

Evaluation of anxiety and hopelessness levels in emergency service workers during the COVID-19 pandemic in Turkey

Derya Canlı¹, Sema Can²

¹ Department of Psychiatry, Amasya University Sabuncuoglu Şerefeddin Training and Research Hospital, Amasya, Turkey

² Department of Emergency Medicine, Uşak Training and Research Hospital, Uşak, Turkey

ORCID  of the author(s)

DC: <https://orcid.org/0000-0002-0210-3922>
SC: <https://orcid.org/0000-0002-0992-4192>

Corresponding Author

Derya Canlı

Amasya University Sabuncuoglu Şerefeddin Training and Research Hospital, Department of Psychiatry, Amasya, Turkey
E-mail: derya.canli03@gmail.com

Ethics Committee Approval

The study was approved by the Amasya University Non-Interventional Clinical Research Ethics Committee (2020/43).

All procedures in this study involving human participants were performed in accordance with the 1964 Helsinki Declaration and its later amendments.

Conflict of Interest

No conflict of interest was declared by the authors.

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Abstract

Background/Aim: The COVID-19 pandemic led to a significant threat to the lives of individuals, particularly frontline healthcare workers. This brought about negative emotions, such as anxiety and hopelessness. Despite the existence of research evaluating psychiatric symptoms among healthcare personnel during the COVID-19 pandemic, this study is also significant in terms of evaluating and emphasizing the common negative emotions experienced by frontline healthcare workers during the pandemic. This study aimed to evaluate anxiety and hopelessness levels in emergency service workers during the COVID-19 pandemic and to examine these levels in terms of specific variables.

Methods: This cross-sectional study was conducted among emergency service healthcare workers, including doctors, nurses, and healthcare officers working in a training and research hospital from July 10 to August 10, 2020 during the pandemic. Participants completed a survey that included a sociodemographic information form, the State and Trait Anxiety Inventory (STAI), and the Beck Hopelessness Scale (BHS). A total of 135 personnel without a history of psychiatric illness or use of psychiatric medication were included in the study.

Results: Of the 135 participants in the study, 67 were female, and 68 were male. The mean state anxiety score for all participants was 44.5 (12.6), trait anxiety score was 44.2 (7.3) and hopelessness score was 7.1 (5.2). It was found that the anxiety of emergency service workers during the pandemic was at a moderate level and their hopelessness was at a mild level.

In the study, higher scores were found in hopelessness and state-trait anxiety measurements in married individuals compared to single participants ($P=0.040$, $P=0.003$, $P=0.001$, respectively). Trait anxiety scores were significantly higher among those with chronic diseases compared to those without chronic diseases, and in those living with families compared to those living alone ($P=0.039$ and $P=0.017$, respectively). A positive and moderate relationship was observed between hopelessness levels and state-trait anxiety levels ($P<0.001$ for all, $r=0.457$, $r=0.425$, respectively).

Conclusion: During the COVID-19 pandemic, increased levels of anxiety and hopelessness were detected among healthcare workers in emergency services. It was observed that as the working time in the emergency department increased, hopelessness and state anxiety levels of the employees also increased.

Keywords: COVID-19, emergency service workers, anxiety, hopelessness

Introduction

The COVID-19 outbreak originated in China and subsequently swept across the globe, triggering a significant pandemic. The pandemic fundamentally altered the lives of societies socially, economically, and psychologically. It led to approximately 7 million deaths to date. Healthcare workers also experienced high rates of infection and mortality related to the coronavirus. Indeed, healthcare workers on the front line during the pandemic faced numerous challenges and sources of distress. In addition to the high risk of contracting the disease due to their work in intense and stressful environments, healthcare workers also faced other difficulties including transmission of the disease to their families, being separated from their daily lives, feelings of loneliness, and dealing with uncertainties. These additional factors contributed to the overall burden and psychological impact to their well-being [1,2].

Emergency services are dynamic healthcare units where life-saving treatments are provided for sudden situations, such as diseases, accidents and trauma, and where crisis situations are often experienced, and as such, they served as the units where virus-infected patients first applied and initial intervention was performed during the COVID-19 process. The pandemic also generated a number of concerns and worries in people, especially those in high-risk groups. They experienced heightened levels of anxiety as they followed the reported number of cases and deaths in their countries and worldwide and contemplated the risk of contracting the virus and losing their lives [3]. The increased workload and intense work pace during the pandemic, feelings of fatigue and burnout, and concerns about contracting the infection and spreading it to their families were traumatic experiences they underwent. In addition, uncertainty also contributed to increased levels of anxiety among healthcare workers.

