

**I.Y. Pinchuk**<sup>1</sup>,  
**V.Y. Pishel**<sup>1</sup>,  
**M.Y. Polyvianaia**<sup>1</sup>,  
**Y.V. Yachnik**<sup>1</sup>,  
**V.V. Virchenko**<sup>2</sup>

## OCCUPATIONAL STRESS IN HEALTHCARE WORKERS DURING A COVID-19 PANDEMIC

*Institute of Psychiatry of Taras Shevchenko National University of Kyiv*<sup>1</sup>

*M. Lomonosov str., 36, Kyiv, 03022, Ukraine*

*Interdisciplinary analytical center on social and economic well-being and mental health of T. Shevchenko National University of Kyiv*<sup>2</sup>

*L. Tolstoi str., 14A, Kyiv, 01004, Ukraine*

*Інститут психіатрії Київського національного університету імені Тараса Шевченка*<sup>1</sup>

*вул. М. Ломоносова, 36, Київ, 03022, Україна*

*Міждисциплінарний аналітичний центр соціально-економічного добробуту*

*та психічного здоров'я Київського національного університету ім. Т. Шевченка*<sup>2</sup>

*вул. Л. Толстого, 14А, Київ, 01004, Україна*

*e-mail: irina.pinchuk0311@gmail.com*

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**Abstract.** *Occupational stress in healthcare workers during a COVID-19 pandemic. Pinchuk I.Y., Pishel V.Y., Polyvianaia M.Y., Yachnik Y.V., Virchenko V.V. Healthcare workers experience overwhelming occupational and psycho-emotional stress during COVID-19 pandemic. Occupational stress leads to emotional burnout, can cause anxiety, depression and other psychopathological symptoms, influencing the quality of medical care. Existing situation necessitates to define risk factors, influencing occupational stress in healthcare workers in order to develop ways and methods to overcome it. Aim of the study was to identify socio-psychological factors associated with occupational stress in healthcare workers during the COVID-19 epidemic in Ukraine. Using a specially designed questionnaire, an online survey of 1,100 medical workers was conducted in all regions of Ukraine. Questioning was carried out over three weeks from 30.03.2020 to 21.04.2020, during the period of quarantine. The majority of respondents were female medical workers (79.9%). Age of respondents: up to 30 years – 179 (16.2%), from 31 to 60 – 824 (75.0%), over 60 – 97 (8.8%), among them doctors – 695 (63.1%) 236 nurses (21.5%), more than a third are general practitioners. Direct care for patients with COVID-19 was provided by 170 (15.5%) medical personnel. The analysis of the results of the questionnaire enabled to determine the peculiarities of medical worker's response to the situation in connection with COVID-19 and highlight the emotional and behavioral factors associated with stress that are significant for most respondents. The study answered the questions regarding the perceived risk associated with the spread, contamination and death related to coronavirus. The most significant factors affecting the occurrence of stress in medical workers are identified. Along with this, factors contributing to stress coping have been identified as well. For subsequent statistical processing, all respondents were divided into two groups depending on the severity of the anxiety/fear. Comparison of these groups by socio-demographic indicators was done using the test  $\chi^2$ . There were no statistically significant differences between groups in all socio-demographic indicators, except for age. That is, only the age factor affected the severity of anxiety/fear among healthcare workers due to COVID-19 ( $p < 0.05$ ). Comparative analysis to assess the severity of stress in groups was performed using the Mann-Whitney U test. Healthcare workers with severe anxiety/fear have a high risk for development of occupational stress during a COVID-19 pandemic ( $p < 0.01$ ). In conclusion, the need for the development and implementation of methods for the prevention of occupational stress in medical workers in the current epidemic situation is substantiated.*

**Реферат.** *Професійний стрес у медичних працівників у період пандемії COVID-19. Пінчук І.Я., Пішель В.Я., Полив'яна М.Ю., Ячник Ю.В., Вірченко В.В. Під час пандемії COVID-19 значне професійне і психоемоційне навантаження відчувають медичні працівники. Професійний стрес сприяє емоційному вигоранню, може викликати тривогу, депресію та інші психопатологічні симптоми, впливати на якість медичної допомоги. Це зумовлює необхідність визначення факторів, що сприяють виникненню професійного стресу в медиків, з метою розробки шляхів і методів його подолання. Мета дослідження – визначення соціально-психологічних чинників, асоційованих з професійним стресом у медичних працівників під час пандемії*

