Effects of contacting with COVID-19 patients on the mental health of workers in a psychiatric hospital

Short running title: **COVID-19 and workers' mental health**

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COVID-19 has negatively impacted the mental health of people in general,[1,2] particularly that of workers treating COVID-19 on the front lines.[3,4] At our psychiatric hospital, COVID-19 was diagnosed in five inpatients and three workers, and each patient with a confirmed COVID-19 diagnosis was transferred to the designated medical institution for COVID-19, but the ward where other patients had had close contact with COVID-19 patients remained as the COVID-19 ward. Workers in close contact with COVID-19 patients were directed to stay at home, while staff from other wards took over their duties in the COVID-19 ward. With this situation, there was concern that the workers would experience mental health problems with the nosocomial infection.

Several studies have shown that frontline healthcare workers treating patients were at increased risk of anxiety and depression symptoms.[3–5] However, to the best of our knowledge, there is no research on the effects of nosocomial COVID-19 infections in a psychiatric hospital on the mental health of workers, and therefore, we aim to investigate workers' mental health state after dealing with nosocomial COVID-19 infections in our psychiatric hospital.

Anonymous questionnaires were distributed to all 468 hospital workers composed of doctors, nurses, occupational therapists, psychologists, laboratory technicians, psychiatric social workers, pharmacists, dietitians, and others (e.g., officers), and of these, 426 responded for this study. The characteristics of the participants are shown in supplemental Table 1. The questionnaire included items about the workers' sex, age, presence of close contact with COVID-19 patients, presence of housemates, and hospital instructions (staying at home, no change in work, transfer to the COVID-19 ward, or transfer to non-COVID-19 wards). Anxiety and depression were assessed using the Japanese version of the GAD-7 (Generalized Anxiety Disorder-7) and the Japanese version of the PHQ-9 (Patient Health Questionnaire-9).[6, 7] Mann-Whitney U test and Kruskal-Wallis test were applied to compare the severity of each symptom. To determine the potential risk factors, a multiple-linear regression analysis was performed. Two-way analysis of variance was applied to determine the interaction between the presence of housemates and close contact. This study was approved by the Ethics Committee of Shichiyama Hospital.

Both the levels of anxiety and depression were significantly higher in workers who had been in close contact with COVID-19 patients and instructed to stay at home than in those who had not ($p = 0.013$, $p = 0.00006$, respectively) (Supplemental Fig. 1). Anxiety and depression levels were significantly interacted with the presence of housemates ($p = 0.042$, $p = 0.031$, respectively) (Supplemental Fig. 2). A multiple regression analysis indicated that being female and staying at home (with close contact) increased the degree of both anxiety and depression (GAD-7: sex, $p = 0.022$; stay at home, $p = 0.010$) (PHQ-9: sex, $p = 0.010$; stay at home, $p < 0.001$), while the presence of housemates increased anxiety levels only ($p = 0.035$) (Table 1), which was also shown in supplemental Fig. 2a. Workers without close contact with COVID-19 patients were divided into three groups: no change in work, transfer to the COVID-19 ward, and transfer to other wards. These instructions did not affect workers' anxiety and depression levels ($p > 0.05$, respectively) (Supplemental Fig. 3a, b).

The finding that the presence of housemates increased workers' anxiety and depression might be due to them being afraid of passing COVID-19 to their family members during staying at home and being worried about

stigma and social ostracism against their family.[8, 9] We also found that being a female was an independent risk factor for both anxiety and depression, which is consistent with previous research.[3, 5] These results suggest that, in a psychiatric hospital, mental health care is needed particularly for female workers who were in close contact with COVID-19 patients and who live with housemates.

Contrary to our expectation that workers in a psychiatric hospital tend to be nervous due to the lack of knowledge of coping with infectious diseases (10), being transferred to the COVID-19 ward did not affect either level of their anxiety or depression. This might be because the inpatients with COVID-19 infection were transferred to other designated medical institutions within two days.

Acknowledgements

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Disclosure Statement

The authors declare no conflict of interest.

