Investigating the Effect of Appropriate Personal Protective Equipment on the Stress Level of Care Workers in the Covid19 Epidemic

Niki Sadeghipor* and Babak Heidari Aghdam

Health Care Professional, Jam Hospital, Tehran City, Iran

*Corresponding author:
Niki Sadeghipor

✉ shamsi_76@yahoo.com

Tel: 0989124292370

Health Care Professional, Jam Hospital, Tehran City, Iran.

Abstract

Importance: Coronavirus disease (COVID-19) is an infectious disease which caused by a newly discovered coronavirus

Objective: The aim of this study was to investigate the effect of access to personal protective equipment on the level of stress of care workers in epidemic conditions.

Design, settings, and participants: This study is hospital - based and which has been donein two stages. The first phase was performed in February 2020, when the disease had justspread and there were insufficient personal protective equipment, and the second phase wasperformed in February 2021, when it was more than 1 year since the outbreak. The disease wasover and personal protective equipment of sufficient quality was provided to the hospital staff.Census method was used to determine the number of participants in the study. In this study,the researchers conducted their research on all people. They gave the questionnaire to allfront-line care worker second-line care worker of Jam Hospital, which was 537 people. In thefirst stage, 472 questionnaires were filled out. In the second stage, 342 questionnaires werefilledout.

Main outcomes and measures: We focused on symptoms of job stress in Jam Hospital staff. The same questionnaire was used in both stages. Data collection tool is a questionnaire (ENSS) Scale is a revised version of the NSS Nursing Stress Scale developed by Gary Taft andAnderson (1981). NSS is the first tool designed to measure nursing stress instead of overall jobstress. Thirty-four items of the NSS questionnaire measure the frequency and main sources ofstressin thepatientcaresituation.

Results: In the first stage of the research, the level of satisfaction with the quality and availability of personal protective equipment Was 2.9%, stress level was high in 69.6% of employees (stress level was high in 65.3% of front line employees and 74% of second line employees).In the second phase of the study, when the level of employee satisfaction with personal protective equipment reached 97.3%, the level of stress was high in 44.1% of employees (the level of stress was high in 57.2% of front line employees and 31.1% of second line employees). That is, it decreased by 25.5%. In both stages of the research, the amount of stress has a significant relationship with the place of work (first stage p valu=0.013 , second stage p valu= 0.01) and there is no significant relationship between the amount of stress, gender, shift work and education

Keywords: Protective Equipment; Care Workers; Covid19 Epidemic

Introduction

As the coronavirus disease 2019 (COVID-19) pandemic accelerates, Preventing spread of infection to and from health care workers (HCWs) and patients relies on effective use ofpersonal protective equipment (PPE). PPE, formerly ubiquitous and disposable in the hospital environment, is now a scarce and precious commodity in many locations when it is needed most to care for highly infectious patients [1]. Limited knowledge of the new disease has been compounded by a lack of emergency preparedness, with

healthcare organizations dealing with a lack of proper medical and personal protective equipment (PPE) [2 The sheer volume of patients has necessitated the influx of nurses from non-pulmonary disciplines to help treat patients with this respiratory virus [3,4]. This has resulted in unprecedented stress on an already overburdened nursing corps [4]. Nurses' primary concern was the lack of adequate PPE followed by concern for the safety of family and friends More than 85% were afraid to go to work [5]. Adequate PPE could attenuate the possible adverse impact of COVID exposure on mental health by helping nurses feel safer in terms of their own health, their patients and their loved one [2]. HCWs face enormous pressure due to work overload, negative emotions, lack of contact with their families, and exhaustion [6]. The extreme preventive practices and the use of whole-body personal protective equipment (PPE) have been linked to many psychological effects [7]. Stress may be compounded when HCWs are shunned because others, including family, fear that they may transmit infection [3,8]. Analysis of survey responses found anxiety levels were associated with the availability of personal protective equipment (PPE): workers who reported more unmet PPE needs also reported higher levels of anxiety [9].

The aim of this study was to investigate the effect of access to personal protective equipment on the level of stress of care workers in epidemic conditions.

