

# Perceived Stress and Quality of Life in Healthcare Workers of Non-COVID-19-Designated Hospitals During the COVID-19 Pandemic in Ukraine

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## Abstract

**Introduction.** Healthcare workers are more vulnerable to negative influences of the Covid-19 pandemic than cross-border travelers as they experience greater occupational stress, exacerbated by the possibility of self-contamination or contamination of their relatives through direct contact with patients, reduced social communication, deterioration in self-care and quality of life due to lack of energy and time.

**The aim** of the study was to assess the level of stress and quality of life in healthcare workers of non-COVID-19-designated hospitals in Ukraine during the COVID-19 pandemic.

**Materials and Methods.** There was carried out a case-control study that included 150 respondents divided into three groups: experimental groups (EG) 1 and 2 comprised 50 physicians and 50 nurses of non-COVID-19-designated hospitals, respectively; the control group (CG) included 50 healthy individuals not working in the healthcare field. The data were collected using paper questionnaires involving sociodemographic questions, the Perceived Stress Scale, and the 36-Item Short Form Health Survey.

**Results.** EG 1 and EG 2 had significantly increased stress levels as compared to the CG. Physical functioning criterion in EG 2 was significantly lower than those in EG 1 and the CG. Vitality and social functioning indicators were significantly lower in EG 1 and EG 2 as compared to the CG. Quality of mental health was worse in EG 1 than in the CG.

**Conclusions.** During the COVID-19 pandemic, healthcare workers of non-COVID-19-designated hospitals experienced a significant reorganization of their work environment, which required them to adjust rapidly to new conditions and psychological difficulties. The medical staff was found to have an increased level of perceived stress and decreased quality of life, which could affect the quality of medical care. Our findings suggest that the COVID-19 pandemic necessitates the development and implementation of stress coping measures to improve mental and physical health of healthcare workers, which can be used to achieve proper work and rest routines, create a microclimate within the team, and restore the work-life balance.

## Keywords

COVID-19; Medical Staff; Stress; Quality of Life

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## Introduction

The world has already seen two major plagues of coronaviruses in the 21<sup>st</sup> century, with multiple infections resulting in two pandemics reported in China in 2003 and 2012. The new version of the virus, which was detected in Wuhan, China, in late June 2019, had a markedly different risk due to genetic mutations and caused a pandemic, thereby placing a question mark over the existence of humanity. It was identified as a pathogen and named the new coronavirus 2019 (2019-nCoV). On March 11,

2020, the World Health Organization declared COVID-19 a pandemic [1, 2]. The disease is caused by the severe acute respiratory syndrome-2 (SARS-CoV-2) coronavirus. It causes significant damage to the body as different respiratory, nervous, and cardiovascular complications occur. SARS-CoV-2 is extremely contagious and pathogenic, creating a life-threatening situation that, for a short period, disrupted world peace and tranquility and paralyzed the global economy. Current activities against COVID-19 include preventing the spread of the disease through social distancing,

controlling the source of infection and effective using antivirals. Due to various problems caused by the virus, it is necessary to focus on fighting this pandemic as quickly as possible [3].

COVID-19 has caused functional change in the healthcare system. The reorganization of the healthcare system due to its spread has led to increased workload, long working hours, discomfort caused by wearing personal protective equipment, high risk of infection, and compromised psychological safety [4, 5].

A complex two-way link between psychological distress and physical symptoms has been established, and the medical community has documented instances in which psychological distress reinforces physical symptoms and vice versa [6, 7]. Consequently, physical symptoms associated with high levels of anxiety in a stressful environment during an illness can lead to excessive effect on the cardiovascular, respiratory, neurological, or gastrointestinal systems, which can significantly impact people's mental health [8]. Remote effects of COVID-19 have been noted, particularly in the form of anxiety disorders, sleep and circadian rhythm disturbances [9–11].