Anxiety is a complex emotional state that arises when individuals perceive internal or external circumstances as threatening or endangering to their well-being and overall existence. It may be associated with danger or when a situation is perceived as unsafe [4]. Anxiety is expressed through terms such as worry, distress, overwhelmed, and boredom. According to Spielberger's definition, anxiety is a state involving unpleasant emotional and observable reactions that occur in relation to stressful situations. These reactions may manifest as symptoms, such as sadness, tension, and changes in perception [5]. As a result of his research, Spielberger put forward the concepts "state" and "trait" anxiety and formed the basis of the two-factor anxiety theory [6]. State anxiety refers to a transient and brief experience that is linked to a specific circumstance or occurrence. It arises depending on the current situation or event and usually decreases with the end of the situation. Trait anxiety, on the other hand, refers to a permanent and continuous state of anxiety experienced by individuals in general. Trait anxiety can be associated with factors, such as an individual's personality structure, genetic factors, or childhood experiences, and can be widely felt in daily life without a specific trigger.

Hopelessness is generally defined as having negative expectations about the future [7]. While hope entails the belief that thoughts can be put into action to achieve a goal, hopelessness involves the belief that those thoughts will not

come to fruition [8]. Hopelessness consists of emotional, cognitive, and motivational components characterized by negative expectations about the future [9]. It is closely intertwined with an individual's cognitive structure and information processing, serving as a risk factor for anxiety [10]. Hopelessness often leads to negative thoughts about the future, a belief that negative events will occur, and a sense of inadequate coping skills, which can increase anxiety. Similarly, individuals with anxiety disorders may develop a negative perspective about the future, and this may lead to feelings of hopelessness. In the literature, there are studies showing a strong relationship between hopelessness and state-trait anxiety [11,12]. It has been reported that hopelessness, which predisposed individuals to depression and suicidal ideation during the COVID-19 period, was also a positive predictor of COVID-19-related fear [13]. The aim of this study was to evaluate the anxiety and hopelessness levels of frontline emergency service workers in a pandemic hospital during the COVID-19 pandemic in Turkey and to evaluate these parameters in terms of specific variables that may be related to these parameters.

Materials and methods

This cross-sectional study included a sample of 135 emergency service healthcare workers, including doctors, nurses, and healthcare officers, working in Amasya University Sabuncuoglu Şerefeddin Training and Research Hospital from July 10 to August 10, 2020. The researchers enrolled emergency service workers into the study after providing them with comprehensive information about the research and obtaining their signed informed consent. Those who declined to participate and individuals with a history of psychiatric illness or use of psychiatric medications were excluded from the study.

Sample size and power analysis were performed using G*Power 3.1 software. According to G power analysis, the power of the study with 135 participants at 0.52 effect size was found to be 0.82 (power alpha=0.05). Ethical approval for the study was obtained from the Amasya University Non- Invasive Clinical Researches Ethics Committee (Decision No: 2020/43). All procedures in this study involving human participants were performed in accordance with the 1964 Helsinki Declaration and its later amendments. Participants were administered a sociodemographic information form, the State-Trait Anxiety Inventory (STAI), and the Beck Hopelessness Scale (BHS).

Data Collection Tools

Sociodemographic Information Form: This form included questions regarding the participants' age, gender, marital status, duration of time in emergency services, whether or not they live alone, and if they have any chronic illnesses.

State-Trait Anxiety Inventory (STAI): This assessment was developed based on Spielberger's two-factor theory of anxiety, and it consists of two separate scales comprising a total of 40 items [14]. STAI-1 measures state or situational anxiety level, while STAI-2 measures trait or general anxiety level. Öner and Le Compte [15] have conducted research to establish the validity and reliability of the scale in the Turkish context. Both scales include items with direct and reversed statements. When calculating the results, the total scores obtained from these statements separately are calculated, and the

total score of the reversed statements is subtracted from the total score of the direct statements. A fixed and unchanging value is added to the obtained number to calculate the individual's anxiety score. The values of 50 for STAI-1 and 35 for STAI-2 are used as fixed and unchanging values. Higher scores on the scale are interpreted as higher levels of anxiety. The commonly accepted cut-off score for STAI-1 and STAI-2 is 40. Scores between 0-19 indicate no anxiety; scores between 20-39 indicate mild anxiety; scores between 40-59 indicate moderate anxiety; and scores of 60 and above indicate severe anxiety [16].