Method Study design

This study followed the Institute for work & health (IWH) reporting guideline. Verbal informed consent was provided by all survey participants prior to their enrollment. Participants were allowed to terminate the survey at any time they desired. The survey was anonymous, and confidentiality of information was assured.

This study is hospital – based and Which has been done in two stages. The first phase was performed in February 2020, when the disease had just spread and there were insufficient personal protective equipment, and the second phase was performed in February 2021, when it was more than 1 year since the outbreak. The disease was over and personal protective equipment of sufficient quality was provided to the hospital staff. The number of patients in the second phase of the study had reached about 119 million To compare the interregional differences of mental health outcomes among health care workers in Iran, All hospitals in Tehran were involved. We chose Jam Hospital as a sample. Because Tehran was most severely affected. Hospitals equipped with fever clinics or wards for COVID 19 were eligible to participate in this survey. This research is applied research and in terms of survey method. The main tool used to collect information in this study is a questionnaire, which was also used to study the evidence to obtain human resource information.

Participant

Census method was used to determine the number of participants in the study. In this study, the researchers conducted their research on all people. They gave the questionnaire to all front-line care worker (nurse, assistant nurse, secretary) second-line care workers (Services, security, chefs and hostesses, facilities) of Jam Hospital,

which were 537 people.In the firststage, 472 questionnaires were filled out. In the second stage, 342 questionnaires were filledout.

Outcomes and Covariates

We focused on symptoms of job stress in Jam Hospital staff. The same questionnaire was used in both stages. NSS is the first tool designed to measure nursing stress instead of overall jobstress. Thirty-four items of the NSS questionnaire measure the frequency and main sources of stress in the patient care situation [10].

In 2000, French et al., In order to identify stressful situations not mentioned in the NSS, as well as to increase the scope of this scale, renewed it. They initially identified twenty stressful situations that were not assessed on the NSS test by conducting a pilot study of Canadian nurses with experience working in a variety of conditions. In the next stage of the research, five more positions were added to the previous positions and the number of new positions was increased to twenty-five positions. The researchers then re-examined the twenty-five added stressful situations to determine conceptual fit with the seven major NSS scales. Of the twenty- five additional positions identified, fourteen positions with five subscales out of the seven major NSS subscales showed conceptual fit. Three situations were grouped under a new scale that showed discrimination in the workplace. Five other situations were grouped under a new subscale for patients and their families. The researchers then measured fifty positions (ENSS) in a large sample (N = 2.280) and according to the obtained results, two positions were removed from the questionnaire. The final version (ENSS) therefore contains fifty-seven expressions in nine subscales. In the present study, due to the standardization of the questionnaires used, their validity is naturally confirmed. During the research of Sharifian et al. (2005) the content validity of this questionnaire has been reported as very good. Cronbach's alpha criterion was used to estimate the reliability and internal consistency of the questionnaire. Regarding ENSS questionnaire, the results showed that the coefficient of the revised scale of nurses (0.96) is higher than the main scale (0.86). Regarding Osipow questionnaire, its reliability was calculated by satisfactory level and its Cronbach's alpha coefficient was calculated and reported equal to (0.86). Fifty-seven questionnaire items are set on a five-point Likert scale, and the subject should choose one of the following options according to the frequency of experience of the desired situation [11].

The answers are:

- I do not have stress at all.

- Sometimes I have stress.

- I often have stress.

- I am very stressed.

- This position does not include my duties.

The Osipow Job Map Questionnaire (1987) by Osipow to assess a person's stress from six dimensions:

- Role loading,

- Role inadequacy,
- Role duality,
- Role scope,
- Responsibility and
- Physical environment have been prepared and used

This questionnaire consists of 60 questions, each of the six dimensions of which are evaluated by ten phrases, respectively

- The "role role" dimension examined the situation of the person in relation to the demands ofthe work environment: the first 10 questions

- The dimension of "role inadequacy" evaluates the appropriateness of skills, education and educational and experimental characteristics of the individual with the needs of the work environment: 10 second question.

- The "role duality" dimension assesses an individual's awareness of priorities, workplace perspectives, and evaluation criteria: 10 Third Question.

- The "role range" dimension evaluates the contradictions that a person has in terms of workconscience and the role that is expected of him in the work environment: 10 fourth question.