*COVID-19 в Україні. З використанням спеціально розробленої анкети проведено онлайн-опитування 1100 медичних працівників з усіх регіонів України. Анкетування здійснювали в період карантину протягом трьох тижнів, з 30.03.2020 р. до 21.04.2020 р. Основну частину респондентів становили жінки (79,9%). Вік опитаних: до 30 років – 179 (16,2%), від 31 до 60 – 824 (75,0%), понад 60 років – 97 (8,8%), серед них лікарів – 695 (63,1%), медичних сестер – 236 (21,5%), більше третини – лікарі сімейної медицини. Безпосередньо допомогу хворим з COVID-19 надавали 170 (15,5%) осіб. Аналіз результатів анкетування дозволив визначити особливості реагування медичних працівників на ситуацію у зв'язку з COVID-19 і виділити значущі для більшості респондентів емоційні й поведінкові фактори, асоційовані зі стресом. У ході дослідження отримано відповіді на питання щодо оцінки ризиків, пов'язаних з розповсюдженням, зараженням і смертю від коронавірусу. Визначено найбільш значущі фактори, що впливають на виникнення стресу в медичних працівників. Поряд з цим встановлено фактори, що сприяють подоланню стресу. Для подальшого статистичного аналізу всі респонденти були розподілені на 2 групи залежно від рівня тривоги/страху. Порівняння цих груп за соціодемографічними показниками здійснювали за допомогою  $\chi^2$ -критерію Пірсона. Статистично значущих відмінностей між групами за всіма соціодемографічними індикаторами, окрім віку, не виявилось. Тобто тільки віковий фактор мав вплив на рівень тривоги/страху в медичних працівників у зв'язку з COVID-19 ( $p < 0.05$ ). Порівняльний аналіз оцінки вираженості стресу в групах проводили з використанням U-критерію Манна-Уїтні. Встановлено, що медичні працівники зі значною тривогою/страхом мають високий ризик розвитку професійного стресу під час пандемії COVID-19 ( $p < 0.01$ ). У висновку обґрунтовано необхідність розробки і впровадження заходів профілактики професійного стресу в медичних працівників в умовах сучасної епідемічної ситуації.*

The outbreak of the COVID-19 epidemic in December 2019 in Wuhan, China, quickly spread to the global scale and in March 2020 it was classified as a pandemic by WHO. During a pandemic, medical personnel work under increased workload and risk, which can cause significant stress, contribute to emotional burnout, and cause symptoms of anxiety and depression. Quarantine measures are also associated with feelings of exhaustion, anxiety, irritability, insomnia, trouble concentrating, unwillingness to work, or thoughts of being fired [1].

Previous studies have shown that H1N1, SARS and Ebola epidemic along with subsequent quarantine measures has a negative impact on the emotional state of the population and can cause a range of psychopathological symptoms. The long-term consequences of quarantine for medical personnel can result in alcohol abuse and the formation of post-traumatic disorders [6, 8, 14]. Recently, there has been an increase in the number of reports on the development of stress among medical personnel in the context of eliminating the consequences of COVID-19 [2, 5, 11]. It is noted that stress symptoms are observed not only among physicians who directly work with patients with coronavirus, but also among those who are “in the rear” [13]. During the COVID-19, pandemic quarantine and strict biosecurity measures could become powerful stress factors for medical personnel including increased requirements for working conditions, increase in the number of patients, the inability to fully benefit from social support, lack of information about COVID-19, fear of infecting friends and family [9].

Recent studies demonstrate that young female healthcare workers are at increased risk, with no social support, in isolation suffer from stigmatization, nurses, and who have a lower level of

specialized training and less work experience [15]. At the same time, the following determinants can be included in the group of factors that reduce the negative impact of COVID-19 on mental health of medical personnel: a friendly atmosphere in the work environment, improving the health status of infected colleagues; stopping coronavirus infections among medical personnel; organizing a coordinated and flexible work of all departments of the institution, past professional experience, a high level of commitment to professional ethics and integrity [3].

Results of literature review allow to conclude that mental health of medical personnel in the context of overcoming the COVID-19 pandemic requires particular attention and further research not only in connection with the safety of the medical professionals themselves, but also to ensure the efficiency of their work.

The aim of this work is to investigate the socio-psychological factors associated with occupational stress among medical personnel during the COVID-19 pandemic in Ukraine.

