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Original Article

Investigating the Frequency and Causes of Nursing Errors and their Relationship with Occupational Stress in Nurses of Sirjan Hospitals During the Coronavirus Disease Outbreak

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Abstract

Background: During the outbreak of infectious diseases, the occurrence of numerous psychological reactions in nursing personnel is likely to increase, affecting their mental health. The present study aims to investigate the frequency and causes of nursing errors and their relationship with occupational stress in nurses of Sirjan hospitals during the coronavirus disease 2019 (COVID-19) outbreak.

Methods: In this cross-sectional descriptive-analytical study conducted in 2021, 301 nurses from Sirjan hospitals were included in the study as census. The individual and occupational characteristics information questionnaire, the Nursing Errors Questionnaire, and the Osipow's Occupational Stress Inventory (OSI) were used to collect data. Data were analyzed using SPSS statistical software version 19.

Results: According to the results of this study, 41.2% of nurses reported their occupational stress to be severe. Illegibility of the doctor's medication orders (46.8%), Giving the wrong medicine to the patient (46.2%) were the most common nursing errors. Based on the results, 68.4% of nurses reported the lack of nurses as the most common cause of nursing errors. Also, regarding the relationship between each part of the nursing error questions with the occupational stress mean scores, reading medication orders incorrectly ($P=0.008$) and sending the wrong blood sample ($P=0.002$) had a significant relationship.

Conclusion: Due to the high prevalence of occupational stress and nursing errors, nurses should work in a calm environment that makes appropriate nursing interventions possible and avoids ward overcrowding. Furthermore, nursing managers should act to provide necessary standards, such as appropriate nurse-to-patient ratio and continuous training on infusing drugs.

Keywords: Coronavirus disease 2019, Healthcare workers, Occupational stress, Nursing errors

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Introduction

As of December 2019, the coronavirus disease 2019 (COVID-19) has spread across the world. The rapid rate of infection and human-to-human transmission is the characteristic of COVID-19. Meanwhile, the infection of doctors, nurses, and healthcare workers has been reported to be more likely than other groups (1). Nurses' work environment is constantly occupied by undesirable physical and social stimuli, each of which can be a source of psychological problems, including occupational stress (2). In today's world, occupational stress has turned into a prevalent and costly issue in work environments to the extent that the United Nations has called it a disease specific to the 20th century and the World Health Organization (WHO) has declared it an epidemic problem in recent years (3).

Occupational stress refers to a group of different physical, mental, psychological, and behavioral reactions, that an individual shows against internal and external balance-disrupting factors. (4). Pressures due to high workload, close and constant communication with patients, responsibility for patients' life and death, technological advances, and increased dimensions of nursing care are directly linked to nurses' tensions (5). The American

National Society of Safety Professionals has introduced nursing as one of the top 40 professions with the highest prevalence of stress-based diseases and believes that nursing is probably placed at the top of the most disorders among healthcare professions. Hence, occupational stress can reduce attention, concentration, and judgment skills among nurses and be negatively associated with the quality of care provided, thus increasing the occurrence of nursing errors. (6).

Nursing errors, meaning the negligence of care and nursing standards (7), are among the most crucial challenges of the healthcare system in all countries, constantly being the problem of managers, head nurses, and healthcare service providers (8). Nursing errors are the third leading cause of mortality in the United States, resulting in the death of about 100 000 people annually (9). Nursing errors occur when healthcare service providers choose incorrect care methods or implement them improperly (10). If nursing errors continue for a long time, they can culminate in significant problems, such as increased mortality rate in patients, long duration of hospitalization, increased treatment costs, and dissatisfaction. Among different hospital wards, intensive care units (ICUs) are the chief focus of nursing errors (11).

Numerous challenges and factors lead to the occurrence of nursing errors, including nurses' high workload, high number of patients, patient unstable condition, nurses' lack of awareness, inappropriate work environment, lack of support and cooperation of experienced nurses, etc (11,12). Assessing the type and causes of nursing errors is the first effective step toward preventing and reducing nursing errors (13). On the other hand, timely diagnosis can elevate the quality of care received by patients (14). Thus, it is necessary to have a comprehensive system to investigate errors in the healthcare field (15).

