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Depressive symptoms, burnout, resilience, and psychosocial support in healthcare workers during the COVID-19 pandemic: A nationwide study in Japan

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Abstract

Aim: The coronavirus disease 2019 pandemic has significantly impacted the mental health of healthcare workers. This study aimed to assess the mental health of healthcare workers and identify risk and protective factors.

Methods: We surveyed 48,031 healthcare workers at 63 Japanese Red Cross hospitals from December 15, 2022 to January 15, 2023. Mental health was assessed using the Center for Epidemiologic Studies Depression Scale, the Japanese Burnout Scale, and 10-item Connor–Davidson Resilience Scale. Furthermore, we inquired about the psychosocial support activities provided to the healthcare workers within their workplaces.

Results: This study included 3815 healthcare workers (250 doctors, 32 residents, 2588 nurses, 504 co-medical staff, and 441 administrative staff). Symptoms of depression were noted in 31.5% of all participants and 46.9% of resident doctors. Women and those who were young, lived alone, had a nonmanagement position, had contact with coronavirus disease 2019 patients, or had passive motivation to coronavirus disease 2019 work had a significantly higher total Center for Epidemiologic Studies Depression Scale score than in the corresponding groups with the opposite characteristics. High emotional exhaustion and depersonalization scores on the Japanese Burnout Scale were risk factors for depressive symptoms, while living with family was a protective factor. Moreover, interventions such as job performance support (skills, knowledge, information, and safety), peer support, and organizational support (infection control team, patient care rotation systems) were effective.

Conclusion: The impact of the prolonged coronavirus pandemic on mental health among healthcare workers is clear, and organized psychosocial support is needed.

KEYWORDS

burnout, COVID-19, depressive symptoms, health personnel, professional, psychological, resilience

INTRODUCTION

The coronavirus disease 2019 (COVID-19) pandemic has had a significant impact on the mental health of healthcare workers (HCWs); they have been under tremendous pressure, facing increased workloads, long working hours, moral dilemmas, and exposure to the virus.[1–3] A systematic review conducted in 2021 indicated that 33%, 42%, 40%, 32%, 42%, and 37% of HCWs working with COVID-19 reported depressive symptoms (95% confidence interval [CI] = 28%–38%), anxiety (95% CI = 35–48), acute stress (95% CI = 32–47), post-traumatic symptoms (95% CI = 26%–37%), insomnia (95% CI = 36–48), and burnout (95% CI = 31–42), respectively.[4] A similar trend was observed in Japan; a survey found that 27% of 848 HCWs met criteria for probable depression during the 2020 outbreak,[5] and another survey found that >40% of nurses and 30% of radiologists and pharmacists met criteria for burnout.[6] Factors contributing to burnout and mental fatigue during the COVID-19 pandemic included increased work hours, concerns about infecting family members, lack of support from peers, limited resources, and overwork.[7,8]

Nevertheless, it is worth noting that not all individuals exposed to crisis situations experience psychological burden, and protective factors such as resilience and psychosocial support can play vital roles.[9] A 2021 integrative review found that HCWs with higher levels of resilience had lower levels of stress, anxiety, and depression during the pandemic.[10]

However, previous studies have primarily focused on specific regions or facilities, which limits their generalizability to broader populations. To fill this research gap, our nationwide study aimed to comprehensively evaluate the mental health of HCWs across Japan during the prolonged COVID-19 pandemic, identifying potential risk and protective factors.

METHODS

Participants

Data were collected from December 15, 2022 to January 15, 2023, during the peak of the pandemic, when the number of daily confirmed COVID-19 cases exceeded 220,000 people.

The study targeted 48,031 full-time employees at 63 out of 90 Japanese Red Cross hospitals providing inpatient and outpatient treatment and testing for COVID-19 patients (70% consent rate). Figure 1 shows the locations of the 63 hospitals.

Questionnaire

The survey was administered anonymously using Microsoft Forms. The contents of the questionnaire included occupation, gender, age, living arrangement, years of service notation, working position, hospital bed (facility size), contact with COVID-19 patients/specimens, motivation to COVID-19 work, the Center for Epidemiologic Studies Depression Scale (CES-D), the Japanese Burnout Scale (JBS), the 10-item Connor–Davidson Resilience Scale (CD-RISC 10), and psychosocial support activities. Contact with COVID-19 patients/specimens was evaluated using the question, "How often does your job require you to come in contact with suspected/confirmed COVID-19 patients/specimens?" The response options were "not at all," "occasionally," and "daily." To assess motivation to COVID-19 work, participants were asked about their decision-making style: passive (follow instructions), active (make own decisions), or semiactive (make decisions on their own after receiving instructions).

