



Evaluation of the Relationship between Occupational Stress and Hospital Support among Nurses Caring for COVID-19 Patients: Comparison between Nurses with Experience of Patient Care in Infectious and Non-Infectious Wards

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Abstract

Background: Nursing care activities in the context of infectious epidemics, such as COVID-19, can lead to high levels of stress in nurses.

Objectives: This study aimed to investigate the relationship between the occupational stress and adequacy of hospital support measures among nurses with the experience of caring for patients with infectious and non-infectious diseases during the COVID-19 outbreak.

Methods: This descriptive-analytical and cross-sectional study was conducted on nurses caring for patients with COVID-19 in Imam Reza Hospital Complex in Mashhad, Iran. The sample size was determined at 194 nurses who were selected through random sampling. The data were collected using a standard questionnaire and analyzed through a structural equation modeling approach using Smart PLS software (version 2.0). Moreover, descriptive and inferential statistics were employed for data analysis.

Results: The results of the correlation analysis showed a negative and significant relationship between occupational stress and adequacy of hospital support measures ($P < 0.001$). Furthermore, the mean occupational stress scores of the nurses with the experience of working in infectious and non-infectious diseases wards were 63.96 and 65.34, respectively. Additionally, there was no difference between the mean values of occupational stress of nurses with the experience of working in non-infectious and infectious diseases wards. Moreover, the effects of the control variables of the work shift (morning, evening, or night) and work experience (years) were not significant in this study.

Conclusion: The COVID-19 epidemic caused many nurses to work in new and sometimes stressful environments and conditions. Proper work shifts, improvement of interpersonal communication, and provision of ongoing supportive measures can be effective in reducing occupational stress.

Keywords: COVID-19, Hospital, Occupational stress, Nurses

1. Background

Coronavirus disease 2019 (COVID-19) is one of the most highly infectious diseases that was first reported in December 2019 in Wuhan, China, and affected all countries in the world (1). The severe acute respiratory syndrome (SARS) experience of the medical staff shows that the outbreaks have short- and long-term effects on their mental health (2). Staff satisfaction and occupational stress can affect the quality of services provided to patients (3,4). Among the professions, nursing is a demanding occupation since it requires professional skills, concentration, strong teamwork, and 24-h care provision, especially during epidemics (5,6). In the SARS outbreaks, symptoms of fear and anxiety appeared immediately in the staff with a sudden onset of the acute respiratory syndrome (7). Accordingly, efforts were made to reduce the work pressure of nurses and provide them with personal protective equipment as

well as practical guidance (8).

Since the healthcare workers are exposed to a variety of risks when providing services to patients with COVID-19 (i.e., the transmission of infection to themselves or their families), it is necessary to provide them with protective equipment, hand hygiene, diagnostic facilities, and training. Moreover, it is of critical significance to consider the workload of nurses and physicians (9). In such situations, the management of healthcare centers is more difficult, compared to the normal conditions, since the demand increases suddenly for healthcare (10). Due to the shortage of nursing staff in countries, especially during an epidemic crisis, hospitals have policies, such as the use of volunteers or nurses working in other wards to provide the patients with care (11).

These nurses may not have as much experience and skills as specialized nurses. In other words,

nurses with insufficient skills may experience low self-esteem, less efficiency, and stress when giving care to patients with infectious diseases (12). Based on the results of a study conducted in Australia, 80% of the nurses who volunteered to provide care in critical situations lacked previous experience and were not able to act effectively in critical situations. Therefore, they often experienced more stress, compared to the nurses who worked at emergency wards (13).

Findings of other studies have also shown that the nurses who had the experience of giving care to special patients (i.e., infectious patients) had less stress in the face of outbreaks of infectious diseases (14). The provision of patients with care during outbreaks requires both experience and skill to perform the clinical procedures, and the lack of these characteristics may cause stress and reduce efficiency in employees who do not have the experience of working in such situations (15).

According to the previous responses to Middle East Respiratory Syndrome, medical staff believed that supportive measures would help protect their mental health (16). Moreover, support and education play significant roles in reducing the negative effects on the mental health of the employees (2).

