Exploration of The Impact of The COVID-19 Pandemic on The Mental Health of Home Health Care Workers in Japan: A Multicenter Cross-Sectional Web-Based Survey

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Research Article

Keywords: home health care workers, COVID-19 pandemic, Fear of COVID-19 scale, Hospital Anxiety and Depression scale, Assessment of Interprofessional Team Collaboration Scale-II

Posted Date: February 23rd, 2022

DOI: <https://doi.org/10.21203/rs.3.rs-1178966/v1>

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Abstract

Background: The COVID-19 pandemic has caused home health care workers (home-HCWs) to experience anxiety. Since the mental health of home-HCWs and related factors during the COVID-19 pandemic have not been clarified, we aimed to investigate the status and associated factors of the fear of COVID-19 infection, anxiety, and depression among home-HCWs in Japan.

Methods: A multicenter cross-sectional web-based anonymous survey of home-HCWs was conducted in August 2021, during the fifth wave of the pandemic in Japan. We surveyed members of facilities that provide home visit services during the COVID-19 pandemic. We measured the Japanese version of the Fear of COVID-19 scale (FCV-19S-J) and the Hospital Anxiety and Depression scale (HADS) as objective variables, and the Japanese version of the Assessment of Interprofessional Team Collaboration Scale-II (J-AITCS-II) as an explanatory variable.

Results: A total of 328 members of 37 facilities responded to the survey, and we ultimately analyzed 311 participants. The most frequent occupation was nurse (32.8%), followed by doctor (24.8%) and medical office staff (18.0%). The mean score of the FCV-19S-J was 16.5 ± 5.0 (7.0 – 31.0), and the prevalences of definitive anxiety and depression were 7.4% and 15.7%, respectively. Multivariate regression analysis revealed that the J-AITCS-II teamwork subscale was significantly negatively associated with FCV-19S-J, HADS-anxiety, and HADS-depression ($\beta = -0.171$, $p = 0.004$; $\beta = -0.151$, $p = 0.012$; $\beta = -0.225$, $p < 0.001$). Medical office staff showed significant positive associations with FCV-19S-J and HADS-depression ($\beta = 0.219$, $p = 0.005$; $\beta = 0.201$, $p = 0.009$), and medical social workers with HADS-anxiety and HADS-depression ($\beta = -0.166$, $p = 0.011$; $\beta = -0.214$, $p < 0.001$) compared to doctors. The unmet support need for expert lectures on COVID-19 was significantly positively associated with FCV-19S-J ($\beta = 0.131$, $p = 0.048$), and the unmet support need for support systems for psychological stress and emotional exhaustion was significantly positively associated with HADS-anxiety ($\beta = 0.141$, $p = 0.022$).

Conclusions: Recognizing that different occupations experience different mental health issues, providing learning opportunities about COVID-19 and expert psychological support, and building good teamwork are important for maintaining the mental health of home-HCWs during the COVID-19 pandemic.

Background

Home health care workers (home-HCWs) for community-dwelling patients play an indispensable role in supporting patients and their family members during the COVID-19 pandemic. Home-HCWs, including home visiting doctors, nurses, medical social workers, care workers, and medical office staff, spend more time in contact with patients and their families and are at potential risk for COVID-19 infection because appropriate triage and zoning are more difficult at home than in the hospital setting.

A recent study has shown not only that home-HCWs receive inadequate support during pandemics but also that this fact is not recognized(1). In addition, home-HCWs were exposed to high stress even before the COVID-19 pandemic, and the COVID-19 pandemic has caused them to feel anxiety due to various stresses. Strengthening of the support system for home-HCWs has therefore been proposed(1–3). A recent systematic review and cross-sectional studies revealed the impact of the COVID-19 pandemic on the mental health of healthcare workers in acute care hospitals, related factors, and the support they need(4–6). Quadros et al. reported the prevalence of fear of COVID-19 infection to be 18.1–45.2% in the general population, and working in healthcare was a risk factor(7).