The CES-D is a reliable and valid 20-item measure that assesses symptoms of depression. The total score ranges from 0 to 60. Participants rated the frequency with which they experienced each symptom in the past week on a four-point Likert scale (0–15, normal; 16–60, depressed).[11]

The JBS is a 17-item inventory based on the Maslach Burnout Inventory, assessing burnout symptoms on three subscales: emotional exhaustion (EE), depersonalization (DP), and diminished sense of personal accomplishment (PA). It is highly reliable and valid, and rated on a five-point Likert scale. Higher scores indicate higher levels of burnout, but no cutoff values are used.[12–14] EE refers to feelings of being depleted and overextended, DP refers to a negative attitude towards one's work, and a reduced sense of PA refers to feelings of inadequacy and ineffectiveness.

Each of the 10 items of the CD-RISC 10 (total score range 0–40) evaluates the individual's ability to cope with stress and adversity. The items are rated on a five-point Likert scale, with higher scores indicating higher levels of resilience.[15,16] Its reliability and validity have been confirmed in Japanese adults and university students.[17]

Additionally, to investigate the required psychosocial support, we included an item in which the participants could select from a list of representative staff support activities that they found useful. Twenty-two example activities were prepared with reference to the Activity Code and Manual for Coordination and Coordination of Mental Health and Psychosocial Support in Disasters, Conflicts, and Other Emergencies, from the Inter-Agency Standing Committee, and multiple choices were allowed.[18]

Data analysis

The results for continuous variables are presented as median and interquartile range (IQR). The chi-square test was used to analyze categorical variables. The Mann–Whitney *U* and Kruskal–Wallis tests were used to compare continuous variables between two or more groups. Participants were divided into two groups based on the previously reported cutoff of the CES-D total score (16 points). The scores of the three subscales of the JBS and the CDRISC-10 score were compared, and Spearman's correlation analysis was used to evaluate the correlations between various variables. Multivariate logistic regression analysis was performed to identify the potential risk factors