Therefore, necessary measures should be taken to manage these critical situations, reduce work stress, prevent the reduction of the care quality and long-term patient stay, increase patient satisfaction, and achieve optimal clinical results. Furthermore, the staff themselves could encourage other personnel to continue working during the outbreak (11).

Imam Reza Hospital was introduced as one of the centers for the admission of patients affected with COVID-19. Since then, it has focused on providing these patients with equipment and human resources, which led to the involvement of nurses from various wards.

Hence, since the composition of the COVID-19 patient care team includes nurses with and without the experience of caring for infectious patients, there may be differences between the levels of stress and work pressure experienced by the two groups during the care of patients. Moreover, hospitals often provide supportive measures to reduce the workload and stress of the medical staff in times of epidemic crises.

In this regard, this study aimed to investigate the relationship of the level of occupational stress and satisfaction with hospital support measures among the nurses who care for patients with COVID-19 in infectious and non-infectious wards. It was hypothesized that supportive measures have a positive impact on the occupational stress of the nursing staff.

2. Objectives

This study aimed to investigate the relationship between the occupational stress and adequacy of hospital support measures among nurses with the

experience of caring for patients with infectious and non-infectious diseases during the COVID-19 outbreak.

3. Methods

3.1. Study design and setting

This cross-sectional and descriptive-analytic study was conducted in Imam Reza Hospital Complex (IRHC), Mashhad, Iran. This tertiary and teaching hospital with 1100 beds provides care to around 81,000 inpatients annually. The IRHC was designated as the COVID-19 Referral Center, especially in Mashhad (The current metro area population of Mashhad in 2020 was approximately 3,208,000).

During the COVID-19 crisis, in addition to infectious and internal wards, surgical wards were assigned for the care of patients with COVID-19 as well. Therefore, the infectious and non-infectious wards were arranged with a combination of urological and infectious therapists as well as surgical and internal therapists, respectively. The study population included nurses working at the infectious and non-infectious wards of the hospital who cared for patients with COVID-19.

3.2. Sample size

As a rule of thumb, the minimum sample size in partial least squares structural equation modeling (PLS-SEM) should be 10 times greater than the maximum number of inner or outer model links pointing at any latent variable in the model. In other words, it must be 10 times the largest number of paths in either the structural or formative measurement models (17). Therefore, it can safely be concluded that a sample size of 230 was acceptable for this study. In total, 36 nurses were excluded from the study due to non-recording of some essential variables, and finally, the data of 196 nurses were analyzed.

It should be mentioned that the response rate of the questionnaire was 84.35%. The response rate of the main variables in the complete questionnaires was almost 100%; hence, this study was performed with complete data. In the rare case where the data was missing, the type of missing seemed to be missing at random; therefore, it did not cause problems in the interpretation of the results.

3.3. Measurements

In this study, the required data were collected using two questionnaires. The Nursing Stress Scale was developed by Gray-Toft and Anderson (1981) and has been widely used to measure potentially stressful situations in the workplace of nurses. In this scale, the rating is based on the perceived occurrence of the situations with higher scores indicating a greater level of stress.

This 34-item scale included seven subscales, namely "mortality" (n=7), "workload" (n=6), "uncertainty concerning treatment" (n=5), "conflict

with physicians" (n=5), "conflict with nurses" (n=5), "inadequate preparation" (n=3), and "lack of support"

(n=3). The items were scored based on a four-point scale ranging from one (never) to four (very frequently) to describe the frequency of the conditions in the work environment. The psychometric properties of this scale have been confirmed, and the test-retest coefficient for the total scale was estimated at 0.81. Moreover, the internal consistency coefficients ranged from 0.79 to 0.89 for the subscales; besides, the corresponding value was estimated at 0.89 for the total scale (18).

The validity and reliability of the questionnaire have been confirmed in many studies in Iran, such as the studies conducted by Rezaee and Pak (19). It should be noted that the test-retest method was also utilized in this study ($r=0.74$). Furthermore, 16 experts in the Faculty of Nursing and Midwifery, Iran University of Medical Sciences, Tehran, Iran, confirmed its reliability after the necessary revisions.