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Supplemental Figure Legends

Supplemental Figure 1

Anxiety and depression in workers having close contact with COVID-19 patients

The GAD-7 score (a) and the PHQ-9 score (b) were significantly higher in the close contact group than in the non-contact group ($p = 0.013$, $p = 0.00006$, respectively). Statistical analyses were performed using Mann-Whitney U Test. Bars represent mean ± SEM. close contact, n = 110; non-contact, n = 316. GAD-7: Generalized Anxiety Disorder-7; PHQ-9: Patient Health Qestionnaire-9

Supplemental Figure 2

Interaction between the presence of housemates and close contact with COVID-19 patients

There was significant interaction between the presence of housemates

and close contact with COVID-19 patients for GAD-7 score (a) and PHQ-9 score (b) ($p = 0.042$, $p = 0.031$, respectively). Statistical analyses were performed using two-way ANOVA. Bars represent mean ± SEM. housemate (-) close contact (-), n = 53; housemate (-) close contact (+), n = 15; housemate (+) close contact (-), n = 255; housemate (+) close contact (+), n = 103. GAD-7: Generalized Anxiety Disorder-7; PHQ-9: Patient Health Qestionnaire-9

Supplemental Figure 3

Anxiety and depression scores of workers after the directed transfer

There was no significant difference in GAD-7 scores (a) and PHQ-9 scores (b) among the three groups; no change, transfer to the COVID-19 ward, and transfer to other wards ($p > 0.05$, respectively). Statistical analyses were performed using Kruskal-Wallis Test. Bars represent mean ± SEM. no change in work (n = 230), transfer to the COVID-19 ward (n = 58), transfer to non-COVID-19 wards (n = 28). GAD-7: Generalized Anxiety Disorder-7; PHQ-9: Patient Health Qestionnaire-9

Table 1a. Influence of different factors on GAD-7.

Model		Unstandardized cofficients		Standardized cofficients		
		B	Standard Error	Beta	T	P
	(Constant)	1.236	1.344		0.919	0.358
	Sex	1.148	0.500	0.110	2.294	0.022*
	Age	0.365	0.203	0.088	1.796	0.073
	Hospital instruction					
	No change (reference)					
	Stay at home (with close contact)	1.552	0.602	0.133	2.579	0.010*
	Transfer to the COVID-19 ward	-0.277	0.741	-0.019	-0.373	0.709
	Transfer to other wards	0.458	1.013	0.022	0.453	0.651
	Housemate	1.419	0.670	0.101	2.118	0.035*