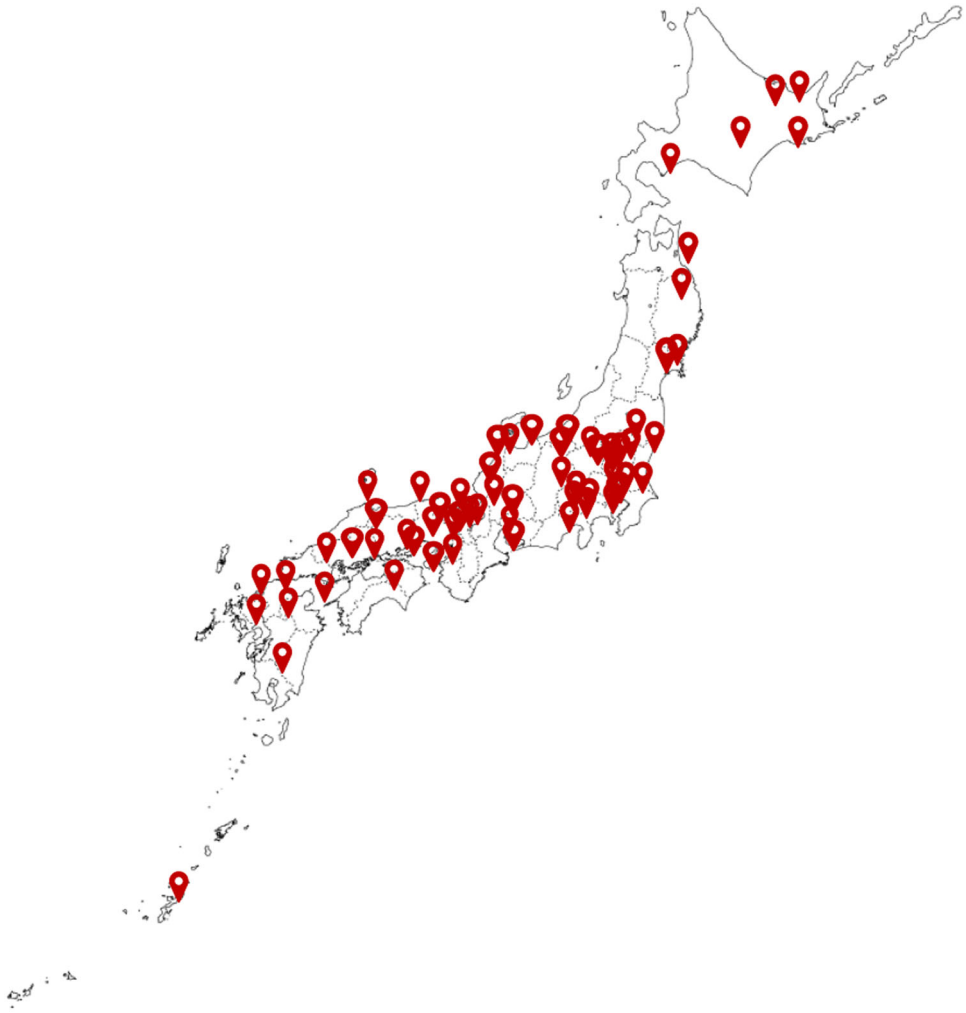

FIGURE 1 Locations of the 63 hospitals that participated in the survey.

for depressive symptoms. The independent variables consisted of gender, age, living arrangement, working position, contact with COVID-19 patients/specimens, the three subscales of the JBS (EE, DP, PA), and the CDRISC-10 score. The dependent variable was the CES-D scale score, which was transformed into a binary variable using a cutoff value of 16. Associations between risk factors and outcomes are presented as odds ratios (ORs) and 95% CIs. Statistical analysis was performed using SPSS Statistics (version 28; IBM Japan), but only logistic regression analysis was performed using EZR software (Saitama Medical Center, Jichi Medical University, Saitama, Japan), a graphical user interface for R (The R Foundation for Statistical Computing, Vienna, Austria). A two-tailed $P < 0.05$ denoted a statistically significant difference.

RESULTS

Demographic characteristics

Out of 49,453 workers who received the questionnaire, 3815 individuals (response rate 7.7%) participated. They included 250 doctors (6.5%), 32 residents (0.8%), 2588 nurses (67.8%), 504 co-medical staff (13.2%), and 441 administrative staff (11.6%). Their demographic characteristics are shown in Table 1. The median age was 42 years, and the majority were women (78.2%). Among the participants, 2720 were frontline workers, mostly nurses (2036).

Measurement scores

The responses to the questionnaire are presented in Table 2. The median total CES-D score was 12 (IQR: 8–18), and 1202 HCWs (31.5%) reported depressive symptoms, indicated by a total CES-D score of 16 or higher. Residents exhibited the highest percentage of depressive symptoms, at 46.9%. The total CES-D score was significantly higher among workers who were women, young, had 5–9 years of service, lived alone, had a nonmanagement position, had daily or occasional contact with COVID-19 patients, and had passive motivation to COVID-19 work than in the corresponding groups with the opposite characteristics ($P = 0.011$, $r = 0.041$; $P < 0.001$, $r = 0.003$; $P = 0.17$,

TABLE 1 Demographic characteristics of the participants.

	Overal	Doctors	Residents	Nurses	Co-medical staff[a]	Administrative staff
Participants, *n* (%)	3815	250 (6.5)	32 (0.8)	2588 (67.8)	504 (13.2)	441 (11.6)
Age, median (IQR),[b] years	42	50	27	42	39	43
Men	832	201	22	170	240	199
Frontline workers,[c] *n*	2720	218	30	2036	269	167

[a]Pharmacists, laboratory technologists, radiological technologists, nutritionists, physical therapists, clinical psychologists, medical engineers, public health nurses, nursing assistants, and medical social workers.

[b]Continuous variables are presented as the median with interquartile range (IQR).

[c]Occasionally or daily contact with COVID-19.

$r = 0.001$; $P < 0.001$, $r = 0.083$; $P = 0.012$, $r = 0.041$; $P \leq 0.001$, $r = 0.003$; $P < 0.001$, $r = 0.003$, respectively).

The median (IQR) JBS scores for EE, DP, and PA were 3.2 (2.4–4.0), 2.0 (1.5–2.7), and 3.6 (3.2–4.2), respectively. By occupation, nurses had the highest median EE score, residents had the highest median DP score, and nurses had the highest median PA scores. The total JBS score was significantly higher among workers who were women, were young, lived alone, had 5–9 years of service, had a nonmanagement position, had daily contact with COVID-19 patients, and had passive motivation for COVID-19 work than in the corresponding groups with the opposite characteristics.

The median CD-RISC 10 score was 19 (IQR: 14–23). By occupation, doctors had the highest CD-RISC 10 score. In addition, the total CD-RISC 10 score was significantly higher among workers who were men, elderly, had ≥15 years of service, lived with family, had management positions, and had active motivation to COVID-19 work.

Furthermore, we found no effect of facility size on any of the mental health indicators (CESD, JBS, or CDRISC score).