The second scale was a researcher-made questionnaire developed to measure satisfaction with hospital support measures. It was designed according to the study conducted by Dehghan Nayeri (20) and other similar studies. This 11-item questionnaire included items that could be answered with "sufficient" and "insufficient". Its validity was measured by content validity ratio (CVR), and the CVI was confirmed by 10 experts in Mashhad University of Medical Sciences, Mashhad, Iran. The reliability of this scale was estimated at 0.81 using Cronbach's alpha method.

3.4. Data collection

The data were collected from the nurses working at wards allocated to taking care of the patients with COVID-19 using the stratified random sampling method. Initially, a list of all nurses who had been working in COVID-19 wards for at least two weeks in the past month was obtained from the Nursing Office. Afterward, the list of nurses was sorted based on their 'national identity number' and some 'national identity numbers' were randomly selected by the "RAND" function in Excel (version 2016). The distribution of questionnaires and their collection lasted from April 11 to May 20, 2020. Unnamed coded questionnaires of the nurses were placed in envelopes in their related departments.

After entering the relevant department and coordinating with the relevant head nurse, the questionnaires were handed over to the relevant nurses by one of the researchers according to the identification code on the sheet which indicated the randomly selected nurse. First, explanations about the study were provided to the nurses and oral consent was obtained from them for participation in the study. The nurses were assured that their answers would be kept confidential.

Afterward, the questionnaires were given to the nurses. They were asked to complete the questionnaires by the end of the shift when the

researcher came to collect the questionnaires from the departments. Regarding the nurses who were on the night shift, the questionnaires were given to them in the morning when the shift was being delivered. They were asked to complete the questionnaire during the next shift and bring it back with them.

3.5. Data analysis

Descriptive analysis and analysis of variance (ANOVA) were performed using SPSS software (version 21) to enhance our understanding of the sample characteristics.

The proposed relationships in the conceptual model were evaluated using the PLS-SEM. The partial least squares modeling is a variance-based structural equation approach that allows the analysis of mediator and moderator variables (21-23). This method has fewer assumptions than the covariance-based structural equation method, for instance, it does not require the assumption of normality and less sample size (21-23).

The PLS-SEM method simultaneously minimizes the bias and error variance (24). Moreover, the factor weighting scheme for inner weighting and statistical inferences were based on the bootstrap procedure. Besides the main variables, gender, work shift, work experience, and marital status were included in the structural model as control variables to control the effects of extraneous variables. The PLS-SEM analysis was conducted using the Smart PLS (version 3.0). It should be mentioned that a p-value of less than 0.05 was considered statistically significant.

4. Results

In total, 194 nurses with a mean age of 34.7 ± 12.9 years participated in this study. The majority of the participants were female (78.4%), and 70.1% of them were married. Moreover, 51.5% of the nurses had children. Regarding the type of employment, 30.9%, 36.1%, and 11.3% of them were permanent, contract, and intern employees, respectively, and the rest were casual and corporate. Table 1 shows the demographic characteristics of the participants.

The mean work experience of the nurses was 16.5 years, and the mean hours of their working during the COVID-19 crisis was seven h per month. About 30% and 70% of the respondents were working at the infectious and non-infectious wards, respectively.

The mean occupational stress scores of the nurses in the infectious and non-infectious wards were 63.96 ± 0.01 and 65.34 ± 0.01 , respectively.

There was no significant difference between the two groups of nurses in this regard during the COVID-19 outbreak. Moreover, the highest and lowest mean occupational stress scores in nurses in both wards were related to "mortality" and "lack of support", respectively. Additionally, there was a significant relationship between gender and occupational stress ($P=0.246$).

