

Factors Affecting the Mental Health of Thai Medical Staff during the Second and Third Waves of the COVID-19 Pandemic: An Online Cross-sectional Survey

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ABSTRACT

Objective: This comparative study of the second and third waves of the COVID-19 pandemic aimed to: 1) examine the mental health status of hospital staff; 2) describe the associations among various factors that affect mental health; and 3) investigate the impact of COVID-19.

Materials and Methods: Data were collected from Siriraj Hospital staff using online questionnaires including demographics, staff characteristics, health behavior, readiness to handle COVID-19; COVID-19 impact; and the Thai version of the Depression Anxiety Stress Scales–21 (DASS-21).

Results: Depression, anxiety, and stress scores were significantly higher in the third wave. Living in a high-surveillance area, social distancing difficulties, health behaviors, and office work all impacted mental health in both waves. Demographics, infection exposure outside the hospital, awareness of social distancing, and readiness to work from home impacted only the second wave. Direct work with COVID-19 patients impacted only the third wave. The common stressors included living expenses, daily life changes, and disease prevention costs in both waves, with COVID-19 news having a greater impact in the third wave. Main daily life impacts were income, transportation, and disease prevention equipment in both waves, with food becoming more important in the third wave.

Conclusion: Mental health should be prioritized especially in severe waves, focusing on staff at high risk of infection, experiencing social distancing challenges, daily life changes, and having health problems. Disease protection should also be emphasized early on.

Keywords: COVID-19; impact; medical staff; mental health; Thailand (Siriraj Med J 2024; 76: 293-303)

INTRODUCTION

Healthcare professionals are an essential group of people who care for COVID-19 patients. Previous studies have found that frontline healthcare staff are at risk of experiencing depression, anxiety, and insomnia, and can face more desperation than non-frontline staff.¹

However, a previous study showed no difference in scores on anxiety and depression between frontline workers and non-frontline workers.² Furthermore, non-frontline staff experienced more vicarious traumatization than frontline staff.³ As a result, it is critical to consider the mental health of all personnel.

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Siriraj Hospital, part of Mahidol University's Faculty of Medicine, is a tertiary-level medical service institution in Thailand. With the potential to treat patients infected with the novel coronavirus 2019, many people are expected to visit for disease examination and treatment. During the first wave, the Human Resources Department of the Faculty of Medicine Siriraj Hospital surveyed stress, mental health status, and the basic needs of hospital staff. According to the survey, more than 31% of staff were found to have high levels of stress, 43% to have high levels of anxiety, and 46% to have high levels of depression on the Depression, Anxiety, and Stress Scales (DASS-21).

Each wave of the pandemic has a different level of stress exposure. Following a previous study in China, the second wave of the outbreak's fear levels was lower than those for the first. Yet compared to the first wave, depression scores in the second wave were significantly greater.⁴ According to reports from England, anxiety levels in the second wave were much lower than in the first wave. Although there was no significant difference in depression in this study, there was a considerably higher rate of suicide ideation.⁵ Nevertheless, the prior study was conducted among the general population. Studies on the mental health of medical staff in the subsequent wave are still scarce.

Thailand managed the COVID-19 crisis so efficiently during the early phases of the outbreak that it was ranked first in the global COVID-19 Index (GCI).⁶ However, the second wave of the outbreak, which started in January 2021, was primarily from a group of migrant workers in the wet market in Samut Sakhon Province, which led to a new wave of panic among the population. Furthermore, during the third wave of the outbreak in May, a cluster of COVID-19 cases was linked to entertainment venues such as pubs, bars, and nightclubs. This wave of the outbreak was caused by the British strain, which was considered more dangerous due to its ability to spread rapidly. As a result of the increased burden on hospitals to treat COVID-19 patients, understanding the mental health status of hospital staff in the second and third waves is critical.

Furthermore, understanding the factors influencing staff mental health status will allow for more effective targeting assistance. A previous study in China indicated that being a nurse, female, a frontline worker, and working in Wuhan were associated with mental health symptoms.¹ Additionally, compliance with and perceived effectiveness of social distancing measures were also associated with lower levels of stress, anxiety, and depressive symptoms, as evidenced in a study in Hong Kong.⁷ Upon closer

examination at university hospital in southern Thailand, being female, having a physical illness, and perceiving exposure to COVID-19 were identified as risk factors for severe mental health outcomes among university staff.⁸ Therefore, this study focuses on demographic information, staff characteristics, health behavior, and readiness to handle the COVID-19 situation.

The objectives of this comparative study of the second and third waves of the COVID-19 pandemic were to: 1) examine the mental health of the medical staff working in the Faculty of Medicine Siriraj Hospital, Mahidol University; 2) describe the relationships between various factors and the staff's mental health; and 3) investigate the effects of the COVID-19 situation on staff.