Beck Hopelessness Scale (BHS): This scale, developed by Beck et al. [9], is widely used to measure and assess the feeling of hopelessness. Durak and Palabıyıkoglu [17] conducted the validity and reliability study of the 20-item scale specifically in the Turkish population. According to the scores obtained from the scale, individuals with scores between 4 and 8 are considered to have mild hopelessness symptoms; those with scores between 9-14 have moderate hopelessness symptoms; and those with scores of 15 and above indicate severe hopelessness symptoms [18]. A high score on the scale indicates a heightened degree of hopelessness.

Statistical analysis

The data analysis was performed using IBM SPSS Statistics version 23. To assess normal distribution, the Kolmogorov-Smirnov and Shapiro-Wilk tests were employed. For variables that exhibited normal distribution, independent samples t-tests were conducted for comparisons. In cases where variables did not follow a normal distribution, the Mann-Whitney U test was utilized. The relationship between variables was examined through Spearman's correlation analysis. Descriptive statistics such as mean (standard deviation), frequency (n), and percentage (%) were used to present the data. The statistical significance level was set at P -value <0.05 .

Results

The mean age of the emergency service healthcare workers included in the study was 34.9 (9.0) years, and the mean duration of work in the emergency service was 78.8 (68.9) months. Of the participants, 49.6% were female, 50.4% were male, and 62.2% were married. It was found that 83.7% of the participants did not have any chronic illnesses, and 77.8% lived with their families. Among the 135 emergency service workers, it was determined that 86 (63.7%) had mild levels of hopelessness, 34 (25.2%) had moderate levels, and 15 (11.1%) had severe levels. It was further observed that 49 (36.3%) of the emergency service workers experienced moderate or higher levels of hopelessness. The examination of general hopelessness level and subscale scores among emergency service workers revealed a mean total hopelessness score of 7.1 (5.2). Regarding the subdimensions of hopelessness, the motivation loss subscale had the highest mean score 3.0 (2.2), followed by the subscales of hope 2.5 (2.1), expectations, and feelings about the future 1.6 (1.7). The mean hopelessness score for emergency service workers was found to be 7.1 out of 20, and according to this result, their feelings of hopelessness toward the future was at a mild level. The participants had a mean score of 44.5 (12.6) for STAI-1 and 44.2 (7.3) for STAI-2, concluding that the participants' state and trait anxieties were at a moderate level.

Sociodemographic characteristics, findings related to some variables, hopelessness levels, and the analysis findings regarding the mean scores of hopelessness and state-trait anxiety for participants are presented in Table 1.

Table 1: Sociodemographic characteristics, hopelessness levels and descriptive statistics scale scores of participants

	n	%	mean (SD)
Age			34.9 (9.0)
Duration of working in the emergency service (months)			78.8 (68.9)
Gender			
Female	67	49.6	
Male	68	50.4	
Marital status			
Married	84	62.2	
Single	51	37.8	
Chronic illness status			
Yes	22	16.3	
No	113	83.7	
Living alone status			
Alone	30	22.2	
Family	105	77.8	
Hopelessness level			
Mild (0-8)	86	63.7	
Moderate (9-14)	34	25.2	
Severe (15 and above)	15	11.1	
BHS Total			7.1 (5.2)
Expectations and feelings about future			1.6 (1.7)
Motivation loss			3.0 (2.2)
Hope			2.5 (2.1)
STAI-1			44.5 (12.6)
STAI-2			44.2 (7.3)

SD: Standard deviation, BHS: Beck Hopelessness Scale, STAI-1: State-Trait Anxiety Inventory -1, STAI-2: State-Trait Anxiety Inventory-2