Table 1. Demographic characteristics of the participants

Variables		Non-infectious nurses	Infectious nurses	p-value
Female	Gender	78.1%	92.9%	0.212
Male		21.9%	7.1%	
Single	Marriage status	25%	31%	0.722
Married		75%	69%	
No	Children	40%	40%	0.481
Yes		60%	60%	
Morning	Work shifts	48.2%	46.4%	0.323
Evening		21.4%	14.3%	
Night		12.5%	14.3%	
Shifts in rotation		17.9%	25%	

In other words, occupational stress was higher in females, compared to males ($P=0.144$). Moreover, occupational stress was higher in single nurses, compared to married ones ($P=0.144$). Regarding other variables, occupational stress showed no significant relationship with the type of employment, work shifts, age, and work experience ($P=0.084$). Furthermore, no significant differences were observed between the two groups of nurses in the infectious and non-infectious wards in terms of the dimensions of "mortality", "workload", "uncertainty concerning

treatment", "conflict with physicians", "conflict with nurses", "inadequate preparation", and "lack of support".

However, eight subscales had a significant relationship with stress, which included "conflict with physicians", "fear of making a mistake when treating the patient", "lack of an opportunity to share experiences and feelings with other personnel in the ward", "feeling of inadequate preparation to meet the emotional needs of the patient", "inadequate information from a physician regarding the medical condition of the patient", "lack of a satisfactory answer to the questions asked by the patient", "making a decision when the physician is unavailable", and "lack of knowledge on what the patients or their families ought to be told about the patient's condition and its treatment".

Table 2 tabulates the level of the satisfaction of nurses with hospital support measures in the infectious and non-infectious wards. The highest satisfaction scores in the infectious and non-infectious wards were related to "reorganization of the hospital under the crisis and timely provision and dispatch of human resources in the ward if necessary" and "exemption of sick and high-risk nurses for the direct care of patients with COVID-19", in that order (Table 3).

Table 2. Occupational stress score of the nurses in the infectious and non-infectious wards

Occupational stress dimension	Mean score			Significance of the difference between A and B (Z)
	C=total (n=190)	A=Infectious (n=58)	B=non-Infectious (n=132)	
Death and dying	14.75/21	14.76/21	14.74/21	0.292
Workload	10.83/18	10.55/18	11.48/18	0.124
Uncertainty concerning treatment	9.49/15	9.39/15	9.72/15	0.483
Conflict with physicians	9.95/15	10.13/15	9.55/15	0.238
Conflict with nurses	9.61/15	9.44/15	10.03/15	0.383
Inadequate preparation	5.32/9	5.25/9	5.51/9	0.395
Lack of support	4.38/9	4.41/9	4.31/9	0.986

Table 3. Comparison of the satisfaction level of nurses with the hospital support measures in the infectious and non-infectious wards

of the No. support	Supportive measures	No. of nurses who evaluated the support as sufficient (%)			Correlation coefficient			Significance of the difference between A and B (Z)
		Total	Infectious	Non-infectious	C=total (n=190)	A=infectious (n=58)	B=non-infectious (n=132)	
Support-1	Provision of appropriate, timely, and continuous training and information for nursing staff during COVID-19 crisis	118 (62%)	44 (75.9%)	74 (54.4%)	-0.208**	-0.270*	-0.211*	-0.39
Support-2	Provision of just-in-time training to reinforce skills and knowledge about safety of nurses in to a patient(s) exposure with COVID-19	106 (55%)	40 (69%)	66 (48.5%)	-0.227**	-0.339**	-0.194*	-0.97