Spearman's correlation analysis revealed a positive correlation between the total CES-D score and the total JBS score ($r = 0.45$, $P < 0.001$) and a negative correlation between the total CES-D score or the total JBS score and the total CD-RISC 10 score ($r = -0.23$, $P < 0.001$ and $r = -0.54$, $P < 0.001$, respectively).

The groupwise comparison of the measurement scores of the healthy and depressive groups are shown in Table 3. The total JBS score and each subscale score (EE, DP, and PA) were significantly higher in the depressive group than in the healthy group ($P < 0.001$, $r = 0.467$; $P < 0.001$, $r = 0.476$; $P \leq 0.001$, $r = 0.462$; $P < .001$, $r = 0.158$, respectively). In contrast, the total CD-RISC 10 score was significantly lower in the depressive group than in the control group ($P < 0.001$, $r = 0.265$).

Risk factors for the depressive symptoms

To find potential risk factors for depressive symptoms, a multiple logistic regression analysis was conducted. Table 4 shows the potential risk factors for depressive symptoms (total CES-D score of 16 points) identified using multivariable logistic regression analysis. EE and DP were significantly associated with depressive symptoms (EE: OR 2.2.55, 95% CI 2.24–2.90, $P < 0.001$; DP: OR 2.06, 95% CI 1.81–2.35, $P < 0.001$). Those living with family (OR 0.71, 95% CI 0.59–0.86, $P < 0.001$) and those with PA (OR 0.67, 95% CI 0.58–0.77, $P < 0.001$) were significantly less likely to develop depressive symptoms than those living alone and those without PA. Age and the total CDRISC-10 score had ORs close to 1, indicating a small effect, although they were statistically significant (age: OR 1.01, 95% CI 1.00–1.02, $P = 0.009$; CDRISC-10: OR 0.96, 95% CI 0.95–0.98, $P < 0.001$).

Psychosocial support

Table 5 displays the number of psychological support activities that the participants considered beneficial during the COVID-19 outbreak. The top five activities were similar in the healthy and depressed groups. The five most popular support activities were "Distribution of personal protective equipment and infection control supplies," "Training sessions and study groups on COVID-19," "Information on COVID-19 patients and infection control measures," and "Support from the infection control team and COVID-19 patient care rotation systems."

DISCUSSION

This study found that 31.5% of participants reported burnout, a rate comparable to that observed during the 2020 COVID-19 outbreak,[5,19] indicating that 3 years after the outbreak, mental health concerns remain prevalent. Moreover, the study highlighted the importance of managing burnout, a known risk factor for depressive symptoms, and providing organizational psychosocial support to mitigate the negative effects of increased workload and improve motivation among HCWs during a prolonged pandemic.

Participants

We conducted a nationwide survey on the mental health of HCWs in 63 of 90 Japanese Red Cross hospitals in the third year of the

TABLE 2 Mental health measurements in the total cohort and subgroups.

		Occupation type						
	Overall (*n* = 3815)	Doctors (*n* = 250)	Residents (*n* = 32)	Nurses (*n* = 2588)	Comedical staff (*n* = 504)	Administrative staff (*n* = 441)	*p*	*r*
Total CES-D	12 (8–18)	12 (9–15)	15 (10–21.5)	12 (8–18)	11.5 (7.5–17)	12 (8–16)	0.123	0.000
Total JBS	8.8 (7.5–10.4)	7.1 (6.2–8.8)	9.2 (7.7–11.0)	9.2 (7.9–10.7)	8.2 (6.9–9.5)	8.4 (7–10.2)	<0.001	0.016
EE	3.2 (2.4–4.0)	2.4 (1.8–3.2)	3.3 (2.6–3.8)	3.4 (2.8–4.2)	2.8 (2.2–3.6)	2.8 (2.0–3.6)	<0.001	0.021
DP	2 (1.5–2.7)	1.7 (1.3–2.2)	2.3 (2.0–3.1)	2 (1.5–2.7)	1.8 (1.3–2.5)	2 (1.3–2.7)	<0.001	0.003
PA	3.6 (3.2–4.2)	3.2 (2.7–3.7)	3.5 (3.0–4.0)	3.8 (3.3–4.3)	3.5 (3.0–4.0)	3.7 (3.2–4.3)	<0.001	0.012
Total CD-RISC10	19 (14–23)	21 (18–26)	18 (15–22)	19 (14–23)	20 (15–24)	19 (14–24)	<0.001	0.003

