Original article

Occupational stress and mental health on frontline healthcare workers during COVID-19 pandemic

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Abstract
Introduction. Occupational stress posed a relevant risk for mental health disturbances in healthcare workers during the 2019 Coronavirus pandemic. **Objective.** To determine the relationship between the level of occupational stress and mental health in front-line healthcare personnel against COVID-19. **Methodology.** An analytical cross-sectional study was carried out in the emergency and hospitalization areas of the San Juan de Dios National Hospital in San Miguel, from September to December 2020. A total of 121 workers participated. The occupational stress scales of the International Labor Organization and the abbreviated Goldberg scale were used. Variable correlation analysis was performed using Spearman's coefficient. **Results.** 59.5 % were female and 44.6 % were the nursing staff. 89.3 % had a low level of stress and 79.3 % had an intermediate level of alteration in mental health with a predominance of anxiety (51.2 %) over depression (8.3 %) in nurses and general services personnel between 21 and 40 years. The analysis of the Spearman correlation determined a positive correlation between occupational stress and mental health disorders (R2 0.218; p = 0.016) in workers. **Conclusion.** The study showed a low and intermediate level of occupational stress in mental health; with a positive correlation, which means that the increase in stress can favor the presence of alterations in the mental health status of the worker.

Keywords
Health personnel, COVID-19, occupational stress, mental health.

Resumen
Introducción. El estrés laboral significó un riesgo importante para la presencia de alteraciones de salud mental en trabajadores de salud, durante la pandemia de Coronavirus 2019. **Objetivo.** Determinar la relación del nivel de estrés laboral y salud mental en el personal asignado en primera línea de atención contra el COVID-19. **Metodología.** Se realizó un estudio transversal analítico en las áreas de emergencias y hospitalización del Hospital Nacional San Juan de Dios de San Miguel, de septiembre a diciembre de 2020. Participaron en total 121 trabajadores. Se utilizaron las escalas de estrés laboral de la Organización Internacional del Trabajo y la escala de Goldberg abreviada. El análisis de correlación de variables se realizó por el coeficiente de Spearman. **Resultados.** El 59,5 % de los estudiados son mujeres y el 44,6 % era personal de enfermería. El 89,3 % tenía bajo nivel de estrés y 79,3 % nivel intermedio de alteración en salud mental con predominio de ansiedad (51,2 %), sobre depresión (8,3 %) en enfermeras y personal de servicios generales entre 21 a 40 años. El análisis de la correlación Spearman determinó una correlación positiva entre el estrés laboral y la presencia de alteración de salud mental (R² 0,218; p = 0,016) en el personal de primera línea. **Conclusión.** El estudio demostró un nivel de estrés laboral bajo e intermedio en salud mental; con relación positiva, lo que significa que el aumento de estrés puede favorecer la presencia de alteraciones al estado de salud mental del trabajador.

Palabras clave
Personal de salud, COVID-19, estrés laboral, salud mental.

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Introduction

Occupational stress and mental health have become more relevant issues since the emergence of COVID-19 disease and its rapid spread from China to many countries around the world[1]. Healthcare workers were specially affected by the increased exposure to risk factors inherent to their professional profile, lack of sufficient protective equipment, and inadequate workplace conditions[1,2].

The World Health Organization (WHO) reported that 14 % of the cases of COVID-19 occurred in healthcare workers[3], and the Pan American Health Organization (PAHO) revealed that more than 570 000 healthcare workers were infected in the Americas[4].

The Ministry of Health of El Salvador reported more than 15 446 infected cases on June 2020; 45 were health care workers[5]. The Epidemiology Unit of San Juan de Dios from San Miguel National Hospital (HNSJSM) recorded 511 infected employees until December 2020.

Contingency plans at the national level began with the WHO emergency appeal, which allowed the prioritization of resource supply actions and other guidelines involving health workers[6]. HNSJSM was a national referral center for the population of the eastern region of El Salvador during the pandemic. Its infrastructure and organization of functions were modified in order to respond to the emergency situation that arose. At HNSJSM, local strategies were designed for confronting the COVID-19 pandemic according to the complexity of the areas and available resources.

Uncertainty and exhaustion due to extensive and intense work shifts increased occupational risk for health service providers and evidenced alterations in mental health[7-9].

The evaluation and measurement of occupational stress are essential to know the type of occupation and work environments that generate a higher level of stress, and that allows to obtain a diagnosis of the problem and the opportunity to develop an intervention, thus avoiding the effects on the health of workers alter their performance[10]. The effects can be physiological and cognitive, the latter being behavioral and emotional disturbances[11].

