

# Depression prevention in healthcare workers during the COVID-19 pandemic

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<b>Background</b>	Few studies have assessed depression in healthcare workers (HCWs) in Japan owing to the coronavirus disease 2019 (COVID-19) pandemic, and no studies have proposed effective interventions to help support their mental health.
<b>Aims</b>	To test the hypothesis that enhancing access to mental healthcare professionals helps to improve HCWs' mental health.
<b>Methods</b>	This cross-sectional study assessed depressive symptoms in HCWs at three hospitals in Osaka prefecture between May and July, 2020. The survey obtained information on HCWs' mental state and related situations/perceptions. Multivariable logistic regression analysis was performed to identify factors associated with depressive symptoms.
<b>Results</b>	Of the 3291 eligible HCWs, 1269 (39%) completed the survey. Of all HCWs, 87 (7%) were physicians, and 700 (55%) were nurses. A total of 181 (14%) HCWs had moderate-to-severe symptoms of depression. Being a frontline worker was not significantly associated with depressive symptoms (odds ratio: 0.86 [95% confidence intervals: 0.54–1.37], $P = 0.50$ ). The unwillingness to consult with anyone was significantly associated with more severe depressive symptoms (1.70 [1.10–2.63], $P < 0.01$ ). HCWs who had no opportunity to confide in family/friends (1.66 [1.10–2.52], $P < 0.01$ ) or colleagues/supervisors (3.19 [2.22–4.58], $P < 0.001$ ) were significantly more likely to have depressive symptoms.
<b>Conclusions</b>	Being a frontline HCW in a Japanese hospital treating patients with COVID-19 was not significantly associated with having depressive symptoms. The study highlights that encouraging daily communication with close persons (family, friends, colleagues and supervisors), rather than improving access to mental health professionals, might help to prevent depression in HCWs during the COVID-19 pandemic.
<b>Key words</b>	Coronavirus disease 2019; depression; healthcare worker; health personnel; mental health.

## Introduction

Since the first report of the novel coronavirus disease 2019 (COVID-19) in China in November 2019, the disease has spread rapidly across the world. The World Health Organization declared COVID-19 a pandemic on 30 January. The Japanese government declared a state of emergency in April 2020, and has adopted several measures to deal with the COVID-19 pandemic. With constant exposure to patients with COVID-19, healthcare workers (HCWs) worldwide face a high risk of developing mental health symptoms; in particular,

frontline HCWs have the highest risk of experiencing mental health problems [1–21]. A large number of studies previously reported that HCWs exposed to patients with COVID-19 exhibit various symptoms of mental health issues [1–21]. Several systematic reviews and meta-analyses have indicated that the prevalence of anxiety, depression and insomnia were relatively high in these HCWs, at 23–33%, 23–28% and 37–39%, respectively [1–3]. In Japan, a few studies have focused on the mental health of HCWs during the COVID-19 pandemic [4,5]. A single-centre study showed that 18% of HCWs

## Key learning points

### What is already known about this subject:

- Several systematic reviews and meta-analyses have indicated that the prevalence of anxiety, depression and insomnia were relatively high at 23–39% in healthcare workers during the coronavirus disease 2019 pandemic, worldwide.
- In Japan, few studies have assessed depression in healthcare workers owing to the coronavirus disease 2019 pandemic; no studies have proposed effective interventions to help support their mental health.
- We hypothesized that enhancing access to mental healthcare professionals might contribute to the improvement of healthcare workers' mental health, and conducted a multicentre study to investigate the potential intervention measures to support the mental health of healthcare workers exposed to patients with coronavirus disease 2019.

### What this study adds:

- The cross-sectional survey enrolled 1269 healthcare workers in Japanese hospitals treating patients with coronavirus disease 2019, and found that 14% of healthcare workers had depressive symptoms.
- Only 15% of all healthcare workers reported being willing to consult with mental healthcare professionals when their mental state was not good.
- The results indicated that support from close persons (family, friends, colleagues and supervisors) may be more important than mental healthcare professionals to prevent the development of depression.