#### **MATERIALS AND METHODS OF RESEARCH**

The survey of 1100 medical workers in all regions of Ukraine was conducted using a specially developed online questionnaire. The questionnaire was developed taking into account the results of the survey conducted during SARS epidemic in 2003 [7, 12]. The questionnaire included three groups of questions: 1) types of response to the COVID-19 related situation; 2) factors influencing the stress response of medical personnel; 3) factors that facilitate coping with stress. The questionnaire was posted on the website of the Institute of Psychiatry of the Taras Shevchenko National University of Kyiv. All study participants were informed about the

purpose and methods of the survey, and also gave informed consent to participate in filling in the questionnaire. The research was conducted in accordance with the principles of bioethics set out in the WMA Declaration of Helsinki – “Ethical principles for medical research involving human subjects”. Study was approved by the Institutional Ethics Committee. The survey was carried out over three weeks from 30.03.2020 to 21.04.2020.

Descriptive statistics was used to describe socio-demographic indicators and the distribution of the ratings on online survey items. The Pearson  $\chi^2$  test was used to compare group differences in the categorical variables (socio-demographic characteristics). The nonparametric Mann-Whitney U test was applied to compare the severity of the assessment of each stress factor between 2 groups; p-value <0.05 was considered to be statistically significant. The results of the study were processed using the statistical package of the licensed program TIBCO Statistica 13.4 (No. JPZ808E093701ARACD-3) [4, 10].

Among the 1,100 respondents, the majority were female medical workers (79.9%). By age, all respon-

dents were distributed as follows: up to 30 years old – 179 (16.2%), from 31 to 60 – 824 (75.0%), over 60 – 97 (8.8%). Among them are doctors – 695 (63.1%), nurses – 236 (21.5%), psychologists and other specialists – 169 (15.4%). More than a third of the respondents were family medicine doctors. The main place of work for 414 (37.6%) respondents were centers and outpatient clinics of primary health care, 478 (43.5%) – worked in inpatient medical institutions, 17 (1.5%) – in infectious diseases hospitals, 191 (17.4%) – in other medical institutions. Direct care for patients with COVID-19 was provided by 170 (15.5%) respondents who participate in the survey.

**RESULTS AND DISCUSSION**

The analysis of survey data allows to identify three groups of factors associated with occupational stress of medical personnel during the coronavirus pandemic. The first group is represented by the types of response of medical personnel to the COVID-19 related situation (Table 1).

*Table 1*

**Perception of the COVID-19 related situation (%)**

Questions	No	Yes	Not sure
You are feeling anxiety/fear about COVID-19	33.5	49.0	17.5
You are trying to reduce contact with Covid-19 patients	30.9	59.9	9.1
You are thinking of leaving work	80.0	9.5	10.5
You are thinking of going to the sick leave	84.2	7.6	8.2
You would quit your job if one of your colleagues falls ill with COVID-19	75.4	8.1	16.5
You would quit your job if one of your colleagues dies of COVID-19	64.9	13.2	21.9
You feel like your colleagues are avoiding you because you can have contact with COVID-19	74.9	14.6	10.5
You feel like others are avoiding you because you can have contact with COVID-19	57.1	31.2	11.7
You are annoyed that your workload has increased compared to non-COVID-19- contacting employees	64.5	22.1	13.4

The emotional reaction in the form of anxiety/fear was noted by almost half of the respondents (49.0%) and only a third (33.5%) denied this problem, while 17.5% of medical professionals could not give a definite answer to this question. Therefore, the COVID-19 pandemic is an emotionally significant problem for the majority of surveyed healthcare professionals. At the same time, 22.1% of respondents noted irritation associated with the increased workload compared to employees

who do not work with COVID-19, the majority (64.5%) gave a negative answer, and 13.4% were unable to give a definite answer to this question.