FUNPRES (Pro-Education Foundation of El Salvador) conducted a study on the Salvadoran population during the COVID-19 pandemic, which showed the presence of alterations in mental health[12], especially in those working in areas of direct patient care, which generates the need to explore possible psychological alterations in El Salvador. It prompted this study to determine the possible relationship between occupational stress and mental health among frontline workers against COVID-19.

Methodology

An analytical cross-sectional study was carried out which measured the level of occupational stress and mental health. It estimated the correlation of both variables in multidisciplinary personnel stationed in the frontline of care in the emergency and hospitalization areas of COVID-19 of the HNSJDSM in the second semester of 2020.

The study population was the multidisciplinary personnel who worked in COVID-19 units at that time. A total of 178 people were distributed among nursing (99), medical (23), clinical laboratory (20), radiology (19), and general services (17) personnel. The inclusion criteria were: rotation through the selected units and acceptance of participation in the study.

Workers in the selected units were contacted through their immediate supervisors and were invited to participate through the WhatsApp application, where they received the link to the questionnaire. Responses were requested anonymously. Participants answered the questionnaire between September 2 and December 19, 2020.

The virtual questionnaire was elaborated in Google Forms©, with closed questions and divided into four parts: the first contained the informed consent form, which was adapted from the WHO/Research Ethics Review Committee (WHO/ERC) informed consent form for clinical studies[18]. The second part asked for the respondent's general data; the third contained the International Labor Organization/World Health Organization (ILO/WHO) occupational stress assessment scale supported by Ivancevich and Matterson in 1989[13]. The fourth part, the abbreviated Goldberg scale (GHQ-28), was developed in 1978 from a modified version of the Psychiatric Assessment Schedule, which measured mental health status. The Spanish version was from Lobo, Perez-Echaverria, 1986[14].

After accepting the informed consent, the worker could continue with the next part of the questionnaire; the completion of the general data, followed by the occupational stress evaluation scale that contained 25 items related to seven segments of the work activity: organizational climate, organizational structure, leader's influence, lack of cohesion, territory, technology and group support. Item responses were according to

a Likert scale, with the following options: never, rarely, occasionally, sometimes, frequently, usually, and always. Finally, they had to answer the GHQ-28 about mental health status, which contained 28 items grouped into four subscales: subscale A (somatic symptoms), subscale B (anxiety and insomnia), subscale C (social dysfunction), and subscale D (major depression). The respondent's answer was limited to their mental situation during the previous two weeks. The questionnaire application time was approximately 25 minutes.

The results related to work stress had a minimum score of 25 and a maximum of 175. The total score was in the following ranges: low-stress level when the result is less than 90.2 points; stress between 90.3 and 117.2; intermediate level between 117.3 and 153.2 and a high-stress level greater than 153.3 points[15]. For this study, the construct validity was by expert opinion, and the content validity was by a pilot test. Cronbach's coefficient was 0.908.

The standardization of the results of the mental health status measurement was carried out using Likert-type scoring[16]. Each question had four possible answers (a, b, c, d), which indicated progressively higher levels. These were assigned values from one to four, respectively, obtaining a minimum score of seven points and a maximum of twenty-eight for each subscale. The subscales were divided into three levels of alteration to evaluate the state of mental health. The low level from seven to 14 points, the medium level from 15 to 21 points, and the high level from 22 to 28 points. To evaluate the scale in general, the low level was from 28 to 56 points, the medium level from 57 to 84, and the high level from 85 to 112. Construct validity was performed by expert opinion and content validity in a pilot test. Cronbach's coefficient was 0.932.

Data processing and analysis were performed with Excel® version 2010 and PSPP 4.0, a free version of SPSS®. The descriptive analysis of the respondent's profile was presented in frequency tables, including arithmetic mean, minimum and maximum value, and percentage. The normal distribution of the data was verified by the Kolmogorv-Smirnov test and the value obtained for the stress scale was 1.027 (p = 0.242) and for the mental health scale it was 1.278 (p = 0.07); the correlation of variables was verified by Spearman's coefficient.

The study was approved by the Local Research Ethics Committee of San Juan de Dios National Hospital of San Miguel and the ethical considerations of the Helsinki declaration version 2000[17] were applied.

Results

A total of 121 workers participated in the study with an average age of 33.5 years (minimum: 21, maximum: 60). A total of 59.5 % were female; 38.8 % were male; and 1.7 % preferred not to disclose their gender. The distribution according to profession and area was as follows: 54 nurses (44.6 %), 17 physicians (14 %), 14 clinical laboratorists (11.6 %), 27 radiology (22.3 %), and nine general services (7.4 %). 73 % of the staff had worked more than three months in the area and 91 % performed their duties in rotating shifts. Job stress and mental health disorders were found mainly among those aged 21 to 40 years (80.1 %).