### What impact this may have on practice or policy:

- Encouraging daily communication with close persons, rather than improving access to mental health professionals, could lead to the prevention of depression among healthcare workers during the coronavirus disease 2019 pandemic.

had depressive symptoms, with the potential risk factors of being a nurse, being young and having low resilience [4]. Another study also reported that 37% of frontline HCWs experienced burnout during the COVID-19 pandemic [5]. Therefore, HCWs require timely mental healthcare support for their daily work [22,23].

In Japan, few studies have assessed depression in HCWs owing to the COVID-19 pandemic [4]. Furthermore, to our best knowledge, no studies have proposed effective interventions to help support their mental health. We hypothesized that enhancing access to mental healthcare professionals might contribute to the improvement of HCWs' mental health. To test these hypotheses, we conducted a multicentre study to assess depressive symptoms and associated factors among HCWs, and investigated the potential intervention measures to support the mental health of HCWs exposed to patients with COVID-19.

## Methods

An administrative cross-sectional survey was conducted by Osaka local government from 27 May to 23 July, 2020. All HCWs from three hospitals in Osaka prefecture were eligible to participate in the survey. These three hospitals were anonymized because of the ethics protocol employed in the study. E-mails and questionnaires were sent to eligible participants, which included the hospital ID with a password, online URL and QR code that was linked to the web-based questionnaire. Participants could respond via either paper-based or web-based

questionnaires, using their own PC or mobile phone. This study was approved by the Clinical research ethics committee of Osaka Prefectural Mental Health Centre, and waived the requirement for informed consent.

Information on depressive symptoms was obtained from HCWs using a validated measurement tool, the Japanese version of the Patient Health Questionnaire-9 (J-PHQ-9), which was the main outcome measure in the study. The total J-PHQ-9 score (range: 0–27) was classified as four grades of severity, as follows: minimal-to-mild (0–9), moderate (10–14), moderate-to-severe (15–19) and severe (20–27). The stratum-specific likelihood ratios for J-PHQ-9 score ranges of 0–9, 10–14, 15–19 and 20–27 for major depression were 0.10, 1.67, 5.41 and 11.98, respectively [24]. We defined participants with scores of  $\geq 10$  as those with depressive symptoms.

The survey questionnaire measured demographic variables and included specific questions to assess HCWs' perceptions about their job potentially related to their mental health. Demographic variables included age, sex, occupation and career length. Occupation was categorized as physician (including dentist), nurse, co-medicals (laboratory/radiology/clinical technician, pharmacist, physical/occupational/speech therapist, case worker/clinical and psychologist), clerks and other. Career length was classified as  $< 3$ , 3–10 and  $\geq 10$  years. Additionally, information on current clinical activities and experience involving patients with COVID-19 was obtained. We defined 'frontline workers' as HCWs who responded that they were engaged in jobs that put them at risk of COVID-19 infection at the time of response.

Specific questions are listed in Table 1. These questions were created according to previous studies and the existing literature [14,21,22,25–28]. Topics of these specific questions included (i) knowledge of mental health management, (ii) current mental state, (iii) consultation willingness, (iv) consultation accessibility of colleagues and supervisors and (v) consultation accessibility of family and friends. The guidance for leaders and managers of HCWs highlights that ‘Psychological First Aid’ is first-line mental well-being support for all HCWs [25,26]. Therefore, we hypothesized that ‘knowledge of mental health management’ was negatively associated with depressive symptoms among HCWs, assuming that the knowledge improvement among HCWs might contribute to the prevention of depression.

Additionally, a previous study reported that HCWs who have support from supervisors/colleagues were less likely to develop psychiatric symptoms [28]. Similar questions used in this previous study were included in the questionnaire as specific questions.