When the scale scores of emergency service workers participating in the study were evaluated according to certain sociodemographic characteristics, it was observed that the mean hopelessness score of female healthcare workers 6.1 (4.7) was lower than that of male healthcare workers; however, this difference was not statistically significant ($P=0.063$). The results indicated that gender did not play a significant role in determining the level of hopelessness among emergency service workers. The total score of the Beck Hopelessness Scale (BHS) showed a difference according to marital status ($P=0.040$). The mean BHS score for married individuals was 7.8 (5.3), while it was 5.9 (4.8) for singles. There was no significant difference observed in the total BHS score across other variables ($P>0.05$ for all). The score for expectations and feelings about the future did not show a difference according in the variables ($P>0.05$ for all). The mean motivation loss subscale score for females was 2.4 (2.2), while it was 3.5 (2.1) for males, but this score did not show a difference according to other variables ($P>0.05$ for all). The score for hope did not differ according to the variables ($P>0.05$ for all). When the anxiety scores were analyzed according to variables, the STAI-1 score differed according to marital status ($P=0.003$). The mean STAI-1 value for married individuals was 46.9 (12.0), while it was 40.5 (12.6) for singles. The score for STAI-2 also showed a difference according to marital status ($P=0.001$). The mean STAI-2 score for married individuals was 45.9 (7.0), while it was 41.5 (7.0) for singles. The STAI-2 score was 47.8 (7.6) for those with chronic illness and 43.5 (7.1) for those without chronic illness. The STAI-2 score for individuals living alone was 41.5 (6.2), while it was 45.0 (7.4) for those living with family. The comparisons regarding hopelessness and state-trait anxiety scores of participants according to specific variables are presented in Table 2.

Table 2: The mean scores of BHS and its subscales and STAI-1, STAI-2 according to sociodemographic characteristics of participants

	BHS Total	Expectations and feelings about future	Motivation loss	Hope	STAI-1	STAI-2
	mean(SD)	mean (SD)	mean (SD)	mean (SD)	mean (SD)	mean (SD)
Gender						
Female	6.1 (4.7)	1.4 (1.6)	2.4 (2.2)	2.3 (1.9)	45.5 (11.9)	44.4 (6.7)
Male	8.0 (5.5)	1.8 (1.8)	3.5 (2.1)	2.6 (2.3)	43.5 (13.3)	44.1 (7.9)
P-value	0.063	0.227	0.002	0.449	0.360	0.492
Marital status						
Married	7.8 (5.3)	1.8 (1.7)	3.3 (2.3)	2.7 (2.1)	46.9 (12.0)	45.9 (7.0)
Single	5.9 (4.8)	1.3 (1.6)	2.6 (1.9)	2.0 (2.1)	40.5 (12.6)	41.5 (7.0)
P-value	0.040	0.130	0.117	0.058	0.003	0.001
Chronic illness status						
Yes	8.6 (5.5)	2.1 (1.9)	3.5 (2.3)	3.0 (2.0)	45.5 (12.3)	47.8 (7.6)
No	6.8 (5.1)	1.5 (1.6)	2.9 (2.2)	2.3 (2.1)	44.3 (12.7)	43.5 (7.1)
P-value	0.148	0.241	0.307	0.683	0.664	0.039
Living alone status						
Alone	6.4 (4.8)	1.4 (1.6)	2.8 (2.0)	2.2 (2.1)	44.1 (13.0)	41.5 (6.2)
Family	7.3 (5.3)	1.7 (1.7)	3.0 (2.3)	2.5 (2.1)	44.6 (12.5)	45.0 (7.4)
P-value	0.453	0.365	0.789	0.425	0.886	0.017

SD: Standard deviation, BHS: Beck Hopelessness Scale, STAI-1: State-Trait Anxiety Inventory -1, STAI-2: State-Trait Anxiety Inventory-2

A weak positive significant relation was found between work duration in emergency services and the total score on the BHS, motivation loss subscale, hope subscale, and STAI-1 among emergency service healthcare workers ($P < 0.05$ for all) (Table 3). When the relationship between the BHS and STAI-1 and STAI-2 mean scores of the emergency service workers was examined, a noteworthy positive correlation was identified between both state and trait anxiety levels and feelings of hopelessness among emergency service workers ($r = 0.457$, $P < 0.001$; $r = 0.425$, $P < 0.001$, respectively) (Table 4).