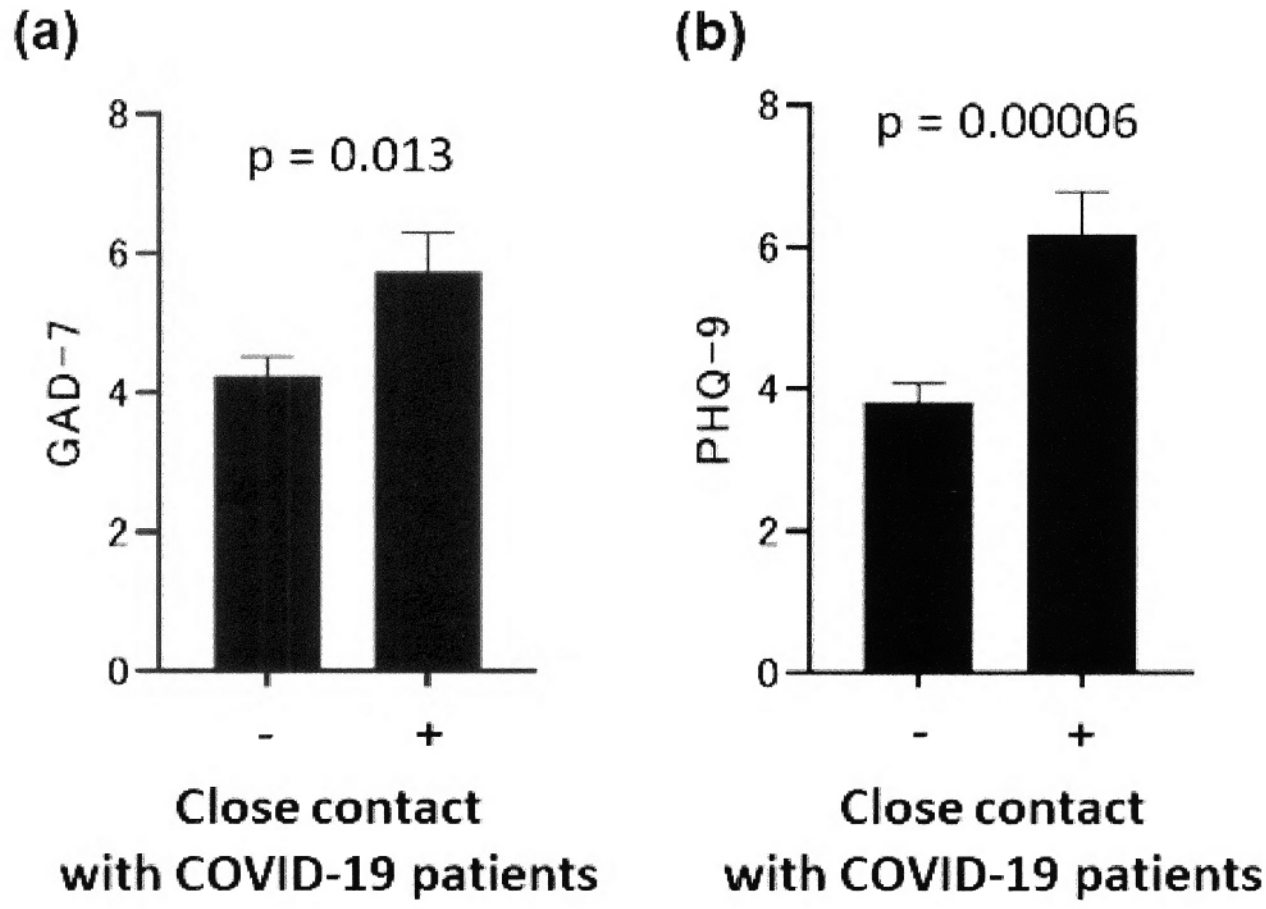
Predictors for GAD-7 scores of staff by Multiple-linear Regression (*p<0.05)

Table 1b. Influence of different factors on PHQ-9.