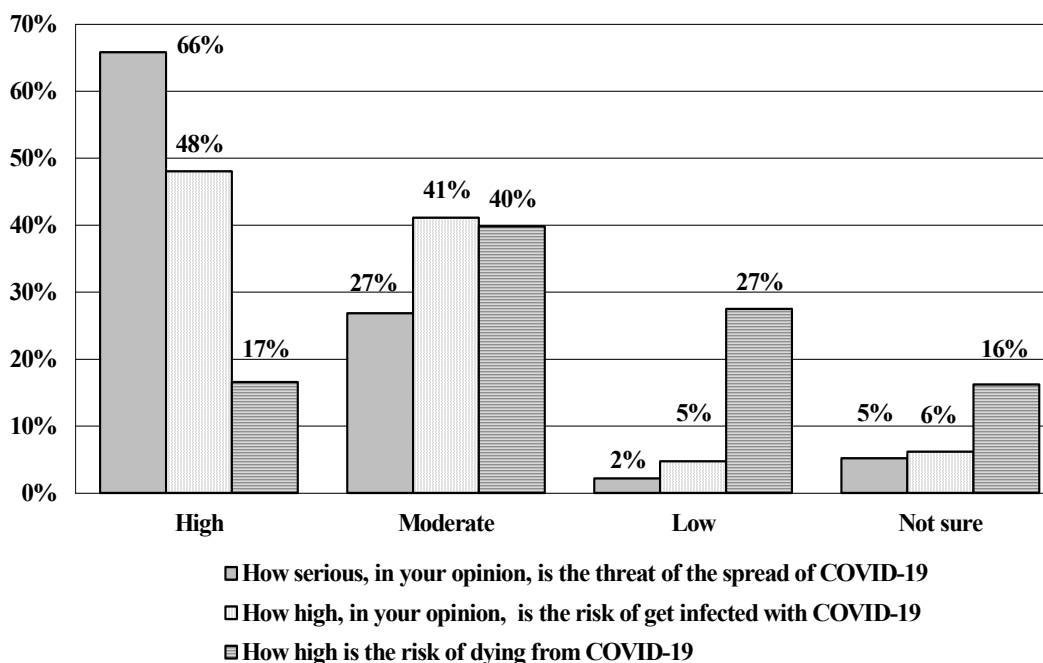
The majority of respondents (59.9%) try to comply with personal safety measures by reducing contacts with patients with COVID-19, including potential ones. Only an insignificant part of the respondents reported that they thought to quit their job (9.5%), even if one of their colleagues had become infected (8.5%) or died from coronavirus

infection (13.2%). Within the existing at the time conditions, only 7.6% of healthcare workers expressed their intention to take sick leave. The survey data indicate that the overwhelming majority of respondents intend to continue their professional activities during the pandemic, despite the pronounced psycho-emotional stress and threat to health and life.

Results of research show that relationship in the professional and personal environment, feeling of support from the team and community become an important factor associated with stress. In this regard, it is important to note that only 14.6% of respondents indicated that medical personnel who do not work with patients with COVID-19 avoid contact with them. At the same time, 31.2% of

respondents noted that people around avoid contact with them, because they are afraid to get infected. At the same time, the majority of survey participants did not experience the impact of such stress factors (74.9% and 57.1%, respectively).

Therefore, analysis of the survey data allows to identify stress factors that were significant for the majority of respondents, namely, emotional (anxiety/fear) and behavioral (limiting contacts with patients with COVID-19). Furthermore, data collected during the survey demonstrate that healthcare professionals differently assess the risks associated with the spread, infection and death from COVID-19 (Figure).



Perceived risk of COVID-19 by medical workers (%)

The majority of respondents (65.8%) consider the spread of COVID-19 to be the most serious threat. The perceived risk of get infected with coronavirus is assessed as high by almost half of medical personnel (48.0%). The same high assessment of the risk of dying from COVID-19 was given by 16.5% of respondents, moderate – 39.8%, while 16.2% of respondents could not give a definite answer, which may be due to the lack of reliable information about the consequences of COVID-19 infection. Noteworthy is the extremely small number of respondents who underestimate the risk of spreading COVID-19 and the risk of coronavirus infection (2.2% and 5.5%, respectively). This fact, in general, testifies to the epidemiological awareness of medical

workers and their adequate assessment of the current epidemiological situation.

The next block of questions was related to the factors affecting the occurrence of stress in healthcare workers. (Table 2). The respondents' assessments of the impact of various stress factors on the mental health of medical personnel varied significantly. A significant part of the respondents (more than 40%) attributed the risk of transmitting the infection to family or friends (49.4%), lack or insufficient protective equipment (47.8%), death of patients with COVID-19 (47.6%), poor effectiveness of personal protective equipment (43.7%) to the key factors that cause great stress for medical personnel.