Table 3. Continued

Support	Measure	n (%)	Infected (%)	Non-infected (%)	r	r ²	p	β
Support-3	Provision of appropriate measures to control the spread of COVID-19 in hospitals	108 (56%)	34 (58.6%)	74 (54.4%)	-0.297**	0.087	0.001	-0.301**
Support-4	Provision of personal protective equipment for nursing staff	104 (54%)	34 (58.6%)	70 (51.5%)	-0.263**	0.069	0.001	-0.354**
Support-5	Implementation of well-being and motivational support programs for nursing staff	70 (36%)	24 (41.4%)	46 (33.8%)	-0.287**	0.081	0.001	-0.323**
Support-6	Provision of a plan for housing and compensating the staff who need to be isolated from their family members and are unable to return to work during their isolation period	48 (26%)	16 (27.6%)	32 (23.5%)	-0.196**	0.038	0.001	-0.311*
Support-7	Possibility of quick access to an infectious disease specialist and screening for nurses if needed	120 (65%)	42 (72.4%)	78 (57.4%)	-0.204**	0.042	0.001	-0.335*
Support-8	Provision of access to mental health support for the staff who feel overwhelmed or concerned	90 (48%)	32 (55.2%)	58 (42.6%)	-0.092	0.008	0.001	-0.293*
Support-9	Exemption of high-risk nurses for direct care of patients with COVID-19	156 (82%)	50 (86.2%)	106 (77.9%)	-0.127	0.016	0.001	-0.329*
Support-10	Timely increase of the number of nurses and nurses' aides when needed	150 (78%)	52 (89.7%)	98 (72.1%)	-0.176*	0.031	0.001	-0.265**
Support-11	Reorganization of the hospital in accordance with the crisis, such as the creation of new wards	162 (84%)	56 (96.6%)	106 (77.9%)	-0.006	0.000	0.001	-0.068

* Correlation is significant at the level of 0.05 (2-tailed).

** Correlation is significant at the level of 0.01 (2-tailed).

Furthermore, there was a significant difference between the two groups of nurses working in infectious and non-infectious wards in terms of the two subscales of hospital support measures, including "provision of personal protective equipment for nursing staff" ($Z=2.06$) and "timely increase in the number of nurses and nurses' aides when needed" ($Z=2.49$).

The multi-group analysis was performed for each of the three groups (i.e., total sample, nurses in infectious and non-infectious wards) to evaluate the relationship between occupational stress and satisfaction with hospital support measures. Statistically, occupational stress had a negative correlation with the four dimensions of hospital support measures in all groups ($P<0.05$). The results showed that in general, hospital support

measures had a significant effect on the occupational stress of nurses ($P<0.01$) (Table 4).

As shown in Figure 1, the evaluation of path coefficients indicates that an increase in hospital support measures will decrease the occupational stress by 0.428 standard deviations if all other variables are kept constant. Moreover, the results of the structural model showed that the significance level for the hypothesized relationships in the whole population was 0.270, which was significant at the level of 1%. The effect of the two control variables, work shift (morning, evening, or night) and work experience (years), was not significant in this study. The results of the path analysis indicated that the research hypotheses reached statistical significance ($P<0.001$).

Table 4. Relationship between hospital support measures and occupational stress of nurses in infectious and non-infectious wards

Path Coefficients (M, SD, t-value) of support -> nurse-stress					
	O	M	SD	SE	t-value (O/SE)
Total sample	-0.426412	-0.474874	0.063346	0.063346	6.731**
Nurses in the infectious diseases ward	-0.512946	-0.545599	0.063866	0.063866	8.032**
Nurses in the noninfectious diseases ward	-0.426412	-0.483214	0.063067	0.063067	6.761**