Hao et al. revealed the prevalences of depression and anxiety during the COVID-19 pandemic to be 24.1% and 28.6% in acute care hospitals, with females and nurses having particularly high rates of depression(8). In addition, Hao et al. suggested that the occupational attribute of medical staff was a protective factor for mental health compared to non-medical staff(8). However, the status of fear of COVID-19 infection, and the prevalences of anxiety and depression during the COVID-19 pandemic among home-HCWs and their related factors, have not been clarified(9).

Clarification of the fear of COVID-19 infection, mental health, and unmet support needs of home-HCWs could improve the working environment during the COVID-19 pandemic and promote preparedness for future pandemics in the home care setting. Thus, our study aimed to investigate the status and associated factors of fear of COVID-19 infection and the prevalences of anxiety and depression among home-HCWs in Japan.

Methods

Procedure

A multicenter cross-sectional web-based anonymous survey of home-HCWs was conducted in August 2021, during the fifth wave of the pandemic in Japan, using the SurveyMonkey platform(10). SurveyMonkey is an online service that facilitates sharing surveys via email,

smartphone applications, and social media platforms such as Facebook and Twitter. Exclusion criteria for participants were: duplicate responses from the same IP address, and no response.

This study was conducted under the ethical standards of the Declaration of Helsinki and the ethical guidelines for epidemiological research issued by the Ministry of Health, Labour and Welfare of Japan. The institutional review board of the University of Tsukuba approved this study (No. 1651).

Settings and participants

We recruited facilities that provide home visit services during the COVID-19 pandemic based on a previous research exercise in Japan(11–13), and the participants belonged to these facilities. We asked the director of each facility to ask their staff to respond to the web-based anonymous survey. We explain the purpose of this study and asked the informed consent to this study on the top of the web page, and only staff who agreed to participate in the study responded.

Participant characteristics

We asked each participant about background characteristics: sex, age, type of occupation, years of experience in the occupation, corona vaccination status, experience of training in wearing personal protective equipment (PPE), living with family or not, and risk of coronavirus infection. We also asked about the availability of information and support, and the impact and difficulties of the COVID-19 pandemic on home care service, e.g., increase in workload, difficulty of communication with colleagues.

Since a recent systematic review indicated that interprofessional collaboration is related to job stress of health care workers(14), we evaluated the perception of interprofessional collaboration of each participant by using the subscale of the Japanese version of Assessment of Interprofessional Team Collaboration Scale-II (J-AITCS-II)(15). AITCS-II was developed as a shortened version of the Assessment of Interprofessional Team Collaboration Scale, a measurement tool developed for evaluating collaboration within teams across various practice settings and the integration of patient involvement as part of team practice(16). Yamamoto et al. confirmed the validity and reliability of two subscales in J-AITCS-II(15), i.e., Patient-centered collaborative care and Teamwork in healthcare professionals. Based on previous studies and discussion among the authors, we measured the subscale of Teamwork in healthcare professionals as a participant characteristic(5, 17, 18).

Questionnaire

In the absence of specific and validated instruments for evaluating the support currently received and the support needs of home-HCWs during the COVID-19 pandemic, we developed an original questionnaire based on data from previous studies and discussion among the authors of this study(5, 17, 18). An example of a question and answer about support currently received is “I have been provided with expert on-site infection control guidance: yes/no”, and an example of a question and answer about support needs is “The need for experts to provide on-site infection control guidance” with a 6-point Likert scale answer – “not needed at all” “not needed” “little need” “some need” “needed” and “very much needed”.

Measurements

Japanese version of the Fear of COVID-19 scale (FCV-19S-J)

The Fear of COVID-19 Scale (FCV-19S) was developed by Ahorsu et al. to measure anxiety and fear of COVID-19 with a seven-item self-administered scale(19). The FCV-19S-J was developed and confirmed for reliability and validity by Midorikawa et al.(20) The response options were “strongly disagree,” “disagree,” “neither agree nor disagree,” “agree,” and “strongly agree”. The minimum score possible for each question is 1 (strongly disagree), and the maximum is 5 (strongly agree). The total score is calculated by adding up each item score (ranging from 7 to 35). The higher the score, the greater the fear of COVID-19.