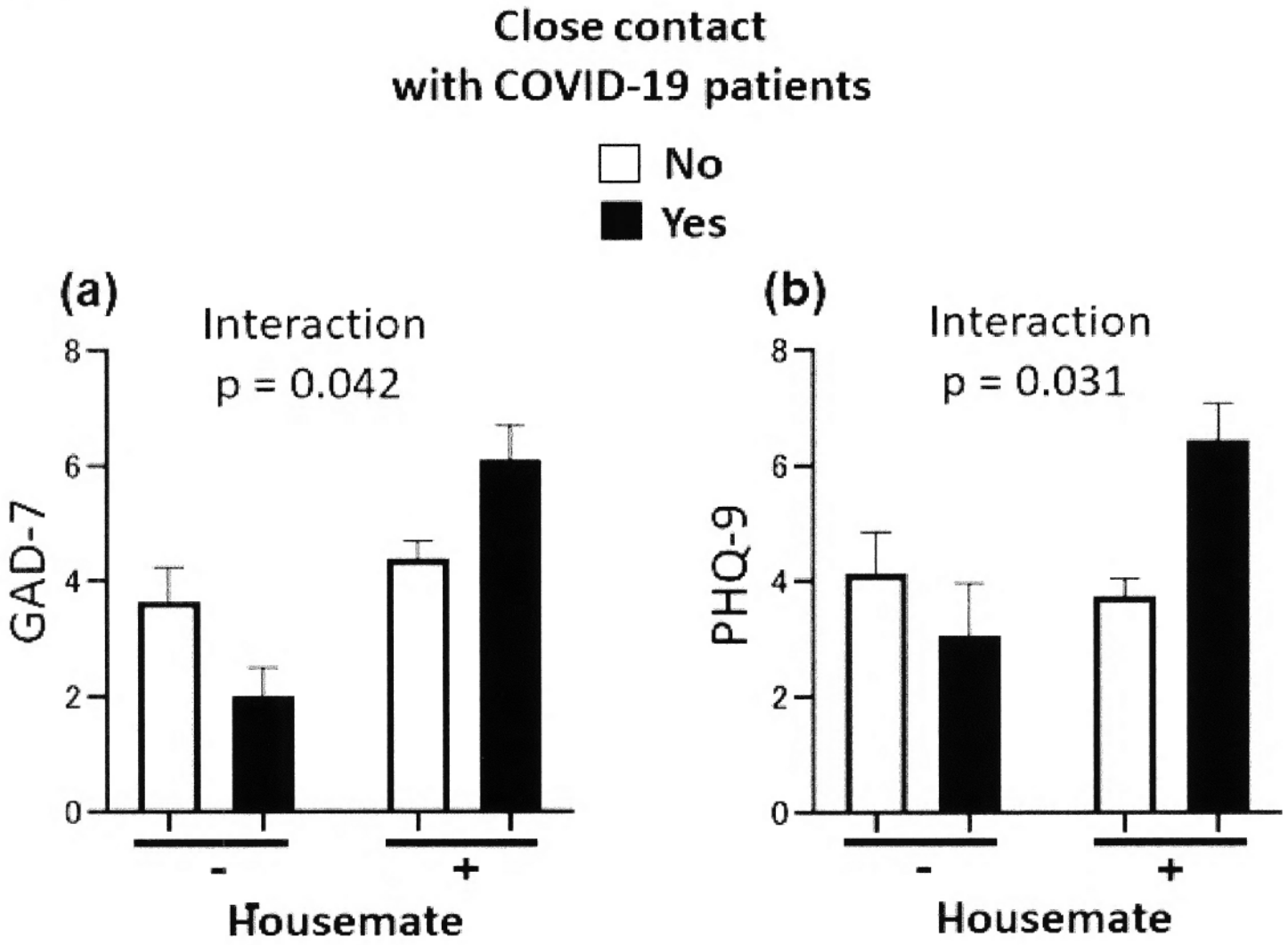
Model		Unstandardized cofficients		Standardized cofficients		
		B	Standard Error	Beta	T	P
	(Constant)	3.971	1.378		2.882	0.004**
	Sex	1.328	0.513	0.123	2.588	0.010*
	Age	-0.090	0.208	-0.021	-0.430	0.667
	Hospital Instruction					
	No change (reference)					
	Stay at home (with close contact)	2.279	0.617	0.189	3.695	< 0.001***
	Transfer to the COVID-19 ward	-0.028	0.760	-0.002	-0.037	0.971
	Transfer to other wards	1.430	1.038	0.067	1.378	0.169
	Housemate	0.379	0.687	0.026	0.551	0.582

Predictors for PHQ-9 scores of staff by Multiple-linear Regression. (*p<0.05, **p<0.01, ***p<0.001)