	Gender				Age (years)				
	Men (*n* = 832)	Woman (*n* = 2983)	*p*	*r*	≤35 (*n* = 1292)	36–48 (*n* = 1304)	≥49 (*n* = 1219)	*p*	*r*
Total CES-D	11 (8–16)	12 (8–18)	.011	0.041	12 (8–19)	12 (8–18)	11 (7–16)	<0.001	0.003
Total JBS	8.0 (6.7–9.7)	9.1 (7.7–10.5)	<.001	0.173	9.4 (8–11)	8.9 (7.5–10.4)	8.3 (7–9.9)	<0.001	0.020
EE	2.7 (2–3.6)	3.4 (2.6–4.2)	<.001	0.233	3.6 (2.8–4.2)	3.2 (2.4–4)	3 (2.2–3.8)	<0.001	0.020
DP	1.8 (1.3–2.5)	2.0 (1.5–2.7)	.045	0.033	2.2 (1.5–2.8)	2.0 (1.5–2.7)	1.8 (1.3–2.3)	<0.001	0.011
PA	3.5 (3–4)	3.8 (3.3–4.2)	<.001	0.124	3.8 (3.3–4.3)	3.7 (3.2–4.2)	3.7 (3–4.2)	<0.001	0.006
Total CD-RISC10	20 (16–24)	19 (14–23)	<.001	0.098	18 (14–22)	19 (14–23)	20 (16–25)	<0.001	0.009

	Living arrangement				Years of service notation					
	Alone (*n* = 961)	With family (*n* = 2854)	*p*	*r*	<5 (*n* = 814)	5–9 (*n* = 563)	10–14 (*n* = 544)	≥15 (*n* = 1894)	*p*	*r*
Total CES-D	13 (8–20)	11 (7–17)	<0.001	0.083	12 (8–18)	12 (8–20)	11 (7–17)	11 (8–17)	0.017	0.001
Total JBS	9.4 (7.9–10.9)	8.8 (7.4–10.3)	<0.001	0.110	9.0 (7.4–10.5)	9.4 (8–11)	9.1 (7.6–10.5)	8.7 (7.4–10.1)	<0.001	0.004
EE	3.4 (2.6–4.2)	3.2 (2.4–4)	<0.001	0.089	3.2 (2.4–4)	3.6 (2.8–4.2)	3.4 (2.4–4.2)	3.2 (2.4–4)	<0.001	0.003
DP	2.2 (1.5–2.8)	1.8 (1.3–2.5)	<0.001	0.110	2 (1.3–2.7)	2.2 (1.7–2.8)	2.2 (1.7–2.8)	1.8 (1.3–2.5)	<0.001	0.004
PA	3.8 (3.3–4.3)	3.7 (3.2–4.2)	<0.001	0.066	3.8 (3.2–4.2)	3.8 (3.3–4.3)	3.8 (3.2–4.3)	3.7 (3.3–4.2)	<0.001	0.002
Total CD-RISC10	19 (14–23)	19 (15–23)	<0.001	0.052	19 (15–23)	18 (13–22)	19 (14–23)	20 (15–24)	<0.001	0.003

	Working position				Hospital bed				
	Management (*n* = 689)	Nonmanagement (*n* = 3126)	*p*	*r*	<300 (*n* = 570)	300–499 (*n* = 2070)	≥500 (*n* = 1175)	*p*	*r*
Total CES-D	11 (7–16)	12 (8–18)	0.012	0.041	12 (7–18)	12 (8–18)	11 (8–17)	0.237	0.000
Total JBS	8.3 (7–9.7)	9.1 (7.6–10.6)	<0.001	0.138	9 (7.6–10.4)	8.9 (7.5–10.4)	8.9 (7.4–10.4)	0.882	0.000
EE	2.8 (2.2–3.6)	3.4 (2.6–4.2)	<0.001	0.145	3.2 (2.4–4)	3.2 (2.4–4)	3.2 (2.4–4)	0.231	0.000
DP	1.8 (1.3–2.3)	2.0 (1.5–2.7)	<0.001	0.085	2 (1.5–2.5)	2 (1.5–2.7)	2 (1.5–2.7)	0.626	0.000
PA	3.7 (3–4)	3.8 (3.2–4.3)	<0.001	0.098	3.8 (3.2–4.2)	3.7 (3.2–4.2)	3.8 (3.2–4.3)	0.350	0.000
Total CD-RISC10	21 (17–25)	19 (14–23)	<0.001	0.146	20 (15–23)	19 (14–23)	19 (14–23)	0.116	0.001

