of depression, anxiety, and insomnia among healthcare workers during the COVID-19 pandemic: a systematic review and meta-analysis. *Brain Behav Immun* [Internet]. 2020 [cited 2021 Oct 28]; DOI: 10.1016/j.bbi.2020.05.026

23. Badahdah A, Khamis F, Al Mahyijari N, Al Balushi M, Al Hatmi H, Al Salmi I, et al. The mental health of health care workers in Oman during the COVID-19 pandemic. *Int J Soc Psychiatry* [Internet]. 2020 [cited 2021 Oct 28]; 67(1):90-5. DOI: <https://doi.org/10.1177/0020764020939596>.
24. Deng X, Liu X, Fang R. Evaluation of the correlation between job stress and sleep quality in community nurses. *Medicine (Baltimore)* [Internet]. 2020 [cited 2021 Oct 28]; 99(4):e18822. DOI: <https://dx.doi.org/10.1097%2FMD.00000000000018822>.
25. Winkelman, JW. Clinical Practice. Insomnia disorder. *N Engl J Med* [Internet]. 2015 [cited 2021 Oct 28]; 373(15):1437–44. DOI: <https://doi.org/10.1056/NEJMc1412740>.
26. Soehner, AM, Kaplan, KA., Harvey, AG. Prevalence and clinical correlates of co-occurring insomnia and hypersomnia symptoms in depression. *J Affect Disord* [Internet]. 2014 [cited 2021 Oct 28]; 167:93–7. DOI: <https://doi.org/10.1016/j.jad.2014.05.060>.
27. Roodbandi AS, Feyzi V, Khanjani N, Rahimi Moghadam S, Shafieezadeh Bafghi M, Moghadasi M, et al. Sleep Quality and Sleepiness: A Comparison between Nurses with and without Shift Work, and University Employees. *Int J Occup Hyg* [Internet]. 2017 [cited 2021 Oct 28]; 8(4):230-6. Available from: <https://ijoh.tums.ac.ir/index.php/ijoh/article/view/243>.
28. Dong H, Zhang Q, Sun Z. et al. Sleep disturbances among Chinese clinical nurses in general hospitals and its influencing factors. *BMC Psychiatry* [Internet]. 2017 [cited 2021 Oct 28]; 17:241. DOI: <https://doi.org/10.1186/s12888-017-1402-3>.
29. Goulia P, Mantas C, Dimitroula, D. et al. General hospital staff worries, perceived sufficiency of information and associated psychological distress during the A/H1N1 influenza pandemic. *BMC Infect Dis* [Internet]. 2010 [cited 2021 Oct 28]; 10:322. DOI: <https://doi.org/10.1186/1471-2334-10-322>.
30. Tu ZH, He JW, Zhou N. Sleep quality and mood symptoms in conscripted frontline nurse in Wuhan, China during COVID-19 outbreak: a cross-sectional study. *Medicine (Baltimore)* [Internet]. 2020 [cited 2021 Oct 28]; 99(26):e20769. DOI: <https://doi.org/10.1097/md.00000000000020769>.
31. Mellor A, Hamill K, Jenkins MM, Baucom DH, Norton PJ, Drummond SPA. Partner-assisted cognitive behavioural therapy for insomnia versus cognitive behavioural therapy for insomnia: a randomised controlled trial. *Trials* [Internet]. 2019 [cited 2021 Oct 28]; 20(1):262. DOI: <https://doi.org/10.1186/s13063-019-3334-3>.
32. Mcdonnell B, Newcomb P. Trial of essential oils to improve sleep for patients in cardiac rehabilitation. *J Altern Complement Med* [Internet]. 2019 [cited 2021 Oct 28]; 25(12):1193-9. DOI: <https://doi.org/10.1089/acm.2019.0222>.