81.5 % of the nursing staff presented a low level of stress, in the case of the medical staff, all presented a low level of stress, as did the clinical laboratory staff. 92.6 % of the radiology staff and 88.9 % of the general services staff presented a low stress level. Thirteen percent of the nursing staff had an intermediate stress level, and 7.4 % of the radiology staff and 11.1 % of the general service staff also had an intermediate stress level. No workers with high stress levels were found. (Figure 1).
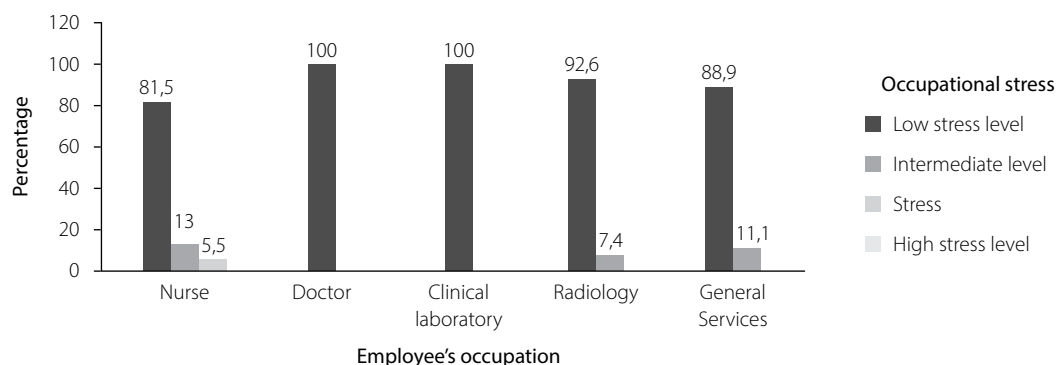

Figure 1. Occupations and their stress levels during 2020

Table 1 shows the results obtained from the occupational stress assessment. 89.3 % of the workers were at a low-stress level. There were no responses at a high level. Only 2.5 % reported stress.

On the other hand, the results according to the dimensions of the ILO-WHO scale showed that the organizational climate generates stress levels ranging from low to high (0.8 % - 81 %). The organizational struc-ture reported low-level values of 82.6 % and 6.6 % of stress; data were not obtained for the high level. In the dimension of technology and leader's influence, the low level was 83.5 %, and the high-stress level was 1.7 % of the participants. In the lack of cohesion item, 89.3 % showed low-stress levels, and 0.8 % showed stress. In the group support item, 92.6 % showed low-stress levels and 1.7 % reached a high-stress level.

Table 1. Occupational stress scale and its dimensions

Occupational stress scale and its dimensions (more specific evaluation of the scale)		Level of occupational stress (general evaluation)									
		Low		Intermediate		Stress		High		Total	
		n	%	n	%	n	%	n	%	n	%
Organizational climate level	Low-stress level	95	78.5	3	2.5	0	0.0	0	0.0	98	81.0
	Intermediate level	11	9.1	5	4.1	0	0.0	0	0.0	16	13.2
	Stress	2	1.7	1	0.8	3	2.5	0	0.0	6	5.0
	High-stress level	0	0.0	1	0.8	0	0.0	0	0.0	1	0.8
	Total	108	89.3	10	8.3	3	2.5	0	0.0	121	100.0
Organizational structure level	Low-stress level	98	81.0	2	1.7	0	0.0	0	0.0	100	82.6
	Intermediate level	8	6.6	4	3.3	1	0.8	0	0.0	13	10.7
	Stress	2	1.7	4	3.3	2	1.7	0	0.0	8	6.6
	High-stress level	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
	Total	108	89.3	10	8.3	3	2.5	0	0.0	121	100.0
Organizational territory level	Low-stress level	103	85.1	5	4.1	2	1.7	0	0.0	110	90.9
	Intermediate level	3	2.5	5	4.1	0	0.0	0	0.0	8	6.6
	Stress	2	1.7	0	0.0	1	0.8	0	0.0	3	2.5
	High-stress level	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
	Total	108	89.3	10	8.3	3	2.5	0	0.0	121	100.0
Group support level	Low-stress level	106	87.6	5	4.1	1	0.8	0	0.0	112	92.6
	Intermediate level	2	1.7	2	1.7	2	1.7	0	0.0	6	5.0
	Stress	0	0.0	1	0.8	0	0.0	0	0.0	1	0.8
	High-stress level	0	0.0	2	1.7	0	0.0	0	0.0	2	1.7
	Total	108	89.3	10	8.3	3	2.5	0	0.0	121	100.0
Lack of cohesion level	Low-stress level	103	85.1	5	4.1	0	0.0	0	0.0	108	89.3
	Intermediate level	5	4.1	4	3.3	3	2.5	0	0.0	12	9.9
	Stress	0	0.0	1	0.8	0	0.0	0	0.0	1	0.8
	High-stress level	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
	Total	108	89.3	10	8.3	3	2.5	0	0.0	121	100.0
Technology level	Low-stress level	94	77.7	7	5.8	0	0.0	0	0.0	101	83.5
	Intermediate level	12	9.9	1	0.8	0	0.0	0	0.0	13	10.7
	Stress	2	1.7	2	1.7	2	1.7	0	0.0	6	5.0
	High-stress level	0	0.0	0	0.0	1	0.8	0	0.0	1	0.8
	Total	108	89.3	10	8.3	3	2.5	0	0.0	121	100.0
Level of leader's influence	Low-stress level	99	81.8	2	1.7	0	0.0	0	0.0	101	83.5
	Intermediate level	9	7.4	4	3.3	1	0.8	0	0.0	14	11.6
	Stress	0	0.0	2	1.7	2	1.7	0	0.0	4	3.3
	High-stress level	0	0.0	2	1.7	0	0.0	0	0.0	2	1.7
	Total	108	89.3	10	8.3	3	2.5	0	0.0	121	100.0