According to the aforementioned materials, occupational stress is one of the most crucial causes of human errors in nurses. This important problem will be solved when the nursing service providing individual can wisely manage work-related needs (16). Due to the significance of this issue and considering that the more mentally healthy nurses are, the better care and interventions they provide for their patients, the current research was conducted to investigate the frequency and causes of nursing errors and their relationship with occupational stress in nurses of Sirjan hospitals during the COVID-19 outbreak. We hope that the results of this study will be an effective step toward recognizing nurses' issues and helping promote the health of individuals and society during epidemics such as COVID-19.

Methods

Participants and study design

The present cross-sectional descriptive-analytical research was conducted to determine the frequency and causes of nursing errors and their relationship with occupational stress in nurses of Sirjan hospitals during the COVID-19 outbreak in 2021. The research community consisted of all nurses working in the educational hospitals of Sirjan (Imam Reza Hospital, N = 257; Dr. Gharazi Hospital, N = 150). In this study as a census, of 407 questionnaires that were provided to nurses, 301 were entirely completed (response rate = 74%). After approving the project at Sirjan Faculty of Medical Sciences (99000059), obtaining the code of ethics (IR.SIRUMS.REC.1400.006), and receiving a letter of introduction from Sirjan Faculty of Medical Sciences, the researcher visited the intended hospitals in different shifts and, after explaining the research objectives to the nurses, provided them with the questionnaire and collected the completed questionnaires from the staff in the same shift or the next shift. The inclusion criteria included working in the nursing profession at the time of completing the questionnaires, having clinical work experience, and holding a bachelor's degree and above in nursing. The exclusion criteria also included nurses with managerial and supervisory positions, withdrawal or lack of interest in participating in the study, or incomplete questionnaires.

Data collection and tools

In this research, in addition to the individual characteristics questionnaire (including age, gender, type of activity, work experience, hospital and working ward, education level, and marital status), the following two tools were used to measure the research variables.

A. *The Nursing Error Questionnaire:* This questionnaire is one of the clinical governance questionnaires of the Ministry of Health used for research. In the first part of this questionnaire, the frequency of various nursing errors is evaluated in 5 two-choice sections (yes and no): Drug therapy (4 questions), prescription reading (2 questions), care (7 questions), vital signs (4 questions), and report writing (2 questions). In the second part, the causes of nursing errors are evaluated in 4 three-choice sections (unfavorable = 3 points, somewhat favorable = 2, and favorable = 1): Management (5 questions), team coordination (4 questions), environment (3 questions), and education (2 questions). The reliability of this questionnaire has been reported to be 0.82 by Cronbach's alpha coefficient (17).

B. *The Osipow's Occupational Stress Inventory (OSI):* The OSI was designed by Osipow in 1987 to assess the individual's stress from six dimensions: 1- Role workload, 2- role incompetence, 3- role duality, 4- role scope, 5- responsibility, and 6- physical environment. It has been used. This questionnaire contains 60 questions, and each dimension is evaluated by 10 statements. This questionnaire is scored on a 5-point Likert scale (never = 1, sometimes = 2, often = 3,

usually = 4, and most of the time = 5). The scores range from 60 to 300, with higher scores indicating the individual's high level of stress. The validity and reliability of the Persian version of this questionnaire have been confirmed many times. In Amanian and colleagues' study, the reliability coefficient was reported to be 0.88 using Cronbach's alpha method (15,18,19).

Statistical analysis

Frequency (percentage) and mean (standard deviation [SD]) were used to describe categorical and continuous variables, respectively. According to the assumptions (normality and homogeneity of variances) related to each test, the one-way analysis of variance (ANOVA), the Kruskal-Wallis test, and the Mann-Whitney U test were used for analysis. The normality of the data was assessed using the Kolmogorov-Smirnov test and the homogeneity of variances was assessed using the Levene's test. The significance level was 0.05 and data were analyzed using SPSS-19 statistical software.

Results

In this study, the nurses' mean (SD) age was 33.7 ± 6.1 years, and their mean (SD) work experience was 7.4 ± 5.4 years. Of 301 nurses participating in the study, 266 were female (88.3%), mostly in the age range of 30-40 (50.5%). Most of the nurses (49.5%) had less than 5 years of work experience, 74.1% were married, 93.4% had a bachelor's degree, and 88.7% reported their type of overtime to be mandatory (Table 1).