Hospital Anxiety and Depression scale (HADS)

The Japanese version of the Hospital Anxiety and Depression Scale (HADS) was confirmed for validity and reliability(21). The HADS comprises a total of 14 items, including seven that measure recent anxiety and another seven that measure recent depression(22). It seeks responses from four choices each. Higher scores denote more severe anxiety or depression experienced recently.

Statistical Analysis

After calculating the sum of the seven items in FCV-19S-J, we then calculated the HADS and analyzed the distributions of other factors. We defined support as unmet when the participant answered that support was “very much needed” or “needed” but the support had not been

received. Subsequently, we performed a multivariate regression analysis of the FCV-19S-J, the score of HADS-anxiety, and HADS-depression with 10 variables: sex, age, type of occupation, score of J-AITCS-II teamwork subscale, increase in workload, unmet support needs (experts to provide on-site infection control guidance, consultation with infection control experts online or by phone, expert lectures on COVID-19, distribution system for PPE by national or local government, expert support systems for psychological stress and emotional exhaustion), based on a previous study and discussion among the authors(7–9, 18, 23–25).

Significance was accepted at $p < 0.05$ and all analyses were carried out using SPSS-J software (ver. 27.0; IBM, Tokyo, Japan).

Results

A total of 328 participants from 37 facilities responded to the survey. We excluded 17 participants whose responses could not be registered. No participant responded more than once from the same IP address. Thus, we analyzed 311 participants. Characteristics of the participants are summarized in Table 1. The most frequent age group was 40's (37.6%), followed by 30's (27.3%), and 69.5% were women. The type of occupation was most frequently nurse (32.8%), followed by doctor (24.8%) and medical office staff (18.0%). Experience in the occupation was most frequently greater than 20 years (28.3%). Coronavirus vaccines had been received at least once by 94.5% of the participants, and 85.2% had experienced a great deal or quite a bit of stress with the COVID-19 during the past month.

Table 1
Participants' background characteristics

	n = 311	%
Age		
20's	21	6.8
30's	85	27.3
40's	117	37.6
50's	67	21.5
60's	17	5.5
70's	3	1.0
Sex		
male	94	30.2
female	216	69.5
Contact with patients in daily practice		
Yes	236	75.9
Type of occupation		
Doctor	77	24.8
Nurse	102	32.8
Medical social worker	21	6.8
Medical office staff	56	18.0
Other	54	17.4
Years of experience		
≤2 years	38	12.2
3–4 years	35	11.3
5–9 years	65	20.9
10–19 years	84	27.0
≥20 years	88	28.3
Living with family		
Yes	256	82.3
Living with family under 15 years		
Yes	140	45.0
Living with family over 65 years		
Yes	56	18.0
Have participated in training on use of personal protective equipment		
Yes, before January 2020	63	20.3
Yes, after February 2020	81	26.0
No	164	52.7
Have received coronavirus vaccine at least once		
Yes	294	94.5

	n = 311	%
Were you ever at risk of contracting COVID-19		
Yes	176	56.6
Were your family or friends ever at the risk of contracting COVID-19		
Yes	135	43.4
During the past month, how stressed have you been about COVID-19		
Not at all/Not much	24	7.7
Neither	19	6.1
A great deal/Quite a bit	265	85.2
How do you feel about your own health condition compared to before the COVID-19 pandemic		
No change	250	80.4
Better	17	5.5
Worse	41	13.2
The COVID-19 pandemic has increased my workload		
Absolutely disagree/Disagree/Somewhat disagree	56	18.0
Absolutely agree/Agree/Somewhat agree	248	79.7
The Japanese version of Assessment of Interprofessional Team Collaboration Scale-II (n = 293)		
mean ± standard deviation	35.4 ± 5.7	
median (min, max)	36.0 (9.0, 45.0)	

Table 2 shows the received support, support needs, and unmet support needs of home health care workers during the COVID-19 pandemic. The most unmet support need was for experts to provide on-site infection control guidance (39.2%), followed by the need for systems to consult with infection control experts online or by phone (38.3%), and the need for systems to support psychological stress and emotional exhaustion (37.9%). There were significant differences in support needs regarding expert lectures on COVID-19 ($p = 0.002$) and distribution systems for PPE by national or local government ($p = 0.001$) among the types of occupation, although there was no significant difference in unmet support needs.