- The "responsibility" dimension measures a person's sense of responsibility in terms of workefficiency and the well-being of others in the workplace: 10 fifth question.

- The dimension of "physical environment" examines the unfavorable physical conditions of the work environment to which the person is exposed: 10 Question

The scoring of the Osipow Job Stress Questionnaire based on the 5 Likert scale is as follows: Foreach phrase 5 options, never equal to 1 point, sometimes = 2, often = 3, usually = 4 and most of the time equal to 5 Points are considered. The range of scores of this questionnaire varies between 60 and 300. The higher scores of the subject in this questionnaire indicate the high level of his stress. Also, the overall stress level in the four categories is described in **Table 1.**

Statistical Analysis

Data analysis was performed using SPSS statistical software version 26.0 (IBM Corp). The significance level was set at α = .05, and all tests were 2-tailed. The original scores of the 4 measurement tools were not normally distributed and so are presented as medians with interquartile ranges (IQRs). The ranked data, which were derived from the counts of each level

Table 1 Stress Rate Scores.

Scores	Stress Rate
50-99	Low stress
100- 149	Lowtomedium
150- 199	Moderateto severe
200- 250	Severestress

for symptoms of job stress, are presented as numbers and percentages.

The nonparametric Mann-Whitney U test and Kruskal-Wallis test were applied to compare the severity of each symptom between 2 or more groups. To determine potential risk factors for symptoms of job stress between risk factors and outcomes are presented as odds ratios (ORs) and 95% CIs, after adjustment for confounders, including sex, age, marital status, educational level, technical title, place of residence, working position (first-line or second-line), and type of section.

Results

Demographic characteristics

This research was conducted in two stages. 472 people participated in the first stage and 342 people participated in the second stage. In the first stage, 373(79%) of the front line, 99 (21%) people of the second line. In the first stage, most participants were women (66.5%), had aneducational level of undergraduate or less (55.7%), were day working (50%) andwere aged 36to 45 (50%). In the second stage most participants were women (68.6%), had an educational level of postgraduate (87.3%), were day working (58.2%) and were aged>46 (34.9%) **(Table 2).**

Severity of measurements and associated factors

In the first stage of the research, the level of satisfaction with the quality and availability ofpersonal protective equipment was 2.9%, stress level was high in 69.6% of employees (stress level was high in 65.3% of front line employees and 74% of second line employees).

In the second phase of the study, when the level of employee satisfaction with personalprotective equipment reached 97.3%, the level of stress was high in 44.1% of employees (the level of stress was high in 57.2% of front line employees and 31.1% of second line employees). That is, it decreased by 25.5%. In both stages of the research, the amount of stress has a significant relationship with the place of work (first stage p value=0.013, second stage p value=0.01) and there is no significant relationship between the amount of stress, gender, shift work and education **(Table 3).**

Risk factors of mental health outcomes

Risk Factors of Mental Health Outcomes analysis showed that Employees who, in care workers, the level of stress has a significant relationship with the level of satisfaction with personalprotective equipment. It was higher. The amount of stress also depends on the place of work.Those who were in the front line and in direct contact with patients with covid19 had a higherlevel ofstress thanthestaffofthesecondline.

Discussion

This cross-sectional survey enrolled 472 respondents in first

Table 2 Demographic and working position Characteristics of Responders.

Characteristic / Overall	Total		The first stage of research		The second stage of research	
	first stage	second stage	Front line care worker	second line care worker	Front line care worker	second line care worker
Sex						
Men	127(33.4%)	109(31.4%)	81	46	93	16
Women	253(66.5%)	238(68.6%)	191	62	154	84
Education level Under graduate ≤ Post graduate ≥	212(55.7%)	46(12.7%)				
	168(44.2%)	316(87.3%)	126	86	44	2
			146	22	218	98
Shift Day	189(50%)	211(58.2%)				
Night	189(50%)	151(41.85)	122	67	184	27
			148	41	78	73
Age						
25-35	99(25.3%)	133(33.4%)	78	21	106	27
36-45	196(50%)	126(31.6%)	138	58	107	19
> 46	96(24.5%)	139(34.9%)	65	31	85	54

Table 3 Severity categories of psychosocial factors, stress and satisfaction with personal protective equipment.