However, healthcare workers are more vulnerable to negative influences of the Covid-19 pandemic than cross-border travelers as they experience greater occupational stress, exacerbated by the possibility of self-contamination or contamination of their relatives through direct contact with patients, reduced social communication, deterioration in self-care and quality of life due to lack of energy and time [12]. They are forced to perform their professional duties with strict adherence to quarantine measures (usage of special protective equipment, compliance with distance measures). Moreover, healthcare workers should work at full capacity, spending close to 16 hours for the follow-up of patients infected with COVID-19 [13, 14].

Fear of illness and death, hopelessness, and the development of depressive symptoms are considered normal reactions in the context of a pandemic. There has been reported an increase in psychological distress among general populations, especially individuals with pre-existing psychiatric dysfunctions and healthcare workers [15]. In addition, the problems encountered by healthcare workers during the COVID-19 pandemic were found to be associated with a high risk of infection and inadequate protection from contamination, overexposure, frustration, isolation, contact with patients having negative emotions, lack of contact with relatives and their rejection [16].

When dealing with these problems, there is a corresponding psychological impact on physicians and medical workers who respond to the treatment. Specifically, medical workers reported signs of post-traumatic stress, depression, insomnia, pronounced signs of anxiety, general psychiatric symptoms, and high levels of work-related stress [17–19].

It should be noted that healthcare practitioners can sometimes face ethical dilemmas in prioritizing a growing number of patients based on risk factors, increased disease severity, and resource availability, that can lead to emotional distress and physical exhaustion [20, 21].

However, there are limited data about the consequences of the COVID-19 pandemic for health professionals of non-COVID-19-designated hospitals.

**The aim** of the study was to assess the level of stress and quality of life in healthcare workers of non-COVID-19-designated hospitals in Ukraine during the COVID-19 pandemic.

## Materials and Methods

### Study Design and Participants

A case-control study was carried out in three Ukrainian healthcare institutions between May–November 2021. The study included 150 respondents divided into three groups: experimental group 1 (EG 1) comprised 50 physicians; experimental group 2 (EG 2) included 50 nurses; the control group (CG) comprised 50 healthy individuals not working in the healthcare field. The number of participants was calculated according to the Altman nomogram and the values were selected that provided a study power of 80%, with a Type I error probability  $\alpha = 0.05$ .

### Inclusion/Exclusion Criteria

Inclusion criteria were as follows:

- working as a physician or a nurse in the non-COVID-19-designated hospital throughout the COVID-19 pandemic for EG1 and EG2, respectively;
- age of 18–59 years;
- being fully vaccinated against COVID-19 at the period of the survey.

Exclusion criteria were as follows:

- age under 18 and over 59 years;
- severe somatic or mental pathology at the time of the survey;
- beliefs about the danger and severity of coronavirus infection clinical course contradicting scientific evidence;
- working in intensive care unit or COVID-19-designated hospital;
- prior self-appeal to a psychologist or a psychotherapist;
- working as a psychologist or a psychotherapist or having close relatives working as a psychologist or a psychotherapist;
- confirmed diagnosis of COVID-19 over the last six months.

### Data Collection Tools

The data were collected using paper questionnaires involving sociodemographic questions (related to age, sex, education level), the Perceived Stress Scale (PSS-10) translated into Ukrainian (Cronbach's  $\alpha = 0.87$ ), and the 36-Item Short Form Health Survey (SF-36) translated into Ukrainian (Cronbach's  $\alpha$  for scales 0.72–0.88).

Stress level was measured using the PSS-10 [22], which includes thoughts and feelings over the last month. Individual scores are within the range of 0 to 40 and are proportional to the level of stress. Each question is evaluated on a 4-point Likert scale, which depends on the frequency of stress sign occurrence, where 0 equals to never and 4

is very often. Scores ranging from 0 to 13 are considered low perceived stress; scores ranging between 14 and 26 are considered moderate perceived stress; scores ranging from 27 to 40 are considered high perceived stress.