Table 2

The received support, support needs, and unmet support needs of home health care workers during the COVID-19 pandemic

	All (n = 311)	%	Doctor (n = 77)	%	Nurse (n = 102)	%	Medical social worker (n = 21)	%	Medical office staff (n = 56)	%	Other occupations (n = 56)	%	p
We have been provided with expert on-site infection control guidance													
Yes	64	20.6	14	18.2	22	21.6	6	28.6	11	19.6	11	19.6	0.875
Need for experts to provide on-site infection control guidance													0.099
Not needed at all/Not needed/Little need	32	10.3	10	13.0	8	7.8	1	4.8	7	12.5	6	10.7	
Some need	102	32.8	24	31.2	27	26.5	11	52.4	24	42.9	16	28.6	
Very much needed/Needed	166	53.4	41	53.2	65	63.7	8	38.1	21	37.5	30	53.6	
Unmet support need for experts to provide on-site infection control guidance													
Yes	122	39.2	31	40.3	48	47.1	4	19.0	15	26.8	23	41.1	0.059
We have a system to consult with infection control experts online or by phone when necessary													
Yes	73	23.5	22	28.6	28	27.5	2	9.5	8	14.3	13	23.2	0.183
Need for system to consult with infection control experts online or by phone when necessary													0.059
Not needed at all/Not needed/Little need	18	5.8	1	1.3	3	2.9	3	14.3	7	12.5	4	7.1	
Some need	109	35.0	30	39.0	33	32.4	6	28.6	21	37.5	19	33.9	
Needed/Very much needed	173	55.6	44	57.1	64	62.7	11	52.4	24	42.9	29	51.8	

	All (n = 311)	%	Doctor (n = 77)	%	Nurse (n = 102)	%	Medical social worker (n = 21)	%	Medical office staff (n = 56)	%	Other occupations (n = 56)	%	p
Unmet support need for systems to consult with infection control experts online or by phone													
Yes	119	38.3	27	35.1	44	43.1	9	42.9	18	32.1	20	35.7	0.739
We are able to attend expert lectures on COVID-19.													
Yes	89	28.6	40	51.9	29	28.4	7	33.3	4	7.1	9	16.1	< 0.001
The need for the expert lectures on COVID-19													0.002
Not needed at all/Not needed/Little need	19	6.1	2	2.6	5	4.9	3	14.3	6	10.7	3	5.4	
Some need	110	35.4	19	24.7	34	33.3	5	23.8	28	50.0	24	42.9	
Needed/Very much needed	171	55.0	54	70.1	61	59.8	12	57.1	18	32.1	25	44.6	
Unmet support need for expert lectures on COVID-19													
Yes	100	32.2	19	24.7	37	36.3	6	28.6	16	28.6	21	37.5	0.385
We have a system of distribution of personal protective equipment by national or local government													
Yes	136	43.7	38	49.4	55	53.9	6	28.6	24	42.9	12	21.4	0.002
Need for system of distribution of personal protective equipment by national or local government													0.001
Not needed at all/Not needed/Little need	26	8.4	4	5.2	2	2.0	4	19.0	6	10.7	10	17.9	
Some need	62	19.9	11	14.3	21	20.6	5	23.8	17	30.4	8	14.3	
Needed/Very much needed	212	68.2	60	77.9	77	75.5	11	52.4	29	51.8	34	60.7	