For (i) knowledge of mental health management, we dichotomously defined responses as ‘with’ knowledge if the responses were either ‘very much’ or ‘quite a lot’, and all other responses were defined as ‘without’ knowledge. A similar definition was applied for variable (iv) consultation accessibility of colleagues and supervisors and (v) consultation accessibility of family and friends, defined dichotomously as ‘able’ of ‘unable’ for the ability to confide in.

HCWs who responded with any incomplete information were excluded from the analysis. First, we determined the distributions of demographic characteristics, severity of depressive symptoms based on PHQ-9 scores and answers to questions potentially related to mental health status in all HCWs. We then assessed the associations between depressive symptoms and specific

questions using Chi-square tests. Finally, multivariable logistic regression analysis was performed to identify potential factors associated with depressive symptoms, which are presented as odds ratios (ORs) and 95% confidence intervals (CIs). Data analysis was performed using EZR (Saitama Medical Centre, Jichi Medical University, Saitama, Japan), which is a graphical user interface for R (The R Foundation for Statistical Computing, Vienna, Austria). The significance threshold was set at  $P < 0.05$ . Categorical variables are presented as the number and percentage unless otherwise indicated.

## Results

Among the 3291 HCWs who were eligible for the study, 1269 (39%) completed the survey (Table 2). Of the 1269 respondents, 554 (44%) were 30–49 years of age; 952 (75%) were female; 87 (7%) and 700 (55%) were physicians and nurses, respectively; 610 (48%) had a career length  $\geq 10$  years; and 209 (16%) were frontline workers who engaged in work that put them at risk of COVID-19 infection at the time of the survey.

Among the 1269 HCWs (Table 3), 659 (52%) reported not having knowledge of mental health management, and 291 (23%) responded that their mental state was worse than before the pandemic. When faced with a poor mental state, 189 (15%) responded that they would consult with a mental health professional, 988 (78%) HCWs responded that they would be willing to confide in their family or friends, and 199 (16%) responded that they would not consult with anyone. A total of 895 (70%) and 1033 (81%) HCWs reported that they could discuss their distress with their colleagues and family, respectively.

Among the 1269 HCWs, 181 (14%) exhibited depressive symptoms (PHQ-9 score  $\geq 10$ ), including 130

**Table 1.** The contents of the questionnaire

Topics <i>Specific questions</i>	Options			
Knowledge of mental health management <i>Do you have enough knowledge of mental health management for HCWs (or self-care)?</i>	1. Very much	2. Quite a lot	3. A little	4. Not at all
Current mental condition <i>How do you feel about your mental condition compared to before the COVID-19 pandemic?</i>	1. Good	2. Unchanged	3. Not good	4. I don't know
Consultation willingness <i>Who are you willing to consult with when your mental condition is not good?</i>	1. Mental health professionals	2. Family/friends	3. Colleagues/supervisors	4. No one
Consultation accessibility of colleagues and supervisors <i>Can you easily communicate your distress to a colleague or supervisor?</i>	1. Very much	2. Quite a lot	3. A little	4. Not at all
Consultation accessibility of family and friends <i>Can you easily communicate your distress to family or friends?</i>	1. Very much	2. Quite a lot	3. A little	4. Not at all

**Table 2.** Demographic characteristics (N = 1269)

Characteristic	n (%)
Age, years	
18–29	360 (28)
30–49	554 (44)
≥50	355 (28)
Sex	
Male	317 (25)
Female	952 (75)
Occupation	
Physician <sup>a</sup>	87 (7)
Nurse	700 (55)
Co-medical <sup>b</sup>	219 (17)
Clerks	153 (12)
Others	110 (9)
Career length, years	
<3	287 (23)
3–10	372 (29)
≥10	610 (48)
Working position	
Frontline	209 (16)
Non-frontline	1060 (84)

<sup>a</sup>Physicians included dentists (n = 1).

<sup>b</sup>Including laboratory/radiology/clinical technician, pharmacist, physical/occupational/speech therapist, case worker/clinical and psychologist.