MATERIALS AND METHODS

Study design and participants

The participants were the staff of the Faculty of Medicine Siriraj Hospital who voluntarily agreed to complete the online survey. The survey link was promoted on a local social media platform, Siriraj staff group. The data of the second wave were collected between January and February 2021, and data of the third wave collected between May and June of the same year. This study was approved by the Institutional Review Board (IRB), Faculty of Medicine Siriraj Hospital, Mahidol University (COA no. Si 081/2021). Participants were informed about the study's objectives and the use of their responses for research. The participants acknowledged consent by completing the survey.

Measurement

A questionnaire on factors affecting the mental health during COVID-19; regarding demographic information, staff characteristics, health behavior, and readiness to handle the COVID-19 situation. Respondents were asked to choose only one option that applied to them in each item.

Questions about the impact of the COVID-19 pandemic; included lists of factors affecting stress and lists of impacts on daily living. Respondents were asked to choose the factors that had an impact on their lives and were allowed to choose more than one factor.

The Thai version of the Depression Anxiety Stress Scales-21 (DASS-21)⁹ was used to assess the mental health status, which had three subscales (Anxiety, Depression, and Stress). Each subscale consisted of seven items with a 4-point Likert scale ranging from "applied to me very much" to "did not apply at all." Cronbach's alpha coefficient cutoffs for Anxiety, Depression, and Stress were .82, .78, and .69, respectively.

Statistical analysis

All statistical analyses were conducted using SPSS 24. The frequency and percentages were used to calculate descriptive data. As distributions of DASS-21 scores were highly right-skewed, the comparisons of scores on DASS-21 with categorical variables were conducted using the Mann-Whitney U and the Kruskal-Wallis tests. Finally, generalized linear models were used for multivariate analysis, including all significant variables from the univariate analysis. P values <.05 were considered statistically significant in this study.

RESULTS

The mental health status of the Siriraj Hospital staff during the second and the third waves.

The number of participants in the second and the third waves was 3,096 and 1,192. In the second and the third waves, the participants' median scores and Q1-Q3 intervals on the DASS-21 were 10 (3-20) and 8 (2-17), respectively. It was found that the scores on depression, anxiety, and stress in the third wave were significantly higher than those in the second wave (Table 1).

Factors affecting the mental health status of Siriraj Hospital staff in the second and the third waves.

Table 2 showed significant factors in the univariate analysis. After performing a multivariate analysis (Table 3), younger age, longer work hours, a history of external infection exposure, and awareness of social distancing were associated with higher depression, anxiety, and stress scores, only in the second wave. Additionally, readiness to work from home were correlated with higher anxiety and stress, demonstrating significant associations only in the second wave.

Factors significantly associated with all emotional scores in both waves included underlying diseases, sleep issues, alcohol use during stress, lack of exercise, residence

in high-surveillance zones, and social distancing difficulties. Office work was correlated with higher anxiety and stress in both waves, with depression showing association only in the third wave. The lack of potential for self-quarantine at home was associated with higher depression and stress in both waves.

Directly caring for COVID-19 patients was significantly associated with higher depression and anxiety only in the third wave. Less exercise than usual was associated with higher anxiety and stress, with these correlations being significant only in the third wave.

Impact (of COVID-19 pandemic) on Siriraj Hospital staff in the second and the third waves

Table 4 indicated that in the second wave, the top three factors affecting stress were living expenses (57.9%), changes in daily living patterns (53.7%), and the cost of protective equipment (45.6%) (7th in the third wave). In the third wave, the first two factors remained consistent (61.3% and 58.6%, respectively), with news and information about pandemics ranking third (51.1%) (7th in the second wave).

Regarding daily life impacts, the top three in the second wave were income (54.3%), transportation (53.1%), and protective equipment for COVID-19 prevention (33.7%) (4th in the third wave). In the third wave, the first two impacts remained the same (59.5% and 52.0%, respectively), with food ranking third (48.2%) (4th in the second wave).

DISCUSSION

This study aimed to investigate the mental health status of hospital staff, the factors affecting the staff's mental health status, and the impact of the COVID-19 pandemic on the staff of Siriraj Hospital in comparison between the second and the third waves of the pandemic.

TABLE 1. The difference between depression, anxiety, and stress of the second and third waves.