	All (n = 311)	%	Doctor (n = 77)	%	Nurse (n = 102)	%	Medical social worker (n = 21)	%	Medical office staff (n = 56)	%	Other occupations (n = 56)	%	p
Unmet support need for system of distribution of PPE by national or local government													
Yes	102	32.8	26	33.8	32	31.4	8	38.1	12	21.4	24	42.9	0.155
We have systems to support our psychological stress and emotional exhaustion													
Yes	81	26.0	22	28.6	23	22.5	8	38.1	9	16.1	19	33.9	0.107
Need for systems to support our psychological stress and emotional exhaustion													0.358
Not needed at all/Not needed/Little need	29	9.3	4	5.2	11	10.8	2	9.5	5	8.9	7	12.5	
Some need	93	29.9	29	37.7	28	27.5	3	14.3	20	35.7	13	23.2	
Needed/Very much needed	178	57.2	42	54.5	61	59.8	15	71.4	27	48.2	32	57.1	
Unmet support need for systems to support our psychological stress and emotional exhaustion													
Yes	118	37.9	24	31.2	44	43.1	8	38.1	22	39.3	19	33.9	0.566

The mean score of the FCV-19S-J was 16.5 ± 5.0 (7.0–31.0), HADS-anxiety was 5.3 ± 3.3 (0.0–18.0), and HADS-depression was 6.5 ± 3.6 (0.0–16.0). The rates of definitive anxiety and depression were 7.4% and 15.7%, respectively. The mean FCV-19S-J scores of nurses, medical office staff, and other occupations was significantly higher than those of doctors. In addition, the mean scores of HADS-depression for nurses, medical social workers, medical office staff, and other occupations were significantly higher than those for doctors. (Table 3)

Table 3
Descriptive statistics and one-way ANOVA of FCV-19S-J and HADS

	All (n = 311)	Doctors (n = 77)	Nurses (n = 102)	p*	Medical social workers (n = 21)	p*	Medical office staff (n = 56)	p*	Other occupations (n = 56)	p*
FCV-19S-J										
mean ± standard deviation	16.5 ± 5.0	14.5 ± 4.6	17.2 ± 5.1	0.003	16.1 ± 5.3	0.699	18.2 ± 4.5	< 0.001	16.4 ± 5.0	0.200
median (min, max)	17.0 (7.0, 31.0)	14.0 (7.0, 24.0)	17.0 (7.0, 31.0)		14.5 (7.0, 27.0)		18.0 (8.0, 29.0)		17.0 (7.0, 28.0)	
HADS										
Anxiety										
mean ± standard deviation	5.3 ± 3.3	5.3 ± 3.3	5.6 ± 3.5	0.103	6.3 ± 3.5	0.145	5.7 ± 3.4	0.171	5.1 ± 2.8	0.782
median (min, max)	5.0 (0.0, 18.0)	4.0 (0.0, 14.0)	5.0 (0.0, 18.0)		6.0 (1.0, 16.0)		5.0 (1.0, 16.0)		4.0 (0.0, 12.0)	
≥11	7.4%	4.0%	8.0%		10.0%		11.8%		5.8%	
≥8	21.1%	12.0%	24.0%		20.0%		25.5%		21.2%	
Depression										
mean ± standard deviation	6.5 ± 3.6	6.5 ± 3.6	7.4 ± 3.8	< 0.001	7.7 ± 3.6	0.007	7.2 ± 3.4	< 0.001	6.5 ± 3.3	0.031
median (min, max)	6.0 (0.0, 16.0)	5.0 (0.0, 12.0)	8.0 (0.0, 16.0)		7.0 (2.0, 15.0)		7.0 (1.0, 15.0)		6.0 (0.0, 14.0)	
≥11	15.7%	4.0%	26.0%		30.0%		13.7%		13.5%	
≥8	38.8%	17.3%	52.0%		40.0%		41.2%		42.3%	
*p: compared with doctors, tested with Turkey HSD										