The total mean score of occupational stress among nurses was 24.43 ± 3.86. Occupational stress was 24.36 ± 3.89 among female nurses and 24.94 ± 3.65 among male nurses, which were not statistically different ($P = 0.403$). The mean score of occupational stress for 30-40-year-old nurses was 157.6 ± 21.9, which based on the one-way ANOVA, no significant relationship was observed between age and the mean score of occupational stress ($P = 0.070$), while there was a significant relationship between work experience and mean score of occupational stress ($P = 0.035$). The difference in the mean score of occupational stress between nurses with work experience

Table 1. Demographic information of nurses and factors related to occupational stress scores

Variable		Male (n = 35) No. (%)	Female (n = 266) No. (%)	Total (N = 301) No. (%)	Occupational Stress (N = 301) Mean ± SD	*P*
Age	20-30	14 (40.0)	91 (34.2)	105 (34.9)	161.4 ± 21.1	0.070*
	30-40	17 (48.6)	135 (50.8)	152 (50.5)	157.6 ± 21.9	
	40 <	4 (11.4)	40 (15.0)	44 (14.6)	152.3 ± 26.7	
Overtime hour	40 ≤	2 (5.7)	68 (25.6)	70 (23.3)	159.0 ± 21.7	0.863*
	40-80	25 (71.4)	180 (67.7)	205 (68.1)	158 ± 22.6	
	80 >	8 (22.9)	18 (6.8)	26 (8.6)	156.2 ± 34.9	
Work experience (y)	5 ≥	19 (54.3)	130 (48.9)	149 (49.5)	161.2 ± 21.5	0.035**
	5-10	11 (31.4)	64 (24.1)	75 (24.9)	157.8 ± 21.9	
	10 >	5 (14.3)	72 (27.1)	77 (25.6)	152.7 ± 24.2	
Employment status	Training	11 (31.4)	37 (13.9)	48 (15.9)	161.1 ± 24.01	0.169**
	Contractual	7 (20.0)	75 (28.2)	82 (27.2)	160.5 ± 19.5	
	Permanent	17 (48.6)	153 (57.5)	170 (56.5)	156.6 ± 22.8	
Marital status	Single	8 (22.9)	68 (25.6)	76 (25.2)	161.8 ± 23.4	0.056**
	Married	27 (77.1)	196 (73.7)	223 (74.1)	156.9 ± 22.2	
	Divorced	0	2 (0.8)	2 (0.7)	164.0 ± 1.4	
Education level	Bachelor	32 (91.4)	249 (93.6)	281 (93.4)	158.0 ± 22.6	0.775***
	Master	3 (8.6)	17 (6.4)	20 (6.6)	160.2 ± 22.01	
Type of overtime	Mandatory	30 (85.7)	237 (89.1)	267 (88.7)	158.5 ± 22.5	0.310***
	Optional	5 (14.3)	29 (10.9)	34 (11.3)	155.8 ± 22.6	
Ward of hospital	Emergency	12 (34.3)	48 (18.0)	60 (19.9)	157.1 ± 20.6	0.048**
	ICU, CCU	9 (25.7)	71 (26.7)	80 (26.6)	158.1 ± 23.8	
	Infectious	16 (17.1)	73 (27.4)	79 (26.2)	163.5 ± 23.8	
	Children	1 (2.9)	24 (9.1)	25 (8.3)	153.1 ± 22.7	
	Surgery	5 (14.3)	38 (14.3)	43 (14.3)	151.1 ± 24.5	
	Psychiatry	2 (5.7)	12 (4.5)	14 (4.7)	164.5 ± 22.5	

SD: Standard deviation; ICU: Intensive care unit; CCU: Cardiac care unit.
*One-way Analysis of variance; **Kruskal-Wallis test; ***Mann-Whitney U test.

of less than 5 years (161.2 ± 21.5) and those with work experience of more than 10 years (152.7 ± 24.2) was significant ($P = 0.020$). According to the Mann-Whitney U test, marital status ($P = 0.056$), education level ($P = 0.775$), and type of overtime ($P = 0.310$) had no significant relationships with the mean score of occupational stress. A significant relationship was observed between the mean score of occupational stress and the ward of service ($P = 0.048$) (Table 1).