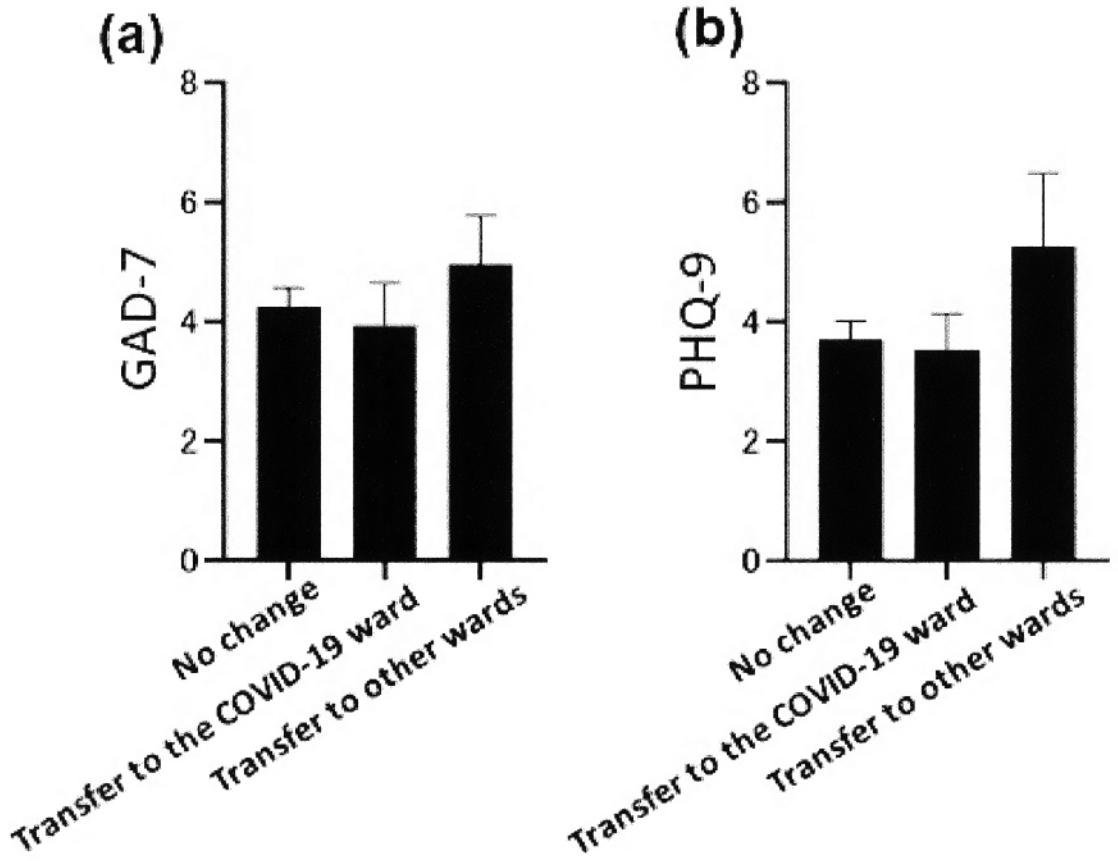
Suppl. Fig 1


(a)
p = 0.013
GAD−7
8
6
4
2
0
-
+
Close contact
with COVID-19 patients
(b)
p = 0.00006
PHQ−9
8
6
4
2
0
-
+
Close contact
with COVID-19 patients

Suppl. Fig 2


Close contact
with COVID-19 patients
No
Yes
(a)
Interaction
p = 0.042
GAD-7
8
6
4
2
0
-
+
Housemate
(b)
Interaction
p = 0.031
PHQ-9
8
6
4
2
0
-
+
Housemate

Suppl. Fig 3


(a)
GAD-7
8
6
4
2
0
No change
Transfer to the COVID-19 ward
Transfer to other wards
(b)
PHQ-9
8
6
4
2
0
No change
Transfer to the COVID-19 ward
Transfer to other wards

Suppl. Table 1. Demographic characteristics of the study sample (n = 426)

	n (%)	GAD-7 AVE(SEM)	PHQ-9 AVE(SEM)
Gender			
Male	173 (40.6)	3.87 (0.37)	3.54 (0.35)
Female	253 (59.4)	5.15 (0.33)	5.04 (0.36)
Age (years)			
20-29	53 (12.4)	3.45 (0.56)	4.66 (0.59)
30-39	63 (14.8)	3.75 (0.61)	3.98 (0.57)
40-49	131 (30.8)	5.34 (0.46)	4.95 (0.50)
50-59	108 (25.4)	5.40 (0.55)	5.22 (0.61)
>59	71 (16.7)	3.80 (0.55)	2.49 (0.41)
Close contact with COVID-19 patients			
Yes	110 (25.8)	5.75 (0.56)	6.19 (0.60)
No	316 (74.2)	4.24 (0.27)	3.82 (0.27)
Transfer of workers			
Stay at home	110 (25.8)	5.75 (0.56)	6.19 (0.60)
No change	230 (54.0)	4.25 (0.32)	3.71 (0.30)
Transfer to the COVID-19 ward	58(13.6)	3.95 (0.65)	3.62 (0.60)
Transfer to other wards	28(6.6)	4.79 (0.80)	5.07 (1.20)
Housemate			
Yes	358 (84.0)	4.89 (0.28)	4.53 (0.28)
No	68 (16.0)	3.28 (0.49)	3.90 (0.60)

AVE : average , SEM : Standard Error of the Mean

Suppl. Table 2

Relationship between the presence of housemates and hospital instructions

Chi-Square Test

	Value	df	P
Pearson Chi-Square	3.458	3	0.326
Likelihood Ratio	3.826	3	0.281
Linear-by-Linear Association	1.816	1	0.178
N of valid cases	426		