(10%), 36 (3%) and 15 (1%) with moderate, moderate-to-severe and severe depression, respectively (Table 4).

Associations between depressive symptoms and the self-report questions are listed in Table 5. HCWs without a knowledge of mental health management were more likely to have depressive symptoms than those with this knowledge (n = 127 [19%] vs. n = 54 [9%]; P < 0.01). HCWs who were unwilling to consult with anyone were more likely to have depressive symptoms compared with those with this willingness (unwillingness to consult with anyone: n = 55 [28%], willingness to consult with mental health professionals: n = 25 [14%] and willingness to consult with a colleagues/supervisors/family/friends: n = 99 [14%]; P < 0.01). HCWs who responded that they would be able to consult with their supervisors or colleagues, as well as their family or friends, were less likely to have depressive symptoms than those who responded that they would be unable to consult with them (n = 74 [8%] vs. n = 107 [29%]; P < 0.001, and n = 112 [11%] vs. n = 69 [29%]; P < 0.01, respectively).

Factors associated with depressive symptoms in HCWs are shown in Table 6. After adjusting for all the variables listed in the table, female sex (OR: 1.54, 95% CI: 1.01–2.34; P = 0.04), not having knowledge of mental health management (1.88, 1.31–2.70; P < 0.01), an unwillingness to consult with anyone (1.70, 1.10–2.63; P < 0.01; reference, colleagues/supervisors/family/friends), and consultation non-accessibility to colleagues/supervisors (3.19, 2.22–4.58; P < 0.01) and family/friends (1.66,

**Table 3.** Responses to the specific questions (N = 1269)

Topics of specific questions	n (%)
Knowledge of mental health management	
With	610 (48)
Without	659 (52)
Current mental condition	
Good	53 (4)
Unchanged	770 (61)
Worse	291 (23)
I don't know	155 (12)
Consultation willingness <sup>a</sup>	
Mental health professional	189 (15)
Colleagues/supervisors	240 (19)
Family/friends	988 (78)
No one	199 (16)
Ability to consult colleagues and supervisors	
Able	895 (70)
Unable	374 (30)
Ability to consult family and friends	
Able	1033 (81)
Unable	236 (19)

<sup>a</sup>Some participants were willing to consult with mental health professionals and/or colleagues/supervisors and/or family/friends.

**Table 4.** Severity of depressive symptoms (N = 1269)

Severity of depressive symptoms (PHQ-9 scores)	n (%)
Without depression	
Minimal-to-mild (0–9)	1088 (86)
With depression	181 (14)
Moderate (10–14)	130 (10)
Moderate-to-severe (15–19)	36 (3)
Severe (20–27)	15 (1)

1.10–2.52; P < 0.01) were significantly associated with depressive symptoms. Being a frontline worker was not significantly associated with symptoms of depression (0.86, 0.54–1.37; P = 0.50). Furthermore, the willingness to consult with a mental health professional was not associated with depressive symptoms (1.16, 0.70–1.93, P = 0.55; reference, colleagues/supervisors/family/friends).

## Discussion

This cross-sectional study of 1269 HCWs in Japanese hospitals treating patients with COVID-19 found that 14% of HCWs had depressive symptoms. Our findings indicate that HCWs who have knowledge of mental health management and those with close sources of support were less likely to have depressive symptoms. Furthermore, HCWs who were unwilling to consult with anyone were at a higher risk for the development of

**Table 5.** Associations between depressive symptoms and the specific questions ( $N = 1269$ )

Topics of specific questions	Depressive symptoms <sup>a</sup>		P-value <sup>b</sup>
	Without	With	
	<i>n</i> (%)	<i>n</i> (%)	
Knowledge of mental health management			
With	556 (91)	54 (9)	<0.01
Without	532 (81)	127 (19)	
Consultation willingness <sup>c</sup>			
Mental health professional	154 (86)	25 (14)	<0.01
Colleagues/supervisors/ family/friends	784 (89)	99 (11)	
No one	144 (72)	55 (28)	
Ability to consult colleagues and supervisors			
Able	821 (92)	74 (8)	<0.01
Unable	267 (71)	107 (29)	
Ability to consult family and friends			
Able	921 (89)	112 (11)	<0.01
Unable	167 (71)	69 (29)	

<sup>a</sup>We defined participants with PHQ-9 scores of  $\geq 10$  as having depressive symptoms.