** Support -> nurse-stress is significant at the 0.01 level

O: original sample, M: sample mean, SD: standard deviation, SE: standard error

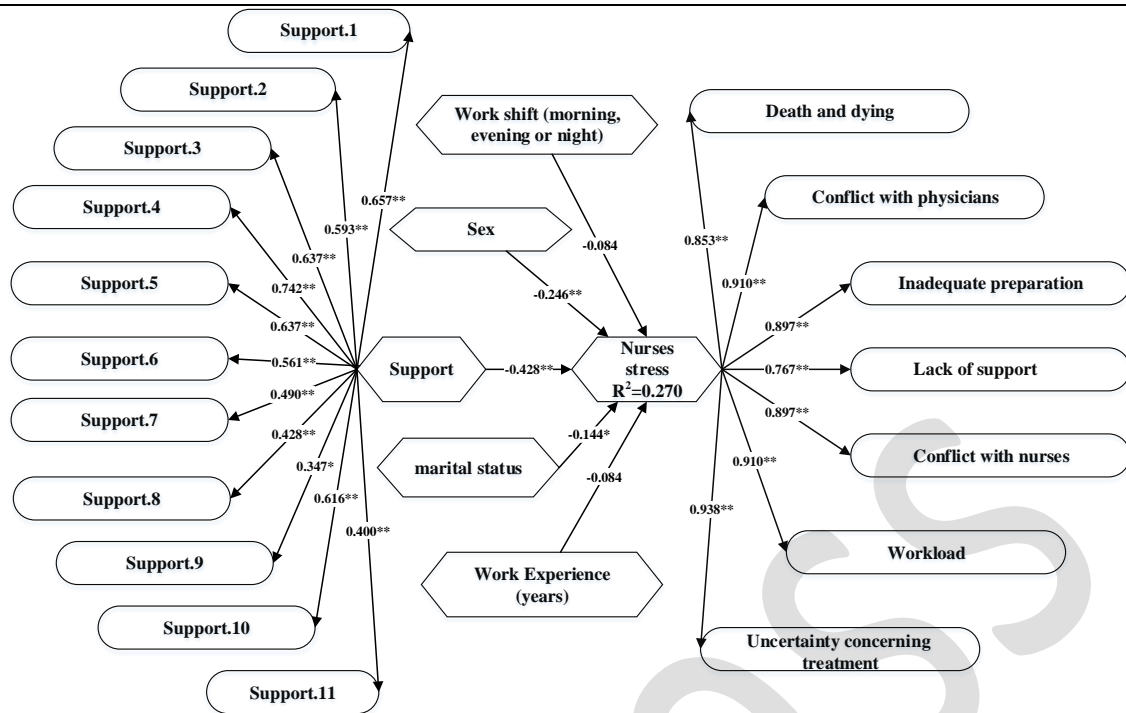


Figure 1. Relationship between hospital support measures and occupational stress among the nursing staff

5. Discussion

The COVID-19 has posed an important public health challenge around the world. This challenge has implications for healthcare workers caring for patients with COVID-19. Since hospital support measures play an important role in reducing occupational stress caused by the outbreak, this study aimed to evaluate the relationship between occupational stress and satisfaction with hospital support measures among nurses caring for patients with COVID-19.

The research hypothesis was tested based on the assumed relationships among the study sample. The results of the correlation analysis showed a negative and significant relationship between occupational stress and support measures which was consistent with the findings of a study conducted by Rezaei (19). According to the aforementioned study, the increase and development of social support could reduce occupational stress in nurses.

Singh et al. (25) stated that the inadequacy of supportive resources was one of the causes of occupational stress in nurses. In a study conducted by Pak et al. (26), a lack of supportive resources was one of the important factors in the occupational stress of nurses. Similarly, Su et al. (27) revealed that social support was an important protective factor for psychological resilience that alleviated mental stress and lifted psychological barriers. Moreover, the results of a study performed by Yu Jiegen (28) indicated that better social support was

a good way to reduce occupational stress among nurses.

Based on the findings of the present study, 40% and 23% of the nurses reported high and very high levels of occupational stress. Considering the stressful nature of the nursing profession, this level of stress obtained in this study is consistent with those in other studies (19,29,30). However, some other studies reported low or moderate levels of stress in nurses (31). It should be noted that this difference may be attributed to the COVID-19 outbreak.

In terms of occupational stressors and stressful situations in this study, it was found that the highest and lowest mean occupational stress scores in nurses were related to the dimensions of "mortality" and "lack of support", respectively. This result was consistent with the findings of the studies carried out by Morteghi Ghasemi (29), Rezaei (19), Hersch Rebekah (32), and Milutinovic (33).

On the other hand, this finding was not consistent with the results of other studies. Ghasemi and Attar (34), Wang et al. (35), as well as French and Kaplan (36), reported "workload", "workload and lack of support", as well as "conflicts between colleagues" as the most important stressors, respectively. This discrepancy may be due to the occurrence of the crisis, differences in personal characteristics of the employees, leadership system, characteristics of the physical work environment, and the perception of the stress of nurses in the

present study.