Table 2

Perceived stress factors (%)

Factors	Not at all stressful	Something causes stress	Causes great stress	Not sure
Get infected with COVID-19	16.3	58.8	18.0	6.9
Transfer COVID-19 to your family or friends	5.6	39.7	49.4	5.4
No information when the COVID-19 outbreak will be under control	18.7	45.6	22.8	12.9
News about new COVID-19 cases on TV / social networks	24.9	48.5	20.9	5.8
Conflict between your duty and your own safety	29.6	45.0	19.0	6.4
Physical exhaustion / fatigue	30.4	42.7	19.9	7.0
No treatment for COVID-19	14.6	40.1	40.3	5.0
To see how patients with COVID-19 die	11.6	32.0	47.6	8.8
Your colleagues stressed or scared	16.7	49.8	26.7	6.7
Lack or insufficient protection	9.7	39.7	47.8	2.7
Poor protection	9.2	43.6	43.7	3.4
Need to wear protective clothing daily	35.5	40.6	19.1	4.8
Lack of staff in your health care institution	31.3	36.9	22.2	9.7
Difficulties to get to work	48.8	24.4	21.3	5.5

A large proportion of respondents experienced a mild stress as for the risk of COVID-19 infection (58.8%), spreading of fear and panic among colleagues (49.8%), information about new cases of COVID-19 infection on TV and in social networks (48.5%), lack of information on successful measures to control the spread of infection (45.6%), conflict between responsibilities and personal safety (45.0%). The group of factors with a relatively low stress potential include difficulties in getting to work (does not cause stress for 48.8% of respondents, causes slight stress for 24.4%), need to wear protective clothing every day (does not cause stress for 35.5% of respondents, causes mild stress for 40.6%), lack of staff in the healthcare institution (does not cause stress for 31.3% of respondents, causes mild stress for 36.9%), physical exhaustion and fatigue (does not cause stress for 30.4% of respondents, causes mild stress for 42.7%).

Therefore, analysis of the survey data allows to identify and rank the stress factors according to the degree of their negative impact on medical personnel, highlighting the most significant among them. Also it is important to take into account not only the stress-generating determinants, but also

factors contributing to overcoming stress. The results of analysis of the corresponding survey data are presented in the table below (Table 3).

Among the factors that facilitate coping with stress, respondents most often indicated the absence of COVID-19 infected among loved ones (58.9% of respondents noted that this factor helps completely and 32.1% of respondents reported that it helps partially). Factors such as the absence of COVID-19 infection among staff, the recovery of COVID-19 patients, and the availability of protective equipment provided approximately the same response to stress. In this regard, the respondents attributed the great importance to the possibility of receiving support both from family and friends (42.2% of respondents noted that this factor helps completely and 40.6% reported that it helps partially) and from colleagues at work (30.4% and 47.7% respectively). Survey data showed that a significant number of respondents assigns an important role in relieving the stress to the opportunity to go in for sports and active leisure (33.4% of respondents noted that this factor helps completely and 38.7% reported that it helps partially) and opportunity of letting out their feelings (14.8% and 30.7%, respectively). In addition, 30.4% of



respondents noted that lack of news in the media about COVID-19 cases helps completely to overcome the stress and 39.0% reported that it helps partially.

It should be underlined that study revealed a rather strong difference among healthcare workers views on the role of additional compensation for working with COVID-19 patients. One third of respondents (35.1%)

believe that this factor does not help to overcome stress, 25.9% noted that this factor helps partially, 20.2% found it difficult to answer, and only 18.7% of respondents indicated that this factor completely helps to overcome stress. The presented data indicate that material incentives at the time of the survey did not have an unconditional priority.

Table 3

### Perceived factors that facilitate coping with stress (%)

Factors	Does not help at all	Helps partially	Helps completely	Unsure
A supportive atmosphere in your office	13.1	47.7	30.4	8.7
Absence of COVID-19 infected among staff	7.9	35.2	51.6	5.4
Recovering patients with COVID-19	6.3	39.7	47.6	6.4
Availability of equipment and means of protection	11.5	47.1	34.0	7.4
Absence of COVID-19 infected among your loved ones	5.2	32.1	58.9	3.8
The likelihood that you will receive additional compensation for working with Covid-19	35.1	25.9	18.7	20.2
To relax, go in for sports, active leisure	18.3	38.7	33.4	9.6
Communicate more often with family and friends to relieve stress and get support	10.5	40.6	42.2	6.7
Absence of news on COVID-19 in media reports in particular on deaths and deaths connected cases	18.0	39.0	30.7	12.2
Ability to "splash" of emotions	35.1	30.7	14.8	19.3

For subsequent statistical analysis, all respondents were divided into 2 groups (A and B) depending on the variant of their answer to the question of the questionnaire "Do you feel the anxiety/fear in connection with COVID-19?" In total, answers were received from 1080 respondents, including 865 of women and 215 of men. Group A consisted of persons who indicated the presence of severe anxiety/fear (223 – 20.7%), group B – all other respondents (857 – 79.3%). To determine indicators of a high risk of anxiety among healthcare workers, an attempt was made to identify significant differences between these groups in socio-demographic indicators (Table 4).