Multivariate regression analysis of FCV-19S-J, HADS-anxiety, and HADS-depression revealed that the J-AITCS-II teamwork subscale was significantly negatively associated with FCV-19S-J, HADS-anxiety and HADS-depression ($\beta = -0.171$, $p = 0.004$; $\beta = -0.151$, $p = 0.012$; $\beta = -0.225$, $p < 0.001$). Medical office staff showed a significant positive association with FCV-19S-J and HADS-depression ($\beta = 0.219$, $p = 0.005$; $\beta = 0.201$, $p = 0.009$), and medical social workers showed significant positive associations with HADS-anxiety and HADS-depression compared to doctors ($\beta = -0.166$, $p = 0.011$; $\beta = -0.214$, $p < 0.001$). The unmet support need for expert lectures on COVID-19 was significantly positively associated with FCV-19S-J ($\beta = 0.131$, $p = 0.048$), and the unmet support need for systems to support psychological stress and emotional exhaustion was significantly positively associated with HADS-anxiety ($\beta = 0.141$, $p = 0.022$). (Table 4)

Table 4
Multivariate regression analysis of FCV-19S-J and HADS

	FCV-19S-J			HADS- anxiety			HADS- depression		
	β	95% CI	p	β	95% CI	p	β	95% CI	p
Female	0.084	-.068–2.50	0.262	-0.016	-1.20–0.96	0.832	0.062	-0.64–1.62	0.395
Age over 60	0.037	-0.79–1.58	0.514	-0.004	-0.83–0.78	0.950	0.093	-0.13–1.55	0.099
Type of occupation									
ref: Doctor	-	-	-	-	-	-	-	-	-
Nurse	0.168	-0.05–3.58	0.056	0.157	-0.13–2.33	0.081	0.282	0.86–3.45	0.001
Medical social worker	0.094	-0.62–4.31	0.142	0.166	0.50–3.85	0.011	0.214	1.30–4.82	< 0.001
Medical office staff	0.219	0.86–4.92	0.005	0.124	-0.30–2.47	0.123	0.201	0.48–3.38	0.009
Others	0.136	0.02–3.56	0.047	0.071	-0.58–1.82	0.310	0.150	0.18–2.69	0.026
J-AITCS-II teamwork subscale	-0.171	-0.25 - -0.05	0.004	-0.151	-0.16 - -0.02	0.012	-0.225	-0.22 - -0.07	< 0.001
Increased workload	0.108	-0.05–2.85	0.059	0.067	-0.41–1.56	0.254	-0.012	-1.14–0.93	0.836
Unmet support needs									
experts to provide on-site infection control guidance	0.023	-1.06–1.53	0.723	0.014	-0.79–0.98	0.833	-0.049	-1.29–0.56	0.438
system to consult with infection control experts online or by phone	-0.024	-1.53–1.04	0.707	-0.067	-1.33–0.42	0.305	0.043	-0.60–1.23	0.498
expert lectures on COVID-19	0.131	0.01 0 2.76	0.048	0.138	0.04–1.91	0.041	0.064	-0.49–1.47	0.324
system of distribution of PPE by national or local government	-0.035	-1.61–0.89	0.566	-0.100	-1.55–0.15	0.106	-0.062	-1.36–0.42	0.300
system to support psychological stress and emotional exhaustion	0.086	-0.32–2.08	0.149	0.141	0.14–1.77	0.022	0.039	-0.56–1.14	0.503

Discussion

To the best of our knowledge, this is the first large-scale nationwide survey to investigate the status and associated factors of fear of COVID-19 infection and mental health among home-HCWs. A notable finding of our study was that the type of occupation, teamwork, and unmet support needs are associated with the fear of COVID-19 infection and the mental health of home-HCWs.

First, our study revealed that the FCV-19S-J scores of home-HCWs was similar to that in the general Japanese population in August 2020. Also, our study revealed that the prevalence of anxiety and depression in home-HCWs was relatively low compared to front-line health care workers in hospitals(8, 18, 23, 25). These results suggest that the mental health condition of HCWs might differ based on the setting, irrespective of the pandemic.

Our study revealed that the FCV-19S-J scores of nurses, medical office staff, and other occupations was significantly higher than those of doctors. In addition, the HADS-depression scores of nurses, medical social workers, medical office staff, and other occupations was significantly higher than those of doctors. These results implied that non-physicians are more likely to be fearful and depressed during the

COVID-19 pandemic, and tailored mental health support based on their occupation, especially for non-physicians, is needed in the home care setting.