Table 3: The relationship between working duration in the emergency service and scale scores

	Duration of working in the emergency service (months)	
	r	P-value
BHS Total	0.194	0.025
Expectations and feelings about future	0.067	0.443
Motivation loss	0.228	0.008
Hope	0.171	0.047
STAI-1	0.172	0.046
STAI-2	0.051	0.560

r: correlation coefficient, BHS: Beck Hopelessness Scale, STAI-1: State-Trait Anxiety Inventory -1, STAI-2: State-Trait Anxiety Inventory-2, r: Spearman's correlation coefficient

Table 4: The relationship between BHS and STAI-1, STAI-2 scale scores

	BHS Total	
	r	P-value
STAI-1	0.457	<0.001
STAI-2	0.425	<0.001

r: correlation coefficient, BHS: Beck Hopelessness Scale, STAI-1: State-Trait Anxiety Inventory -1, STAI-2: State-Trait Anxiety Inventory-2, r: Spearman's correlation coefficient

Discussion

The COVID-19 pandemic has had significant negative effects not only on individuals' physical health but also on their mental health. Although all individuals were affected by the outbreak, healthcare workers who undertook the treatment and care of patients infected with the virus were more at risk [19]. Emergency services are the units that initially receive patients and provide the first medical interventions, and the healthcare professionals working in these units were at the forefront of the fight during the pandemic. This study aimed to investigate the levels of anxiety and hopelessness among healthcare workers actively serving in the emergency service of a pandemic hospital in Turkey during the COVID-19 pandemic. Additionally, several variables believed to be associated with these levels were

examined. The findings were thoroughly discussed in relation to the existing literature.

In our study, we observed that emergency service workers had a mean score of 44.5 for state anxiety and a mean score of 44.2 for trait anxiety. It has been reported that scores of 40 and above on the State-Trait Anxiety Inventory indicate a moderate level of anxiety [16]. Studies have shown that anxiety levels among healthcare workers during the pandemic were higher compared to non-healthcare employees [20]. Factors such as patient workload, direct contact with infected patients, the need to maintain distance from family and relatives, fear of transmitting the disease, and uncertainty may have contributed to increased anxiety levels among emergency service workers.

Results of the present study show that female emergency service workers had slightly higher scores in both state and trait anxiety compared to males, although the observed difference did not reach statistical significance. These findings align with previous studies that indicate women tend to exhibit higher levels of state and/or trait anxiety compared to men [21-23]. The lack of disparity in state and/or trait anxiety between men and women may be attributed to various factors, including life experiences, social and cultural influences, genetic factors, and individual variations. In the analysis of anxiety levels among emergency service workers in relation to their marital status, it was observed that married individuals demonstrated significantly higher state anxiety scores compared to single individuals. Additionally, married individuals exhibited significantly higher trait anxiety scores compared to their single counterparts. This finding is supported by previous studies, however, some studies found higher anxiety levels among singles [21,22]. Factors such as increased shared responsibilities in marriage during the pandemic, limited physical proximity and emotional support due to measures restricting physical contact, increased domestic tensions due to spending more time together at home, and concerns about the future regarding spouses and children could contribute to higher anxiety levels among married individuals.

The analysis of anxiety levels based on the presence or absence of chronic illness revealed a noteworthy finding: Emergency service workers with chronic illnesses exhibited significantly higher levels of trait anxiety compared to those without chronic illnesses. In the study conducted by Karasu et al. [21], it was observed that individuals with chronic illnesses had significantly higher levels of both state and trait anxiety. Similarly, there were studies during the COVID-19 pandemic that reported increased anxiety among healthcare workers with a perception of poor health status; however, other studies suggested no association between anxiety levels of healthcare workers and having a chronic illness [22,24-26]. Factors such as concerns about resistance and immunity to diseases, being in a higher-risk group, increased worries about contracting the virus more easily, experiencing more social isolation than others, and difficulties in accessing healthcare and treatment services could explain the increased anxiety levels in individuals with chronic illnesses.

In terms of anxiety according to whether or not the employee lived alone, it was found that emergency service workers living with families had significantly higher levels of trait anxiety compared to those living alone. Bayülgen et al. [26]

reported that there was no significant difference in coronavirus anxiety levels between individuals living alone and those living with their families. However, Karasu et al. [21] found higher levels of both state and trait anxiety in healthcare workers with children. The elevated anxiety levels observed in married individuals and those living with their families may be attributed to various factors, including concerns about the risk of transmitting the disease to their loved ones, prolonged periods of close proximity at home, fear of potential job loss leading to economic difficulties, and the challenges of maintaining a balance between work and family responsibilities.

In this study, although the general level of hopelessness among emergency service workers during the pandemic was mild, it was determined that some individuals experienced high levels of hopelessness. Among the participants in the present study, 36.3% reported experiencing moderate to high levels of hopelessness. It was determined that the hopelessness levels of emergency service workers during the pandemic did not differ according to gender, chronic illness status, or whether or not they lived alone, but differed according to marital status.