The Life Satisfaction Inventory SF-36 was used to assess mental and physical well-being. It contains 36 items comprising 8 scales: physical functioning, role physical, bodily pain, general health, vitality, social functioning, role emotional, and mental health [23]. The results are interpreted as scores from 0 to 100, with higher score representing better mental and physical health. These subscales form two main components – the physical component summary and the mental component summary, by which these dimensions are assessed.

## Data Analysis

MS Excel Office 2016 and EZR 1.34 were used for statistical processing. Analysis of data distribution was performed using the Shapiro-Wilk criterion. For quantitative data, the means (M) and standard errors (m) were calculated. Qualitative results were presented either in absolute (abs.) or relative (%) values. As all groups were normally distributed, there was used one-factor analysis of variance (ANOVA) with the Scheffe's test to compare the quantitative characteristics between the three independent groups. The categorical characteristics were compared using the Pearson's chi-square test with Yates' correction; critical value  $p = 0.05$ . The construct validity of the PSS-10 and SF-36 was assessed by exploratory factor analysis using maximum likelihood estimation. Cronbach's alphas were computed to measure the internal consistency of scales.

## Results

Our study included 150 participants, including 50 physicians, 50 nurses and 50 office employers. The groups were representative by age and sex (Table 1).

There was significant difference by education level between groups, which occurred due to the fact that nurses, as a rule, have a bachelor's degree.

The average values of PSS scores in EG 1 and EG 2 were within a range of moderate-intensity stress –  $18.29 \pm 3.14$  and  $24.67 \pm 2.57$ , respectively, and in the CG, the value was  $12.67 \pm 2.91$  which corresponded to low-intensity stress. There was a statistically significant difference between the groups studied ( $p=0.009$ ). The value was significantly higher in EG 2 as compared to EG 1 ( $p=0.024$ ) and the CG ( $p=0.003$ ), while in EG 1, it was higher as compared to the CG ( $p=0.031$ ).

There were significant differences between groups ( $\chi^2=10.47$ ,  $df=4$ ,  $p=0.034$ ): EG 1 and EG 2 were characterized by higher percentage of participants with moderate and high levels of stress (Table 2).

The values of role physical, bodily pain, general health, and role emotional did not significantly differ between groups (Table 3;  $p > 0.05$ ). Physical functioning criterion revealed statistically significant differences between groups, i.e., in EG 2, it was significantly lower than those in EG 1 and the CG. Vitality and social functioning were significantly lower in EG 1 and EG 2 as compared to the CG. Quality of mental health was worse in EG 1 and EG 2 as compared to the CG (Table 3).

The physical component summary showed no statistically significant differences between all groups ( $p=0.861$ ), whereas the mental component summary in EG 1 was significantly lower ( $p=0.038$ ) as compared to the CG.

Fig. 1 shows the distribution of the mean SF-36 subscale values in the observed groups during the COVID-19 pandemic.

## Discussion

The COVID-19 pandemic significantly affects health and has long-lasting sequelae after an illness [24]. At the same time, the pandemic is a significant psycho-traumatic factor that is particularly prevalent among healthcare workers. We found that during the COVID-19 pandemic healthcare workers of non-COVID-19-designated hospitals had higher level of perceived stress than non-medical workers. In addition, high levels of stress experienced by both medical and nursing staff due to the increased impact of technical and

**Table 1.** Sociodemographic characteristics of study population.

	Groups			p-value
	EG 1 (n=50)	EG 2 (n=50)	CG (n=50)	
Age, years (M±m)	47.24±1.37	44.28±2.15	46.74±1.76	0.762
Sex (female:male)	39 (78%) : 11 (22%)	46 (92%) : 4 (8%)	42 (84%) : 8 (16%)	0.443
Highest education level	Master – 50 (100%)	Master – 2 (4%) Bachelor – 48 (96%)	Master – 43 (86%) Bachelor – 7 (14%)	$p<0.001$