Multivariate regression analysis revealed that medical office staff had a significant positive association with FCV-19S-J score, and medical social workers had a significant positive association with HADS-anxiety. Although previous studies found that nurses or front-line workers had a high prevalence of fear of COVID-19 infection and anxiety(9), our study newly shows that medical office work and medical social work are possible risk factors for fear of COVID-19 infection and deterioration of mental health in the home care setting. One possible explanation for this result is that medical office staff and medical social workers do not have sufficient knowledge about COVID-19 infection. Another possible reason is that since both medical office staff, who conduct reception with patients and/or families, and medical social workers who conduct the first intake with patients and/or families, are often the first contact person in the home care setting, and the unknown risk of infection may worsen their fear of COVID-19 infection and their mental health condition. This result highlights the need for appropriate infection protection systems and mental health support for non-physicians and non-nursing staff as well as physicians and nurses during the COVID-19 pandemic.

Perceived good teamwork within each facility had a significant inverse association with the fear of COVID-19 scale and HADS-anxiety and depression. This result is partially consistent with the previous systematic review which indicated that, among nurses, dissatisfaction with teamwork was significantly associated with depression, but not with both anxiety and stress(26). Thus, our study presents novel evidence about the mental health of home-HCWs during the COVID-19 pandemic in that good teamwork can mitigate the negative influence on home-HCWs' mental health regardless of the type of occupation. In general, i.e., not during the COVID-19 pandemic, interprofessional factors such as teamwork, collaboration and cooperation are positively associated with job satisfaction, and dissatisfaction with teamwork is significantly associated with depression among expatriate nurses(26). However, a theoretical foundation for this association between interprofessional work and mental health of HCWs during the COVID-19 pandemic is still being developed(27). Since our results suggest that it is important for an organization to regularly promote teamwork, not only to improve the quality of care for patients but also to maintain and improve the mental health of their staff, our study could contribute to theory-based interprofessional working in the home care setting in the COVID-19 era.

Lastly, our study revealed that it is important to provide home-HCWs with learning opportunities about emerging infectious diseases and psychological support from experts to maintain and improve the mental health of the staff during the COVID-19 pandemic. In addition, as described in the previous systematic review, these efforts can be carried out as daily activities based on the needs of the staff, which could enhance teamwork(28).

It is worth noting the significant differences in support needs among the types of occupation during the COVID-19 pandemic, although there were no significant differences in unmet support needs. This result implied that support needs during the COVID-19 pandemic might vary by type of occupation, but unmet support needs might vary by facility initiatives. It is important for facility managers to understand the support needs of their staff and to provide systematic support according to individual needs.

The strengths of our study included a relatively large sample size and multidisciplinary participants nationwide. However, our study had some limitations. First, we used some variables that have not been validated, although we measured the outcomes with well-validated scales. Second, our study was a cross-sectional survey and could not determine causality among the outcomes and variables. Third, we did not assess the presence of anxiety and/or depression of the participants before the COVID-19 pandemic. Fourth, the results would be influenced by the situation of the pandemic, and thus we were unable to draw definitive conclusions about associated factors of anxiety and/or depression during the COVID-19 pandemic. However, we believe that these limitations are unlikely to have had a significant impact on the results of our study, and that this study drew on the best available evidence during the COVID-19 pandemic.

Conclusions

Recognizing that different occupations have different mental health conditions, providing learning opportunities about COVID-19 and expert psychological support, and building good teamwork are important for maintaining the mental health of home-HCWs during the COVID-19 pandemic.

Abbreviations

home-HCWs: Home health care workers

PPE: Personal protective equipment

J-AITCS-II: The Japanese version of Assessment of Interprofessional Team Collaboration Scale-II

AITCS-II: The shortened version of Assessment of Interprofessional Team Collaboration Scale

FCV-19S-J: Japanese version of the Fear of COVID-19 scale

FCV-19S: The Fear of COVID-19 scale

HADS: Hospital Anxiety and Depression scale

Declarations

Ethics approval and consent to participate

This study was conducted under the ethical standards of the Declaration of Helsinki and the ethical guidelines for epidemiological research issued by the Ministry of Health, Labour and Welfare of Japan. The institutional review board of the University of Tsukuba approved this study (No. 1651). We explain the purpose of this study and asked the consent to this study on the top of web page.