By age, the respondents were presented as follows: under 40 – 43.7% (group A) and 39.9% (group B); 41-60 years old – 40,6% (A) and 50.7% (B); over 60 years old – 15.7% (A) and 9,4% (B). Among young workers under 40, the representation of persons with both severe and mild anxiety (or lack of it)

was approximately the same. Respondents aged 41 to 60 were more likely to experience mild anxiety, while healthcare workers over 60 were significantly more likely to report severe anxiety associated with COVID-19. The differences between the groups were statistically significant, i.e. the influence of the age of healthcare workers on the severity of anxiety in connection with coronavirus disease was established ( $p < 0.05$ ).

The study of the influence of the gender itself and the characteristics of marital status on the level of anxiety did not reveal statistically significant differences in the compared groups. Also, a comparative analysis of some characteristics related to the professional activity of the respondents showed no statistically significant differences in groups A and B ( $p > 0.05$ ). Thus, the above factors do not affect the level of anxiety/fear among healthcare workers during the coronavirus pandemic.

Table 4

**Differences between comparison groups\* in socio-demographic indicators (Pearson's test)**

Socio-demographic indicators	Significance of differences		
	$\chi^2$ **	df***	p-value
Gender	0.684157	1	0.408161
Age	11.5711	4	0.020848****
Marital status	0.928164	3	0.818626
The presence of underage children	0.011945	1	0.912971
Form of residence	2.98506	3	0.393939
Type of health care institution	5.88779	5	0.317299
Profile of the department	10.8875	9	0.283517
Position	4.28357	5	0.509356
Medical specialty	11.3328	12	0.500643

Notes: \* – comparison groups: group A (n=223) – persons who indicated the presence of severe anxiety/fear; group B (n=857) – all other respondents; \*\* – Pearson's  $\chi^2$  test; \*\*\* – degrees of freedom; \*\*\*\* –  $p < 0.05$ .

We also carried out a comparative analysis of the assessment of the severity of stress in groups A and B in connection with the stress factors indicated in the questionnaire (Table 5). These factors caused more pronounced stress among the respondents in

group A ( $p < 0.01$ ). This allows us to conclude that medical workers with severe anxiety/fear have a high risk for development of occupational stress during a COVID-19 pandemic.

Table 5

**Severity of stress in comparison groups\* (Mann-Whitney test)**

Perceived stress factors	Comparison groups* (middle rank)		Significance differences	
	A (n=223)	B (n=857)	U**	p-value
You may get infected by COVID-19	690.71	491.97	57567.500	< 0.01
You can transfer COVID-19 to your family or friends	763.03	476.25	43136.000	< 0.01
You do not know when the COVID-19 outbreak will be under control	695.68	489.34	56056.500	< 0.01
News about new COVID-19 cases on TV / social networks	727.86	479.60	48191.000	< 0.01
Conflict between your duty and your own safety	710.64	482.76	51940.500	< 0.01
Physical exhaustion / fatigue	659.78	492.06	61498.500	< 0.01
No treatment for COVID-19	683.10	487.39	56893.500	< 0.01
To see how patients with COVID-19 die	611.57	494.84	67185.000	< 0.01
Seeing your colleagues stressed or scared	698.41	484.13	53803.000	< 0.01
Lack or insufficient protection	641.40	496.32	65058.500	< 0.01
The need to wear protective clothing daily	614.69	506.07	71208.500	< 0.01
Lack of staff in your health care institution	642.44	490.97	61962.500	< 0.01
Difficulties to get to work	615.78	502.91	70568.000	< 0.01

Notes: \* – comparison groups: group A - persons who indicated the presence of severe anxiety/fear; group B - all other respondents; \*\* – Mann-Whitney U test.



## CONCLUSIONS

The analysis of the survey data demonstrated the extreme urgency of the problem of occupational stress among healthcare workers in the context of the COVID-19 pandemic. In this regard, it is of particular importance to determine the factors that not only cause professional stress, but also factors that influence coping with it. The data obtained in the study provide a basis for the development and implementation of complex preventive and rehabilitation measures, which will stabilize the psycho-

emotional state of medical personnel and improve the quality of medical care.

Conflict of interests. The authors declare no conflict of interest.

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