Table 2 shows the results obtained from the mental health evaluation. 79.3 % showed alterations at an intermediate level, 16.5 % at a low level, and only 4.1 % obtained alterations at a high level.

The results related to mental health status reported that 61.2 % presented a medium level of alteration in the psychosomatic symptoms subscale, 19.8 % showed a high level, and 19 % a low level. The anxiety symptoms subscale reported that 51.2 % had an intermediate level of anxiety, 35.5 % had a low level, and 13.2 % had a high level. With symptoms of social dysfunction in daily activities, 79.3 % showed impairment at intermediate level, 18.2 % at a low level, and 2.5 % at a high level. A low level of depression was found in 90.9 %, a medium level in 8.3 %, and a high level in 0.8 % (Table 2).

Figure 2 shows the level of mental health impairment according to the type of profession. On average, 77.9 % reached an intermediate level, 17.3 % a low level, and 7.93 % a high level. The intermediate level was in clinical laboratory personnel (85.7 %) and radiology (88.9 %). Only nursing, radiology, and general services had high levels of mental health disturbance (5.5 % -11.1 %).

The results of the correlation analysis through Spearman's correlation test (Rho) between occupational stress and mental health status show a positive relationship (Rho = 0.218; $p < 0.05$). It implies that the relationship before the elevation of the stress level also increases the level of alteration of the mental health status in workers (Table 3).

Discussion

During the COVID-19 pandemic, the evaluation of occupational stress and mental health of frontline workers was very relevant[1]. Knowing the experience of personnel in this situation became a strategic point to improve human resource management with a focus on workplace safety.

Thus, it was found a correlation between occupational stress and mental health level in 121 interviewees, it shows how working conditions can contribute to the development of alterations in the worker's health with manifestations at the psychological level, especially in non-ordinary situations such as those experienced in the COVID-19 pandemic. Similarly, the results of studies conducted in Asian countries in

Table 2. Distribution of altered mental status according to its subscales

Mental health subscales (specific assessment by sub-scales)		Level of alteration of mental health status (general evaluation)							
		Low		Medium		High		Total	
		n	%	n	%	n	%	n	%
Psychosomatic symptoms	Low	14	11.6	9	7.4	0	0.0	23	19.0
	Medium	6	5.0	68	56.2	0	0.0	74	61.2
	High	0	0.0	19	15.7	5	4.1	24	19.8
	Total	20	16.5	96	79.3	5	4.1	121	100.0
Anxiety	Low	20	16.5	23	19.0	0	0.0	43	35.5
	Medium	0	0.0	61	50.4	1	0.8	62	51.2
	High	0	0.0	12	9.9	4	3.3	16	13.2
	Total	20	16.5	96	79.3	5	4.1	121	100.0
Social dysfunction in daily activity	Low	12	9.9	10	8.3	0	0.0	22	18.2
	Medium	8	6.6	85	70.2	3	2.5	96	79.3
	High	0	0.0	1	0.8	2	1.7	3	2.5
	Total	20	16.5	96	79.3	5	4.1	121	100.0
Depression	Low	20	16.5	88	72.7	2	1.7	110	90.9
	Medium	0	0.0	8	6.6	2	1.7	10	8.3
	High	0	0.0	0	0.0	1	0.8	1	0.8
	Total	20	16.5	96	79.3	5	4.1	121	100.0
Social dysfunction in daily activity	Bajo	12	9.9	10	8.3	0	0.0	22	18.2
	Medio	8	6.6	85	70.2	3	2.5	96	79.3
	Alto	0	0.0	1	0.8	2	1.7	3	2.5
	Total	20	16.5	96	79.3	5	4.1	121	100.0

a group of physicians and nurses indicate a correlation with high levels of occupational stress[19,20], in contrast to this study in which the levels were low.