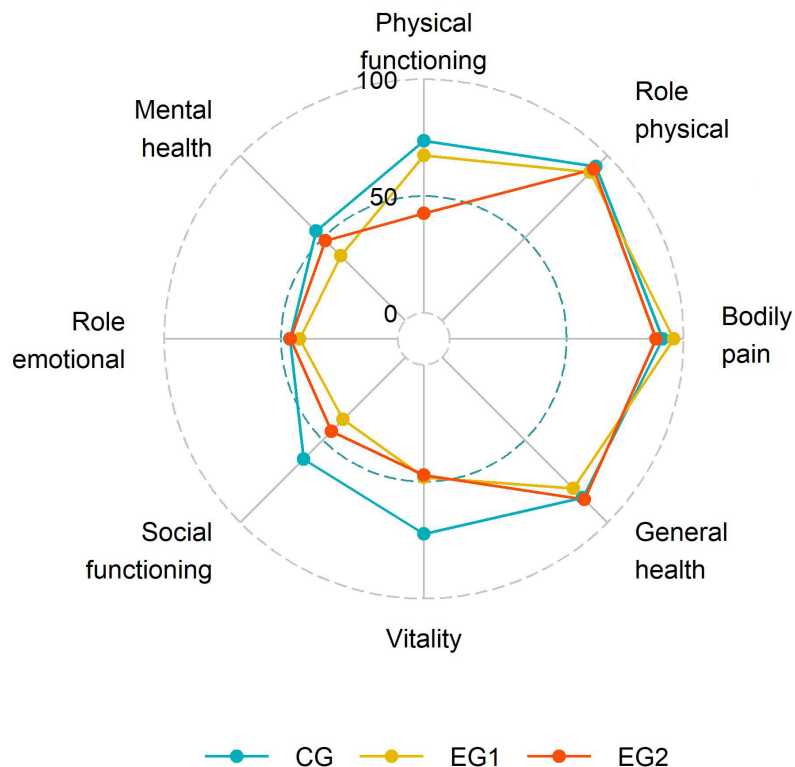
**Table 2.** Level of perceived stress in healthcare workers during the COVID-19 pandemic (abs., %).

Stress level	Groups		
	EG 1 (n=50)	EG 2 (n=50)	CG (n=50)
Low (0-13)	9 (18%)	8 (16%)	19 (38%)
Moderate (14-26)	24 (48%)	19 (38%)	19 (38%)
High (27-40)	17 (34%)	23 (46%)	12 (24%)

**Table 3.** Quality of life of the study population during the COVID-19 pandemic (M±m).

	Groups			p – value*		
	EG 1 (n=50)	EG 2 (n=50)	CG (n=50)	EG1	EG2	CG
Physical functioning	67.34±5.07	42.67±5.19	73.67±4.58	0.009	-	0.238
Role physical	89.71±4.81	91.79±3.92	93.16±4.37	p=0.764	-	0.003
Bodily pain	95.86±5.17	88.34±5.29	91.18±4.93	p=0.547	-	-
General health	79.32±2.19	86.11±3.71	84.92±2.67	p=0.329	-	-
Vitality	48.08±5.76	47.24±4.17	72.41±3.28	0.873	-	0.012
Social functioning	37.69±4.93	44.81±5.24	61.75±4.39	0.873	-	0.007
Role emotional	42.13±3.87	45.97±3.91	46.29±3.66	p=0.661	-	0.014
Mental health	39.22±6.17	48.43±4.56	54.12±5.58	0.321	-	0.028
Physical component summary	57.94±4.48	52.03±4.79	57.72±4.13	p=0.861	-	0.096
Mental component summary	28.78±2.74	35.20±3.14	38.37±3.02	0.041	-	0.038
				EG2	-	0.434

Note: \* – ANOVA with the Scheffe's test.



**Figure 1.** Distribution of the mean SF-36 subscale values in healthcare workers and non-medical specialists during the COVID-19 pandemic.



organizational factors on the healthcare system are particularly noteworthy. Studies conducted in European hospitals during the COVID-19 pandemic showed similar results and demonstrated the elevated levels of stress and anxiety among medical staff and even reported the development of post-traumatic stress disorder [25, 26].