		First stage				Second stage			
		Severity category(%)				Severity category(%)			
		Low	Natural	High	P value	Low	Natural	High	P value
Working position	Front line	6.6	28.1	65.6		28.6	14.2	57.2	
	Second line	12	13.8	74	0.013	26.3	36.9	31.1	0.03
sex	Men	55	22.7	22.3		58.5	20.2	21.7	
	Women	49	26.5	24.5	0.29	42.2	23.5	33.3	0.3
Shift	Day	25	35.4	39.6		39	22.7	38.3	
	Night	18.9	39.6	41.5	0.07	49.6	17.6	32.8	0.08
Satisfaction with personal protective equipment		95.1	2		2.9	1.5	1.2		97.3

stage and 342 respondents in second stage and revealed a high prevalence of mental health symptoms among health workers treating patients with COVID-19 in Iran. Overall, in first stage 69.6% of all participants reported symptoms of job stress and in second stage 44.1% all participants reported symptoms of job stress. In the first phase, when Covid19 disease had just started to spread and the personal protective equipment was not sufficiently available to the medical staff, compared to the second phase of the study, which was one year after the spread of the disease and the personal protective equipment was sufficiently available to the staff, The rate decreased by 25.5%. In both stages of the research, most of the participants were female. In the first stage, most of the participants had Undergraduate education and were equally equal in day and night shifts, and most of the participants were between 36 to 45 years old. In the second stage, most of the participants had a university education, were night shifts, and were over 45 years old. In both stages, there was no significant relationship between age, sex of work shift and employee stress level. At both stages the stress was greater on the secretaries and facilities. In both phases, there was a significant relationship between where employees serve and the amount of stress.

Other studies show Preventing spread of infection to and from health care workers (HCWs) and patients relies on effective use of personal protective equipment (PPE) [12]. We expected to see heightened anxiety and depression during this pandemic, but we didn't expect to see levels this high. What's notable is that, if PPE protection and infection control policies and practices are adequate, then this mental health burden can be reduced." [13]. Limited knowledge of the new disease has been compounded by a lack of emergency preparedness, with healthcare organizations dealing with a lack of proper medical and personal protective equipment (PPE) [14]. The sheer volume of patients has necessitated the influx of nurses from non-pulmonary disciplines to help treat patients with this respiratory virus3. This has resulted in unprecedented stress on an already overburdened nursing corps [15]. Nurses' primary concern was the lack of adequate PPE followed by concern for the safety of family and friends More than 85% were afraid to go to work [5 Adequate PPE could attenuate the possible adverse impact of COVID exposure on mental health by helping nurses feel safer in terms of their own health, their patients and their loved one [16]. HCWs face enormous pressure due to work overload, negative emotions, lack of contact with their families, and exhaustion [17]. The extreme preventive practices and the use of whole-body personal protective equipment (PPE) have been linked to many psychological effects [16,18]. Stress may be compounded when HCWs are shunned because others, including family, fear that they may transmit infection [1,7,19-21].

It is true that nurses are in direct contact with the patient and

4

the symptoms of stress are high in them, but the present study shows that secretaries and staff of the second line are at high risk of stress which is usually ignored.

Limitations

This study has several limitations. First, it was limited in scope. All participants were from Jam hospital in Tehran. Second, not all employees were interested in completing the questionnaire. Third, due to the large number of questionnaire questions, participants may not have completed a number of questions accurately. Fourth, due to the prolongation of the epidemic period, the psychological symptoms of the employees may have worsened and it is not possible to follow up.

Conclusions

It study showed that the level of stress is significantly associated with satisfaction with personal protective equipment. At the beginning of Corona, when the means of personal protection were low, the level of stress in the treatment staff was high. After 1 year, when the means of personal protection were abundant and of good quality, the level of stress in the staff was significantly reduced. The amount of stress also depends on the place of work. Those who areat the forefront and in direct contact with patients with covid19 have higher levels of stress.

Support for front-line and second-line staff seems necessary.