Studies examining the impact of gender on hopelessness levels are consistent with our findings, showing no significant differences in hopelessness levels between men and women [18,23,26]. In our study, we observed that the subscale for motivation loss was significantly higher in men compared to women. These findings align with the results reported in the study conducted by Oğuztürk et al. [27]. However, Ottekin [28] found no significant differences in the scores of hopelessness subscales (hope, motivation loss, expectations and feelings about the future) based on gender in a study conducted with university students. Synder et al. [29], in their study, observed that the gender of students had an impact on the level of hopelessness. In Turkish society, it is believed that upbringing differences, assigned social roles, stress, emotional burden, and hormonal changes between men and women may be determinants of hopelessness levels. The higher scores in the motivation loss subscale among men in our study could be explained by men having difficulty expressing their emotional struggles or a lack of willingness to seek emotional support due to societal norms.

In our study, we observed a significant difference in the levels of hopelessness between married individuals and singles, with married individuals displaying higher levels of hopelessness. Akçöltekin et al.'s [30] study reported significantly higher levels of hopelessness among single students compared to married ones. Researchers have posited that the underlying reason for this finding may be attributed to higher levels of anxiety associated with the prospect of marriage among single individuals. Similarly, there are study findings indicating no significant difference in levels of hopelessness between married and single nurses during the COVID-19 pandemic [26]. These findings are inconsistent with our study. The reason behind this result could be that married individuals may experience higher levels of hopelessness due to being away from their homes, fear of transmitting the disease, limited social interaction, and communication problems during the pandemic.

Another finding of the study was the relationship between the work duration in emergency services and the participants' general level of hopelessness, loss of motivation,

and state anxiety. This relationship can be explained by the intense and stressful working conditions in emergency services, exposure to traumatic experiences, time pressure, and irregular working hours such as night shifts.

The identification of a positive and statistical relationship between anxiety and hopelessness levels constitutes another significant finding of our study. There are studies in the literature that support our findings [20,26]. The rapid global spread of the disease, the alarming number of deaths, media portrayal of distressing images, the absence of a definitive treatment, the risk of rapid transmission, and the experience of social isolation during the pandemic can be considered factors that contributed to feelings of hopelessness. Previous studies have consistently demonstrated a strong association between hopelessness and state-trait anxiety [11,12]. Hopelessness and anxiety are intertwined processes. In situations such as a pandemic, the sense of uncertainty and loss of control over the future, negative thoughts regarding what lies ahead, a decline in motivation, and a decrease in overall functioning are believed to collectively contribute to elevated levels of hopelessness and anxiety.

Limitations

This study has several limitations. Firstly, it was conducted in a single center. The sample selected in the study reflects only the emergency department of one pandemic hospital. Secondly, the sample size was relatively small. The changes in the working conditions of emergency service workers during COVID-19 made it difficult to reach a sufficient number of participants. Additionally, the study focused on specific variables influencing hopelessness and anxiety, potentially excluding other important factors that could contribute to a comprehensive understanding of these psychological states. Variables, such as the economic status of the participants, news and media follow-up, loss of relatives or loved ones due to the virus, and whether participants had children may have also affected their anxiety and hopelessness levels during the pandemic, and these variables were not evaluated. Furthermore, the study was conducted with self-report scales completed by the participants. This may have caused biases in the results due to increased workload and working conditions. Statistical analyses may have been affected due to these issues beyond our control. Therefore, studies with larger sample groups and those that evaluate more variables that may affect anxiety and hopelessness should be conducted in healthcare personnel working on the front line in overworked and stressful environments.

Conclusion

In conclusion, this study revealed moderate anxiety and mild hopelessness levels among frontline healthcare workers in the emergency department during the COVID-19 pandemic. The fact that emergency department workers worked under higher risk and difficult conditions compared to other members of the society, changes in the work processes, and adaptation difficulties may have also contributed to increased levels of anxiety and hopelessness. Therefore, it is important to focus on training and informing healthcare workers, improving working conditions, psychological support, regular assessment of mental health symptoms, regular individual sessions, and providing necessary treatment when needed during periods of uncertainty,

trauma, and difficulties such as infectious disease outbreaks. Encouraging healthcare workers to adopt healthy habits such as proper nutrition, regular sleep, stress management techniques, regular exercise, and self-care can also be beneficial in reducing levels of hopelessness and anxiety. This study sheds light on the protection and support of the mental health of healthcare professionals, especially those working on the front line during pandemics.

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