Consent for publication

Not applicable

Availability of data and materials

The datasets generated during and analyzed during the current study are not publicly available due to them containing information that could compromise research participant privacy/consent but are available from the corresponding author on reasonable request.

Competing interests

The authors declare that they have no competing interests.

Funding

This work was supported by JSPS KAKENHI Grant Number 19K10551, and a research grant of the Mitsubishi Foundation (201930027). The funder had no role in the design and conduct of the study, the collection, management, analysis, and interpretation of data, the preparation, review, and approval of the manuscript, or the decision to submit the manuscript for publication.

Authors' contributions

All authors made substantial contributions to the conception and design of the work. JH facilitated the acquisition of data, SO, SM, TH, HN, TA, HT, ST, and SE led the interpretation of data and drafting the work, all authors revised it critically, and all authors read and approved the final version of the manuscript.

Acknowledgments

The participating investigators and study sites of this study were as follows: Keijiro Miyake, M.D., Ph.D. (Keijiro Clinic), Yoshihiro Kataoka, M.D., Ph.D. (Oomori Clinic/ Hitachi Oota Family Clinic), Masanori Kawahara, M.D., Ph.D. (Soshukai Okabe Clinic Sendai), Hongja Kim, M.D. (Kaita Hospital), Takashi Inaba, M.D. (Kasama City Hospital), Hiroki Takahashi, M.D. (KamisuSaiseikai Hospital), Kaoru Okawa, M.D. (Kameda Medical Center), Ryo Osawa, M.D. (Kitaibaraki Family Clinic), Fuminao Kitanishi, M.D. (Total Family Care Kitanishi Clinic), Keiichirou Sakato, M.D. (Kensei Kuroishi Clinic), Takuya Shinjo, M.D. (Shinjo Clinic), Yohei Shinya, M.D. (Chubu Tokushukai Hospital), Yu Yamamoto, M.D. (Tsukuba Central Hospital), Hiroshi Taira, M.D. (Torimachi Clinic), Kazuhiro Hisajima, M.D. (Dr. GON Kamakura Clinic), Tomoyuki Koga, M.D. (Nozominohana Clinic), Asumi Nakamura, M.D. (Himawari Clinic), Kotaro Hashimoto, M.D. (Fukushima Home Palliative Care Clinic), Ryo Takayanagi, M.D. (Maebashi Kyoritsu Clinic), Mariko Shutoh, M.D., Ph.D. (Minato Home Care Clinic), Shouko Nishimizu, M.D. (Miyazaki Clinic), Yuri Morimoto, M.D. (Morimoto Clinic), Jun Sasaki, M.D. (Yushouka Medical Corporation), Junichiro Toya, M.D. (Sakura-shinmachi Urban Clinic), Hiroto Shirayama, M.D. (Osaka Kita Home Care Clinic), Yasuhiro Saitou, M.D. (GP Clinic Jiyugaoka), Nobuyuki Miyata, M.D. (Miyata Clinic), Yurika Kawamura, M.D., Ph.D. (Miyata Clinic), Masakatsu Shimizu, M.D., Ph.D. (Shimizu Medical Clinic), Ryo Yamamoto, M.D. (Saku Central Hospital Advanced Care Center), Yousuke Kimura, M.D. (Yamato Clinic), Yasuyuki Arai, M.D., Ph.D. (Iki-iki Clinic), Hideki Shishido, M.D. (Shishido Internal Medicine Clinic), Kazushi Nakano, M.D., Ph.D. (Nakano Zaitakuiyou Clinic), Maiko Haruki, M.D. (Orange Home-Care Clinic), Sen Otomo, M.D., (Seimeikan Clinic).

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