Our study found that mental health, social functioning, and role emotional were the most lowered domains of quality of life, which emphasized a significant impact of the COVID-19 pandemic on mental status and overall quality of life. At the same time, healthcare workers seemed to have worse vitality and physical functioning than non-medical specialists. A study of medical workers in non- and COVID-19-designated hospitals in Vietnam reported a higher rate of mental health problems among medical workers of COVID-19-designated hospitals [27].

There was a statistically significant decrease in social functioning and vitality as well. Author team supposes that it can be attributed to overzealous performance of professional duties, and reduced team communication, as well as communication within the community due to compliance with quarantine requirements.

A decrease in overall quality of life was also found among medical workers in India and Italy [28, 29], indicating similar psychological effects of pandemics throughout the world. Findings of this study demonstrated that during the COVID-19 pandemic, physicians tended to have poor mental health, while nurses were found to have more difficulties with physical functioning as compared to doctors and non-medical specialists. Based on the results of meta-analysis, Pappa S *et al.* [30] concluded that physicians had more symptoms of depression and anxiety than nurses. Nurses' poorer physical functioning might be caused by the nature of their work, where they are required to perform multiple tasks simultaneously, including both administrative and medical work, as well as patient care responsibilities [31].

An important component of full-fledged work of highly qualified medical personnel is the right work-life balance; in case of work-life imbalance, work-family conflict occurs, which can arise as a result of external factors, such as the profession leading to a number of injuries [32]. However, it is worth noting that perceived social support among healthcare workers had a reinforcing effect on their mental health during the COVID-19 outbreak, and thus, family support, friend support, and other types of social support were necessary. These results were associated with domains of quality of life such as physical functioning, energy/fatigue, and emotional well-being [33].

## Limitations

This study has some limitations. The research was conducted in a specific period among healthcare workers who agreed to participate in the study. In addition, we should notice that we had a sample from only one administrative region which might impact the results. The influence of personal characteristics of the respondents, such as emotional intelligence and alexithymia that were not investigated in our study, but they might determine susceptibility to stress

and subjective assessment of quality of life, cannot be excluded [34–36]. Further research ought to include the data on healthcare workers' marital status, medical history and personality traits which may influence the perception of stress among medical workers and their coping strategies.

## Conclusions

During the COVID-19 pandemic, healthcare workers of non-COVID-19-designated hospitals experienced an increased level of perceived stress and decreased quality of life, which could affect the quality of medical care. Both physicians and nurses tended to score lower on vitality and social functioning. However, physicians tended to have poorer mental health, while nurses tended to have poorer physical functioning.

## Practical Recommendations

Our findings suggest that the COVID-19 pandemic necessitates the development and implementation of stress coping measures to improve mental and physical health of healthcare workers in non-COVID-19-designated hospitals, which can be used to achieve proper work and rest routines, create a microclimate within the team, and restore the work-life balance. Moreover, healthcare workers of non-COVID-19-designated hospitals require additional stress management techniques, in particular psychoeducational techniques, to improve their quality of life and maintain the quality of healthcare delivery to the population.

## Ethical Statement

Permissions from the local ethics committee and institution were obtained. The study was conducted according to the principles of the Code of Ethics for a Scientist in Ukraine, the Code of Ethics of Physicians of Ukraine, and the World Medical Organization Declaration of Helsinki.

## Informed Consent

All respondents provided informed consent to participate in the study.

## Acknowledgements

The authors, therefore, gratefully acknowledge the LLC Multidisciplinary Medical Diagnostic and Treatment Center “Medion” for technical and organizational support.

## Conflict of Interest

The authors declare that no conflicts exist.

## Financial Disclosure

This study is supported by the Poltava State Medical University (Research project 0121U108235 “Clinical-psychopathological and paraclinical examinations and optimization of medical and rehabilitation measures at the common forms of mental and comorbid disorders”).

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**Received:** 2022-05-25

**Revision Requested:** 2022-06-22

**Revision Received:** 2022-07-17

**Accepted:** 2022-07-24