The factors that may have influenced these results were: the period when the study was due to a decrease in cases in El Salvador between September and December 2020. In addition, the hospital prepared a contingency plan during the pandemic (April 2020), which determined the general lines of action taken up by the head offices in their specific strategies considering some factors that affect working conditions and the state of mind of the health personnel according to the experience of other countries[7,8,19,20]. Thus, the management oriented the improvement of the physical space, permanent supply of personal protection and biosafety supplies, and training of the personnel for the management of critical patients; Also, rest areas and schedules, improvements in food, recreational meetings for the care of emotions, continuous rotation of personnel, transfers with a prior medical evaluation, and the option of staying in the hospital for each worker.

In contrast to a study conducted in the Salvadoran population, which reported high values in anxiety and depression disorders[12], this study showed low values in health workers, similar to the findings of Kang *et al.* and Labrague *et al.* in 2020[21,22]. However, Murat *et al.* (2021) and Magnavita *et al.* (2020), reported higher levels of stress and mental health compared to the rest of the society[8,23].

The lack of management of risk factors in the population, such as organizational support, additional disease knowledge, and preventive measures as received by health personnel, are elements that have improved worker resilience in the short term and allow them to adapt positively in stressful situations[24-26]. In 2020 Skalski *et al.* demonstrated the positive effect on the population when it benefits from interventions that improve mental health[27].

Regarding age, sex, profession, and time working in frontline areas, some differences showed that people who aged 21 to 40 years, women and nurses with more than three months in the area presented higher percentages of stress and mental health disorders. These results coincide with studies in 2020, which showed that women are more likely to have psychosocial risk than men[28,29]. On the other hand, most nurses are female and are the closest to the patient throughout the care process[30,31]. It increases the risk of exposure derived from care[32].

Zhang *et al.* (2020) and Torrente *et al.* (2021) did not report results consistent with those previously mentioned. In their study, medical personnel were more affected by stress, anxiety, and depression[33,34] and as for age, this research reported high levels of stress in young people and adults (21-50 years) in contrast to other studies where older adults were affected in addition to young people[28,29]. The results in this study are likely due to the fact that the older staff did not have direct patient care functions and work teams had young adults.

This study also revealed that general service and clinical laboratory personnel presented high levels of occupational stress and mental health alterations. It is similar to what happened to nurse personnel since close contact with the patient increases work risk and stress, as showed in a study in Asia and Europe where physicians were more affected by this condition[35].

It is important to emphasize that the study has some limitations concerning the collection of information. It was impossible to obtain the opinion of all frontline personnel (pharmacy personnel and medical documents) even though meetings were in specific areas and individual consultations to provide explanations of all the doubts that arose. In addition, the result of the action plan, which could have changed stress levels, was not evaluated because it was not the object of the study; however, it is important to take it up in future post-pandemic follow-up research.

Finally, the study showed that it is necessary to undertake preventive and containment actions that can impact worker health and safety[19-35]. Some preventive actions can lead to strength in human resource management with a focus on risk[22,25] and work planning to identify vulnerable groups with particular needs[8] and thus improve assignments[20]. Despite the low-stress level identified, it is significant to consider early psychological support interventions for acute mental disorders[22], as well as continuing education programs that contribute to the resilience of health personnel[24-26]. On the other hand, implementing new technologies, such as telemedicine, can facilitate the care process when the aim is to reduce direct contact as much as possible[29].

Concerning containment actions, it is necessary to prioritize the permanent provision of biosecurity measures[19], detection tests[32], and ensure that workers receive social security benefits for work injuries[20], and in turn, develop training programs that promote knowledge and skills in

patient care and mental health for front-line personnel[8,19,20].

Conclusions

Healthcare personnel stationed on the front line of care during the COVID-19 pandemic showed occupational stress and alterations in mental health. Even though high levels did not reach an alarming percentage to be a positive correlation between occupational stress and mental health status, they revealed personnel vulnerability before organizational and environmental conditions that can be improved not only in routine situations but also in global emergencies, these being effective strategies to reduce occupational risk and increase the quality of health care.

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