	Contact with COVID-19 patients/specimens					Motivation to COVID-19 work				
	Non (*n* = 1095)	Occasionally (*n* = 1881)	Daily contact (*n* = 839)	*P*	*r*	Active (*n* = 233)	Semi-active (*n* = 1310)	Passive (*n* = 1121)	*p*	*r*
Total CES-D	11 (7–16)	12 (8–18)	13 (8–20)	<0.001	0.003	11 (8–14)	12 (8–18)	12 (8–20)	<0.001	0.003
Total JBS	8.6 (7.2–10)	9 (7.6–10.4)	9.4 (7.8–10.9)	<0.001	0.007	7.9 (6.5–9.3)	8.8 (7.6–10.1)	9.5 (8.1–11.2)	<0.001	0.018
EE	3 (2.2–3.8)	3.2 (2.4–4)	3.6 (2.6–4.2)	<0.001	0.010	2.8 (2–3.6)	3.2 (2.4–4)	3.6 (2.8–4.4)	<0.001	0.014
DP	1.8 (1.3–2.5)	2 (1.5–2.7)	2.2 (1.5–2.8)	<0.001	0.005	1.7 (1.3–2.2)	1.8 (1.5–2.5)	2.2 (1.5–2.8)	<0.001	0.010

(Continues)

TABLE 2 (Continued)

	Contact with COVID-19 patients/specimens					Motivation to COVID-19 work				
	Non (*n* = 1095)	Occasionally (*n* = 1881)	Daily contact (*n* = 839)	*P*	*r*	Active (*n* = 233)	Semi-active (*n* = 1310)	Passive (*n* = 1121)	*p*	*r*
PA	3.7 (3.2–4.2)	3.7 (3.2–4.2)	3.8 (3.2–4.3)	0.512	0.000	3.3 (2.8–3.8)	3.7 (3.2–4.2)	3.8 (3.3–4.3)	<0.001	0.013
Total CD-RISC10	19 (14–23)	19 (15–23)	19 (14–23)	0.378	0.000	22 (18–27)	20 (15–23)	18 (13–22)	<0.001	0.011

Notes: Continuous variables are presented as the median with interquartile range (IQR). JBS subscales: EE, emotional exhaustion; DP, depersonalization; PA, personal accomplishment.

TABLE 3 Comparison of mental health measurements at the cutoff point of the CED-D scale.

	Healthy group[a] (*n* = 2613)	Depressive group[a] (*n* = 1202)	P	*r*
Total JBS, median (IQR)	8.3 (7–9.5)	10.5 (9.2–11.7)	<0.001	0.467
Emotional exhaustion	2.8 (2.2–3.6)	4 (3.4–4.6)	<0.001	0.476
Derersonalization	1.7 (1.3–2.2)	2.5 (2–3.3)	<0.001	0.462
Personal accomplishment	3.7 (3.2–4.2)	4 (3.3–4.3)	<0.001	0.158
Total CD-RISC 10, median (IQR)	20 (16–24)	17 (11–21)	<0.001	0.265

Note: Continuous variables are presented as the median with interquartile range (IQR).

[a]Healthy group: total CES-D score <16, depressive group: total CES-D score ≥16.

TABLE 4 Risk factors for depressive symptoms[a].

	(*n* = 3815)		
	OR	95% CI	P
Gender	0.90	0.73–1.12	0.36
Age (years)	**1.01**	**1.00–1.02**	**0.009**
Living arrangement	**0.71**	**0.59–0.86**	**<0.001**
Working position	1.02	0.80–1.30	0.90
Contact with COVID-19 patients/ specimens	1.01	0.84–1.21	0.93
Japanese Burnout Scale			
Emotional exhaustion	**2.55**	**2.24–2.90**	**<0.001**
Depersonalization	**2.06**	**1.81–2.35**	**<0.001**
Personal accomplishment	**0.67**	**0.58–0.77**	**<0.001**
Connor–Davidson Resilience Scale	**0.96**	**0.95–0.98**	**<0.001**

Abbreviations: OR, odds ratio; CI, confidence interval.

[a]Depressive symptoms were defined using a total Center for Epidemiologic Studies Depression Scale score cut-off of 16.

COVID-19 pandemic. Out of 49,453 workers who received the questionnaire, 3,815 individuals (response rate 7.7%) participated. The low response rate can be attributed to participants' busy schedules and time constraints, given the survey was conducted during the eighth wave of the COVID-19 pandemic, when infections were widespread and healthcare resources were strained. The survey also coincided with year-end and New Year vacations, resulting in reduced staff availability. However, the survey covered diverse geographic areas and occupations, mitigating systematic bias. Despite the limited response rate, the large sample size ensures that the findings remain broadly representative within the given context.