In addition, the results showed that despite the absence of significant differences between the two groups of nurses in the infectious and non-infectious wards in terms of the occupational stress, nurses in infectious wards showed less stress statistically in eight subscales of the stress. This can be attributed to the skills of these nurses regarding working in stressful conditions, as well as their knowledge about caring for patients in infectious wards or isolated rooms along with feeling more comfortable with protective clothing as a way of personal protection (37,38).

On the other hand, nurses who care for patients with COVID-19 in critical situations with no work experience in infectious wards are exposed to new conditions. These conditions include the increasing number of confirmed and suspected cases, high workload, as well as a shortage of personal protective equipment and medication that may lead to more stress (39,40).

Furthermore, the results showed a significant relationship between gender and occupational stress in a way that occupational stress was higher in females than males. This finding is consistent with the results of other similar studies (41-43). Shojaei et al. (2013) mentioned housework and child care as the reason for this difference (44).

In the same vein, the results of this study showed that occupational stress was higher in single nurses than married ones. Nourian (45) and Adelaide Ofei (46) in their studies showed that single nurses had more occupational stress and lower levels of mental health, compared to married ones. They regarded marriage and support resources as factors in the family to reduce psychological stress in nurses. Other findings in this study showed no significant relationship between occupational stress and age, shift work, work experience, overtime rate, or the number of children. This finding is consistent with the results of other similar studies (44,47,48).

However, Fatma A. Mohamad (49) found that the level of stress of nurses had a statistically significant relationship with the wards they work at, their units, and work shifts. In general, the results of the aforementioned study indicated a relationship between satisfaction with hospital support measures and stress levels of nurses. Furthermore, the level of stress was higher than average among nurses working at infectious and non-infectious wards, which was expected due to the crisis (COVID-19) to some extent.

In several studies, the solutions include: 1) use of material and spiritual incentive policies by hospital managers, 2) fulfillment of the needs of nurses, 3) provision of the necessary equipment for adequate personal protection, 4) programs to train new staff, 5) provision of psychological services to

people with higher levels of stress, 6) provision of arrangements to reduce working hours, and 7) consideration of the problems of nurses (those with special diseases or nurses who are pregnant). These measures can be effective in increasing the satisfaction of nurses and reducing their stress levels, which will ultimately improve the quality and quantity of the care provided to patients with COVID-19.

One of the limitations was that the present study was conducted in one hospital using quantitative methods (questionnaire) to collect data. Therefore, the collected information might not be in-depth data due to the attitudes and beliefs of the individuals. However, attempts were made to overcome this limitation to some extent by visiting the nurses in person. Additionally, since there is a limited number of studies to compare the stress levels of nurses in the present study with those of the nurses before COVID-19, it is of significant importance to consider this issue in data analysis. Accordingly, further research is recommended to evaluate the occupational stress of nurses caring for COVID-19 patients in other hospitals or the hospitals that admit non-COVID-19 patients and compare the results with the findings of the present study.

Another limitation of this study was the lack of previous information on the level of occupational stress of nurses before the COVID-19 crisis. Hence, it is impossible to compare the results of the current study with those of the studies performed before the crisis.

The COVID-19 epidemic imposed conditions on hospitals that were vastly different from the normal conditions. The working conditions of the nurses are also different in terms of the type of disease, personal protection equipment, and work environment. This situation caused nurses to work in unfamiliar situations. Due to the importance of this issue and based on the research findings, it is possible to reduce stress levels by creating an occupational rotation system and making nurses more familiar with working conditions during a crisis, especially infectious epidemics. In addition, reducing working hours and increasing hospital support measures can help reduce the stress levels of nurses.

6. Conclusion

The COVID-19 epidemic caused many nurses to work in new and sometimes stressful environments and conditions. Proper work shifts, improvement of interpersonal communication, and provision of ongoing supportive measures can be effective in reducing occupational stress.

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Footnotes

Author's contributions: S.F., M.Y., and M.H. wrote the first draft of the manuscript. All authors approved the final version of the manuscript.

Conflicts of Interest: Authors declare that they have no competing interests.

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