References

1   Livingston E, Desai A, Berkwits MJJ (2020) Sourcing personal protective equipment during the COVID- 19 pandemic. JAMA 323: 1912-1914.

2   Arnetz JE, Goetz CM, Sudan S, Arble E, Janisse J, et al. (2020) Personal protective equipment and mental health symptoms among nurses during the COVID-19 pandemic. J Occup Environ Med 62: 892-897.

3   Adams JG, Walls RMJJ (2020) Supporting the health care workforce during the COVID-19 global epidemic. JAMA 323: 1439-1440.

4   Lai J, Ma S, Wang Y, Cai Z, Hu J, et al. (2019) Factors associated with mental health outcomes among health care workers exposed to coronavirus disease 2019. JAMA Netw Open 3: e203976-e.

5   Arnetz JE, Goetz CM, Arnetz BB, Arble E (2020) Nurse reports of stressful situations during the COVID-19 pandemic: qualitative analysis of survey responses. Int J Environ Res Public Health 17: 8126.

6   Kang L, Li Y, Hu S, Chen M, Yang C, et al. (2020) The mental health of medical workers in Wuhan, China dealing with the 2019 novel coronavirus. Lancet Psychiatry 7: e14.

7   Maraqa B, Nazzal Z, Zink T (2020) Palestinian Health Care Workers' Stress and Stressors During COVID-19 Pandemic: A Cross-Sectional Study. J Prim Care Community Health 11: 2150132720955026.

8   Khalid I, Khalid TJ, Qabajah MR, Barnard AG, Qushmaq IA (2016) Healthcare workers emotions, perceived stressors and coping strategies during a MERS-CoV outbreak. Clin Med Res 14: 7-14.

9   Smith PM, Oudyk J, Potter G, Mustard C (2020) Labour Market Attachment, Workplace Infection Control Procedures and Mental Health: A Cross-Sectional Survey of Canadian Non-healthcare Workers during the COVID-19 Pandemic. Annals of Work Exposures and Health 65: 266–276.

10 Ziba FN, Donyayi M, Hannani S (2020) Relationship Between Occupational Stress And Patient Safety Performance Of Operating Room Technologists In Medical-Educational Hospitals Of Iran University Of Medical Sciences In 2016-2017.

11 Phillips CE, King C, Kivisalu TM, O'Toole SK (2016) A reliability generalization of the Suinn-Lew Asian self-identity acculturation scale. Sage Open 2016: 1–15.

12 Wu P, Fang Y, Guan Z, Fan B, Kong J, Yao Z, et al. (2009) The psychological impact of the SARS epidemic on hospital employees in China: exposure, risk perception, and altruistic acceptance of risk. Can J Psychiatry 54: 302-311.

13 Schwartz J, King CC, Yen MY (2020) Protecting healthcare workers during the coronavirus disease 2019 (COVID-19) outbreak: lessons from Taiwan's severe acute respiratory syndrome response. Clin Infect Dis 71: 858-860.

14 Kaloti R (2020) Situational Brief: Palestinian Refugees in the Occupied Palestine Territories during COVID-19. GCRF.

15 Nicks B, Wong OJM (2020) Coronavirus Disease 2019 (COVID-19): A Global Crisis. Medscape.

16 Agresti A, Caffo B (2000) Simple and effective confidence intervals for proportions and differences of proportions result from adding two successes and two failures. The American Statistician 54: 280-288.

17 Abramson LY, Metalsky GI, Alloy LB (1989) Hopelessness depression: A theory-based subtype of depression. Psychological Review 96: 358–372.

18 Kleiman EM, Liu RT, Riskind JH, Hamilton JL (2015) Depression as a mediator of negative cognitive style and hopelessness in stress generation. Br J Psychol 106: 68-83.

19 CDC (2004) Guidance for the selection and use of personal protective equipment (PPE) in healthcare settings.

20 Rubin MA, Samore MH, Harris AD (2018) The importance of contact precautions for endemic methicillin-resistant Staphylococcus aureus and vancomycin-resistant enterococci. JAMA 319: 863-864.

21 Bauchner H, Fontanarosa PB, Livingston EH (2020) Conserving supply of personal protective equipment—a call for ideas. JAMA 323: 1911.