Depressive symptoms

Among the 3815 participants, 1202 (31.5%) developed depressive symptoms (total CES-D score ≥16), including 46.9% of residents. Women and those who were young, lived alone, had a nonmanagement position, had contact with COVID-19 patients, or had passive motivation to COVID-19 work showed more depressive symptoms than the corresponding groups with the opposite characteristics. This finding is in line with a meta-review conducted by Chutiyami et al.[20] in 2021, which reported high rates of depressive symptoms among women, single individuals, those under 40 years, and nurses and frontline professionals. Furthermore, high EE and DP scores on the JBS were found to increase the risk of depression, while living with family was a protective factor. These results are consistent with previous research linking EE to an increased risk of mental illness in HCWs,[21] therefore, during a prolonged pandemic, it is critical to manage burnout in HCWs.

Burnout

In this study, the median (IQR) JBS scores for EE, DP, and PA were 3.2 (2.4–4.0), 2.0 (1.5–2.7), and 3.6 (3.2–4.2), respectively. The EE and PA scores were particularly high compared to a pre-pandemic

TABLE 5 Examples of psychosocial support activities.

	Total *n*	Healthy group,[a] *n* (%)	Depressive group,[a] *n* (%)
Training sessions and study meetings on COVID-19	1931	1386 (71.8)	545 (28.8)
Support from the infection control team, COVID-19 patient care rotation systems	879	651 (74.0)	228 (26.0)
Information on COVID-19 patients and infection control measures	1712	1272 (74.3)	440 (25.7)
Educational materials on coping with stress and pandemic-related issues	352	260 (73.9)	92 (26.1)
Stakeholder meetings to discuss the hospital's response to the COVID-19	485	363 (74.8)	122 (25.2)
Interviews with frontline staff to discuss their problems, opinions, and requests	340	251 (73.8)	89 (26.2)
Discussions and chats within departments	1303	912 (69.9)	391 (30.0)
Information and consultation services provided for staff families	73	54 (74.0)	19 (26.0)
Dedicated rest areas for ward and outpatient staff dealing with COVID-19 patients	151	109 (72.2)	42 (27.8)
Refreshment rooms and rest areas for staff	135	96 (71.1)	39 (28.9)
Training and orientation for new employees on handling COVID-19	140	105 (75.0)	35 (25.0)
Stress management training for managers	71	52 (73.2)	19 (26.8)
Distribution of personal protective equipment and infection control supplies	1935	1357 (70.1)	578 (29.9)
Accommodation for staff and temporary nursery	153	105 (68.6)	48 (31.4)
Care for employees who have been absent from work due to infection/suspected infection	480	364 (75.8)	116 (24.2)
Attention to staff with special needs, such as pregnant or chronically ill staff	125	98 (78.4)	27 (21.6)
Counseling with psychologists	86	58 (67.4)	28 (32.6)
Group discussions and conferences with psychologists	34	25 (73.5)	9 (26.5)
Mental health care provided by managers, health managers, personnel and labor relations	180	135 (75.0)	45 (25.0)
Medical check-ups and interviews with industrial doctors	42	28 (66.7)	14 (33.3)
Consultation services provided by psychiatrists, psychosomatic physicians, psychiatric nurses, psychiatric social workers	50	37 (74.0)	13 (26.0)
Outpatient psychiatric consultation and inpatient treatment in the hospital	17	13 (76.5)	4 (23.5)

[a]Healthy group: total CES-D score <16, depression group: total CES-D score ≥16.

(October 2019) survey of 1261 Japanese neurologists in which the mean JBS scores for EE, DP, and PA were 2.86, 2.21, and 3.17, respectively.[22] Women and those who were young, lived alone, had a nonmanagement position, had daily contact with COVID-19 patients, and had negative motivation to COVID-19 work were significantly more likely to experience burnout than those with the opposite characteristics, which was consistent with previous studies.[23,24]

By occupation, nurses had the highest EE score and residents had the highest DP score, which is consistent with previous studies.[25,26] During the pandemic, nurses faced increased workloads, reassignment to new roles, fear of infection, and long

working hours. Residents in particular have been reported to be highly prone to burnout due to their youth, inexperience, and high work demands.[27–29] In addition, burnout has been reported to affect worker health, quality of care, and organizational well-being in past outbreaks of infectious diseases, even years after the outbreak.[30]

Thus, to manage burnout during pandemics, it is crucial to provide organizational psychosocial support to mitigate the negative effects of increased workload and improve HCWs' motivation.

The Mann–Whitney *U*-test revealed a higher PA in the depressed group than in the healthy group, but logistic regression analysis showed the opposite. Some studies have reported that the COVID-19 pandemic increased EE and DP in HCWs, but the useful, altruistic, gratifying, and meaningful nature of their work may have contributed to increased levels of PA.[31–33] Therefore, the role of PA during the pandemic is complex, and further investigation is needed to understand it better.