<sup>b</sup>Chi-square tests.

<sup>c</sup>Some participants were willing to consult with mental health professionals and/or colleagues/supervisors and/or family/friends.

depressive symptoms. Only 15% of all HCWs reported being willing to consult with mental healthcare professionals when their mental state was not good. Our study highlights that support from close persons may be more important than mental healthcare professionals to prevent the development of depression. All staff in hospitals treating patients with COVID-19 may therefore benefit from these sources of support.

In this study, the prevalence of depression among HCWs was 14%. There have been several studies focusing on depression of HCWs during the COVID-19 pandemic [1–4,8–10,12,13,15]. Several meta-analyses have reported a pooled prevalence of depression of 23–28% [1–3]. A Japanese study conducted in a single hospital reported that 28% of HCWs developed depressive symptoms [4]. In contrast, according to the results from the Japanese nationwide survey, 12-month prevalence of any mental disorders, including depressive symptoms, was 5% in males and 6% in females among the general Japanese population [29]. In our study, prevalence of depression in the Japanese HCWs was lower than that found by these previous studies investigating prevalence of depression in HCWs [1–4], but still more than double the prevalence of depression in the general Japanese population [29]. This may be because our survey was conducted after the first wave of the COVID-19 pandemic. At the time of the survey, the number of patients with COVID-19 was relatively small. Differences in healthcare settings (e.g. hospital size, function and the number of staff who have

expertise in respiratory/intensive care) might also affect the prevalence of depressive symptoms. Although various factors may affect the mental well-being of HCWs, reducing overworking through increasing staff to patient ratios might improve HCWs' mental health and decrease the prevalence of depressive symptoms.

Another finding of our study was that HCWs that had the support of someone close to them, rather than contact with a mental health professional, had lower proportions of depression. Only 15% of participants reported being willing to consult with a mental health professional when their mental state was not good. Osaka local government has implemented mental health hotline services for HCWs, but they were rarely used at the time of the survey. A study from Hong Kong previously reported that few HCWs considered professional counselling for their mental health during an outbreak of severe acute respiratory syndrome (SARS) in 2003 [27]. This is consistent with our results. Hotline services are important, but might not be useful for HCWs who are not willing to consult with mental health professionals. Indeed, our study indicates the majority of participants preferred their families, friends, supervisors and colleagues as people to confide in. Our findings indicate that having these close sources of support might be a protective factor for depression. In the UK, peer support has been suggested as first-line care to meet the psychological needs of HCWs [26]. These studies could support our findings. To give and receive peer support, HCWs should know about mental healthcare. In our study, half of the HCWs reported not knowing about the available mental healthcare options, although the Japanese local governments provided information about mental health. Ensuring a wide and repeated dissemination of information for mental health may be important to prevent depression in HCWs. Several specific preventive interventions might be suggested. For example, Knowledge promotion of 'Psychological First Aids' may contribute to mental well-being among HCWs [25,26]. 'Schwartz Rounds' provide an opportunity for all staff in a healthcare setting to meet regularly and reflect on the human connections made with the emotional impact of their work, which may also have a positive impact on their mental status [30].

Notably, being a frontline HCW was not independently associated with the development of depressive symptoms. This finding is consistent with previous results from a Japanese study [4] as well as studies conducted in other countries worldwide [16,18]. However, other studies have reported that being a frontline worker might be a risk factor for depression [7,9,15,17,19,20]. Thus, as there are conflicting reports on this topic, further studies are warranted to clarify this issue. At present, mental health strategies aimed at all HCWs are desirable.