Illegibility of the doctor's medication orders (46.8%), Giving the wrong medicine to the patient (46.2%) were the most common nursing errors. Assessing the relationship between each item of the nursing error questions and the occupational stress scores indicated that only two items (reading medication orders ($P = 0.008$) and sending the wrong blood sample to the laboratory ($P = 0.002$)) were significantly correlated (Table 2).

The most important reason for nursing errors from the perspective of nurses was the lack of nurses (68.4%) and the least important was the colleagues' reproachful treatment (Table 3).

Table 2. The frequency of nursing error questions in the last 6 months and assessing the relationship of each item with the occupational stress scores (N = 301)

Questions		No. (%)	Occupational stress Mean ± SD	*P**
Giving the wrong medicine to the patient	Yes	139 (46.2)	159.3 ± 22.5	0.275
	No	162 (53.8)	157.2 ± 22.6	
Giving the medicine with the wrong dose to the patient	Yes	116 (38.5)	161.2 ± 20.4	0.097
	No	185 (61.5)	156.3 ± 23.6	
Mixing two medicines inside the serum without considering the incompatibility	Yes	108 (35.9)	159.1 ± 21.7	0.741
	No	193 (64.1)	157.6 ± 23.0	
Giving medicine or painkillers without the doctor's prescription	Yes	126 (41.9)	159.9 ± 22.7	0.107
	No	175 (58.1)	156.9 ± 22.3	
Illegibility of the doctor's medication orders	Yes	141 (46.8)	160.7 ± 18.7	0.225
	No	160 (53.2)	155.9 ± 25.3	
Errors in reading medication orders	Yes	127 (42.2)	162.1 ± 20.6	0.008
	No	174 (57.8)	155.3 ± 23.5	
Forgetting an essential nursing care	Yes	132 (43.9)	159.4 ± 21.6	0.537
	No	169 (56.1)	157.2 ± 23.2	
Dressing without full compliance with sterile instructions	Yes	100 (33.2)	158.6 ± 20.5	0.684
	No	201 (66.8)	158.0 ± 23.5	
Sending the wrong blood sample to the laboratory	Yes	92 (30.6)	164.1 ± 21.4	0.002
	No	209 (69.4)	155.6 ± 222.6	
Wrong injection of blood and blood products	Yes	101 (33.6)	159.1 ± 23.7	0.475
	No	200 (66.4)	157.7 ± 22.0	
Not checking the patient's health status	Yes	98 (32.6)	161.1 ± 20.6	0.103
	No	203 (67.4)	156.8 ± 23.3	
Not taking medical history	Yes	94 (31.2)	159.1 ± 20.3	0.565
	No	207 (68.8)	157.7 ± 23.5	
Not taking medical records	Yes	90 (29.9)	157.9 ± 20.5	0.648
	No	211 (70.1)	158.3 ± 23.4	
Carelessness in taking the patient's blood pressure	Yes	92 (30.6)	158.8 ± 23.4	0.584
	No	209 (69.4)	157.9 ± 22.2	
Carelessness in taking the patient's heart rate	Yes	96 (31.9)	160.2 ± 23.5	0.157
	No	205 (68.1)	157.2 ± 22.0	
Carelessness in taking the number of breaths	Yes	101 (33.6)	159.2 ± 21.5	0.593
	No	200 (4.66)	157.6 ± 23.1	
Carelessness in taking the temperature	Yes	78 (25.9)	156.4 ± 20.2	0.315
	No	233 (74.1)	158.8 ± 23.3	
Incomplete reporting	Yes	104 (34.6)	160.2 ± 22.1	0.406
	No	197 (65.4)	157.1 ± 22.8	

SD: Standard deviation; *Mann-Whitney U test.

Discussion

The present study aimed to determine the frequency and causes of nursing errors and their relationship with occupational stress in nurses of Sirjan hospitals during the COVID-19 outbreak. Based on the results of this study, 41.2% of nurses reported their occupational stress to be severe. These results are consistent with other studies conducted in Iran (20,21). Iranian nurses are exposed to high occupational stress due to high workload, lack of nurses, mandatory overtime, and being on the front line of treating epidemic diseases such as COVID-19. Occupational stress increases the possibility of nursing and medical errors, leads to damages to medical systems, and prolongs the duration of hospitalization for inpatients (22).