Resilience and psychosocial support

The study's median CD-RISC 10 score of 19 (IQR: 14–23) was comparable to the first quartile of Davidson's normative data (29 for 25%, 32 for 50%, and 36 for 75%) in a general US population sample from 2003.[34] Additionally, a survey of 1004 individuals during the first week of the COVID-19 lockdown (April 9 and 10, 2020) revealed significantly lower psychological resilience than CD-RISC 10 normative data, particularly in those with mental health problems and difficulties in coping with stress.[35] These findings suggest that the pandemic may have negatively impacted self-perceived psychological resilience. However, this study also identified factors associated with high resilience, including being a doctor, men, older age, a long career, living with family, a management position, and having active motivation to COVID-19 work. That is, those with work discretion, active engagement in COVID-19 work, and family support were found to be most resilient to the pandemic's mental health challenges. During past outbreaks of infectious diseases, such as severe acute respiratory syndrome, Ebola, and Middle East respiratory syndrome coronavirus, the psychological resilience, coping skills, and social support of HCWs were found to play a protective role against the emotional and psychological burden of caring for infected patients.[36,37] In addition, being recognized and appreciated by the management at the workplace was found to improve work engagement and well-being among HCWs.[38–40] To protect staff from chronic stress, it is not a good idea to rely on individual toughness. Job performance support (skills, knowledge, information, and safety), peer support, and organizational support (division of infectious disease duties and support systems) are effective.

LIMITATIONS

The main strength of this study was that data were collected from HCWs in Red Cross hospitals across Japan. The findings suggest that HCWs may face depression and burnout during a pandemic, irrespective of their place of residence and work.

However, this study has several limitations. First, there might be a response bias if nonrespondents were either too stressed to respond or not interested in the survey. Second, the one-time assessment of depressive symptoms restricts comparisons to pre-pandemic levels and understanding of the long-term impact, therefore caution is needed when generalizing these findings. Larger longitudinal studies are needed to better comprehend the pandemic's lasting effects on mental health.

CONCLUSIONS

In the third year of the COVID-19 pandemic, 31.5% of the 3815 HCWs at the Red Cross Hospital who participated in the study developed depressive symptoms. During the COVID-19 pandemic, 31.5% of the 3815 HCWs at the Red Cross Hospital who participated in the study developed depressive symptoms.

EE and DP were risk factors for depressive symptoms, and living with family was a protective factor. The findings suggest that it is important to manage burnout among HCWs to protect the mental health of HCWs during a pandemic. This requires mitigating the negative effects of increased workload and improving HCWs' motivation through job performance support (skills, knowledge, information, and safety), peer support, and organizational support (infection control team and COVID-19 patient care rotation systems).

AUTHOR CONTRIBUTIONS

Nene Oyama, Reo Morimitsu, Mayumi Seki, Mari Nakai, Kyoko Miyamoto, and Kayoko Nagao: Conceptualization. Nene Oyama: Data curation and analysis. Reo Morimitu: Supervision, reviewing and editing the drafts. Nene Oyama: Writing an original draft. All authors have read and agreed to the published version of the manuscript.

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CONFLICT OF INTEREST STATEMENT

The authors declare no conflict of interest.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the Disaster Management Research Institute but restrictions apply to the availability of these data, which were used under license for the current study and so are not publicly available. Data are available, however, from the authors on reasonable request and with permission of the Disaster Management Research Institute.

ETHICS APPROVAL STATEMENT

In accordance with ethical guidelines, this study received approval from the Ethics Committee of the Japanese Red Cross College of Nursing (Approval No. 2022-034). The research was conducted in compliance with the principles outlined in the Declaration of Helsinki and relevant national regulations.

PATIENT CONSENT STATEMENT

Initially, after a comprehensive explanation of the study's purpose, procedures, potential risks, benefits, measures to protect confidentiality, and the voluntary nature of participation, consent was sought from the facility director and staff. Only those hospitals whose consent was obtained were included in the study. Furthermore, participants who provided electronic consent to participate in the study and disclose their data were included. Prior to their inclusion, participants were informed about the following aspects: preservation of anonymity, voluntary participation without adverse effects, utilization of statistical techniques to safeguard privacy, exclusive use of data for research purposes, implementation of anonymization and encryption techniques, and assurance of secure data handling.

CLINICAL TRIAL REGISTRATION

This study is an observational study and therefore not registered as a clinical trial. However, the study design, methods, and analysis plan were pre-specified in advance, and the study was conducted in accordance with the ethical principles of the Declaration of Helsinki. Details of the study design, methods, and analysis are described in the Methods section.

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