This study has some limitations. The primary limitation was that the study was conducted employing a

**Table 6.** Factors associated with depressive symptoms (*N* = 1269)

Variable	Number of depressive cases/total cases (%)	Adjusted OR (95% CI)	<i>P</i> -value
Age, year			
18–29	51/309 (14)	0.91 (0.51–1.61)	NS
30–49	81/473 (15)	0.93 (0.61–1.42)	NS
≥50	49/306 (14)	1 (Reference)	
Sex			
Male	36/281 (11)	1 (Reference)	<0.05
Female	145/807 (15)	1.54 (1.01–2.34)	
Career length, years			
<3	36/251 (13)	1 (Reference)	
3–10	62/310 (17)	1.44 (0.88–2.34)	NS
≥10	83/527 (14)	1.10 (0.63–1.91)	NS
Working position			
Frontline	28/181 (13)	0.86 (0.54–1.37)	NS
Non-frontline	153/907 (14)	1 (Reference)	
Knowledge of mental health management			
With	54/556 (9)	1 (Reference)	<0.01
Without	127/532 (19)	1.88 (1.31–2.70)	
Consultation willingness			
Mental health professional	25/154 (14)	1.16 (0.70–1.93)	NS
Colleagues/supervisors/family/friends	99/784 (11)	1 (Reference)	
No one	55/144 (28)	1.70 (1.10–2.63)	<0.01
Ability to consult colleagues and supervisors			
Able	74/821 (8)	1 (Reference)	<0.01
Unable	107/267 (29)	3.19 (2.22–4.58)	
Ability to consult family and friends			
Able	112/921 (11)	1 (Reference)	<0.01
Unable	69/167 (29)	1.66 (1.10–2.52)	

cross-sectional study design. Our results indicate that HCWs who have good communication with close persons were less likely to have depressive symptoms; however, on the contrary, these results could be also explained that the development of depression might result in poor communication with their close persons (i.e. reverse causality). Therefore, our study could not determine the causality between depression and the potential risk factors. Furthermore, our study was conducted just one time at the first wave of the COVID-19. Results might differ if similar surveys had been conducted after the second or later wave and longitudinal follow-up studies may be warranted to confirm our results. Second, the survey obtained limited information. For example, our data were not available on specific information on job descriptions involving patients with COVID-19. Additionally, private non-COVID-19-related factors, such as problems at home, financial issues, other life events, might also have affected depressive symptoms. Unfortunately, the survey was forced to collect minimum information because of considering the potential extra burden on HCWs. The institutional ethics review board also approved collecting minimum information. Third, the response rate was low (39%). Response bias may exist if non-respondents were

either too depressed to respond or not depressed at all and thus not interested in this study. Fourth, particular questions may be limited in their validity. HCWs might have a different perception of ‘knowledge of mental health management’ because this was not referenced against particular standards. Additionally, consultation with colleagues and supervisors might not be similarly accessible to the HCWs surveyed (horizontal or vertical workplace relationships), and these could have been explored in separate questions. Fifth, we did not compare differences by the three hospitals participating in the survey because the hospital information was already anonymized due to the ethic protocol. Sixth, although this was a multicentre survey, all hospitals were located in just one prefecture of Japan, and therefore the results may have limited the generalizability. Finally, it was not clear whether respondents provided honest answers or socially desirable answers.

In conclusion, HCWs in Japanese hospitals treating patients with COVID-19 reported substantial depressive symptoms. The study highlights that healthcare workers who did not have opportunities to confide in close persons (family, friends, colleagues and supervisors) were significantly more likely to have depressive

symptoms. The study also indicates that when experiencing a deterioration in mental state, HCWs were more inclined to consult with close persons than professionals. Encouraging daily communication with close persons, rather than improving access to mental health professionals, might lead to the prevention of depression and facilitate seeking the initial support among HCWs during the COVID-19 pandemic.

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## Competing interests

None declared.

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