The results of this study also revealed a significant relationship between work experience and occupational stress in nurses during the COVID-19 outbreak. These results are aligned with previous studies (22). Nurses who have more work experience can easily control stressful situations and lessen emotional pressure. On the other hand, the results indicated that nurses working in ICU/cardiac care unit (CCU) and infectious wards experience higher levels of occupational stress. Nurses in ICU/CCU wards are faced with events, such as the death of clients, putting them under high stress. Special and specialized care requires high scientific level and clinical skills. With the spread of COVID-19, the nurses in infectious wards were exposed to stress and anxiety arising from this unknown disease. The increased workload, the unknown nature of the disease, uncontrollability of the disease, and the likelihood of contracting the medical staff increase occupational stress in nurses (23, 24). In a study in Wuhan, China, HU et al (2020) indicated that nurses on the front line of treatment faced major mental health problems (19). Huang et al showed that during the COVID-19 era, nurses were more anxious, sad, and angry during care than before COVID-19. Thus, by providing nurses with psychological support and timely psychological help and by training coping strategies, it is possible to improve the

Table 3. The frequency (percentage) of the causes of nursing errors according to the nurses participating in the study

Questions	Male (n=35) No. (%)	Female (n=266) No. (%)	Total (N=301) No. (%)
Lack of nurses	23 (65.7)	183 (68.8)	206 (68.1)
Nurses' high workload	21 (60.0)	160 (60.2)	181 (60.1)
Lack of supervision of care	17 (48.6)	131 (49.2)	148 (49.2)
Lack of recording and reporting system	14 (40.0)	117 (44.0)	131 (43.5)
Manager's reproachful treatment	11 (31.4)	130 (48.9)	141 (46.8)
Inappropriate communication between the coordination-care team members	19 (54.3)	119 (44.7)	138 (45.8)
Inappropriate manager-staff communication	13 (37.1)	121 (45.5)	134 (44.5)
Colleagues' reproachful treatment	12 (34.3)	91 (34.2)	103 (34.2)
Responsibilities outside the job description	15 (42.9)	117 (44.0)	132 (43.9)
Inappropriate environmental conditions	13 (37.1)	114 (42.9)	127 (42.2)
Inappropriate physical conditions	14 (40.0)	114 (43.2)	128 (42.8)
Lack of appropriate educational facilities in the workplace	13 (37.1)	110 (41.4)	123 (40.9)
Lack of access to resources	13 (37.1)	100 (37.6)	113 (37.5)
Managers' indifference to training	14 (40.0)	92 (34.6)	106 (35.2)

nurses' ability to regulate their emotions (25).

According to the results of this study, there is a significant relationship between nursing errors and occupational stress. Research has shown that nurses who are more exposed to occupational stress make more errors. A recent review on medication errors among Iranian nurses indicates that 54% of Iranian nurses make medication errors (17,26). In a study entitled "A Narrative Review of the Causes of Nursing Errors and Strategies to Reduce them," Salehi Sahlabadi et al showed that most nursing errors were functional errors (27).

There were limitations in this research. One of these limitations was the concurrent completion of three questionnaires, which was time-consuming and might have made the respondents tired and affected their responses. On the other hand, considering that in Iran limited studies have addressed the types and causes of nursing errors and identifying the error is the first step in preventing such errors, conducting research in this regard seems totally necessary. In addition, it is suggested that the effect of COVID-19 on job satisfaction, anxiety, sleep quality, stress, and coping styles in nurses be investigated in future studies.

Conclusion

During the COVID-19 outbreak, nurses have a high occupational stress, subsequently increasing nursing errors. The results of this research demonstrated that by identifying the frequency and causes of nursing errors in nurses and planning to lower these errors and their causes, it is possible to lay the ground appropriately for providing high-quality care to patients leading to their improvement. On the other hand, as nurses' occupational stress decrease, their efficiency and ability to service provision increase. Moreover, nurses with good mental health are able to relieve stress and anxiety in patients during the COVID-19 outbreak. This research can be an effective step toward identifying the causes of nursing errors and helping health managers under stressful conditions due to the COVID-19 outbreak.

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Authors' Contribution

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Competing Interests

The authors declared no conflict of interest.

Ethical Approval

This study was approved by the Ethics Committee of Sirjan Faculty of Medical Sciences (IR.SIRUMS.REC.1400.006).

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