DASS-21	Mean (SD)		Median (Q1-Q3)		P-value
	Wave 2	Wave 3	Wave 2	Wave 3	
Depression	3.74 (4.25)	4.35 (4.58)	2 (0-6)	3 (1-7)	.000
Anxiety	2.82 (3.57)	3.25 (3.85)	1 (0-4)	2(0-5)	.001
Stress	4.72 (4.46)	5.27 (4.66)	4 (1-7)	5(1-8)	.000

TABLE 2. Factors that affect the depression, anxiety and stress of the second and third waves.

Variables	Wave 2				Wave 3											
	n	%	Depression Median (Q1-Q3)	p value	Anxiety Median (Q1-Q3)	p value	Stress Median (Q1-Q3)	p value	n	%	Depression Median (Q1-Q3)	p value	Anxiety Median (Q1-Q3)	p value	Stress Median (Q1-Q3)	p value
Demographic information																
Gender				0.676		0.619		0.641				0.043		0.284		0.010
Female	2568	82.9	2 (0-6)		1 (0-4)		4 (1-7)		1062	89.1	3 (1-7)		2 (0-5)		4 (1-7)	
Male	504	16.3	2 (0-6)		2 (0-4)		4 (1-7)		125	10.5	3 (1-7.5)		2 (0-5)		5 (2-10)	
Age (years)				0.000		0.000		0.000				0.000		0.013		0.002
20 - 30	880	28.4	3 (0-7)		2 (0-5)		4 (1-7)		319	26.8	4 (1-8)		2 (0-6)		5 (2-9)	
31 - 40	920	29.7	3 (1-6)		2 (0-5)		5 (1-8)		319	26.8	4 (1-7)		2 (1-5.5)		5 (2-8)	
41 - 60	1269	41.0	2 (0-5)		1 (0-4)		3 (1-7)		547	45.9	2 (0-6)		2 (0-4)		4 (1-7)	
>60	27	0.9	0 (0-3)		1 (0-1)		1 (0-4)		7	0.6	1 (0-4)		2 (0-6)		2 (0-4)	
Work experience (years)				0.000		0.000		0.000				0.000		0.008		0.001
<5	785	25.4	3 (0-7)		2 (0-5)		4 (1-8)		278	23.3	3 (1-8)		2 (0-5.25)		5 (2-8)	
5 - 10	612	19.8	3 (0-6)		2 (0-4)		4 (1-8)		212	17.8	4 (1-8)		2 (0-7)		5 (1-9)	
11- 20	857	28	3 (0-6)		2 (0-5)		4 (1-7)		299	25.1	3 (1-7)		2 (1-5)		5 (2-8)	
>20	842	27	2 (0-5)		1 (0-3.25)		3 (1-6)		403	33.8	2 (0-5)		1 (0-4)		3 (1-7)	
Working hour (hours)				0.000		0.003		0.000				0.142		0.096		0.210
<8	1257	40.6	2 (0-5)		1 (0-4)		3 (1-7)		541	45.4	3 (0-7)		2 (0-5)		4 (1-7)	
8-9	1420	45.9	3 (0-6)		2 (0-4)		4 (1-7)		536	45.0	3 (1-7)		2 (0-5)		5 (1-8)	
>9	419	13.5	3 (0-7)		2 (0-5)		5 (1-9)		115	9.6	3 (1-7)		3 (0-5)		5 (2-8)	
Staff characteristics																
Working frontline				0.322		0.532		0.691				0.591		0.325		0.563
Yes	630	20.3	3 (0-6)		1 (0-4)		3 (1-7)		259	21.7	3 (1-7)		2 (0-5)		5 (2-8)	
No	2466	79.7	2 (0-6)		1 (0-4)		4 (1-7)		933	78.3	3 (1-7)		2 (0-5)		5 (1-8)	
Working in the office				0.965		0.001		0.003				0.009		0.001		0.002
Yes	775	25.0	2 (0-6)		2 (0-5)		4 (1-8)		255	21.4	3 (1-8)		3 (0-7)		5 (2-10)	
No	2321	75.0	2 (0-6)		1 (0-4)		4 (1-7)		937	78.6	3 (1-6)		2 (0-5)		4 (1-7)	
Working in the lab				0.679		0.875		0.795				0.162		0.034		0.021
Yes	61	2.0	2 (0.5-5)		1 (0-4)		4 (1-7)		22	1.8	4 (2-7.25)		3 (2-5.75)		7 (3.5-12)	
No	3035	98.0	2 (0-6)		1 (0-4)		4 (1-7)		1170	98.2	3 (1-7)		2 (0-5)		5 (1-8)	
Caring for COVID-19 patients directly				0.369		0.527		0.272				0.025		0.016		0.047
Yes	112	3.6	3 (0-6)		2 (0-5)		4 (1-8)		156	13.1	4 (1-8)		3 (0-6)		5 (2-9)	
No	2984	96.4	2 (0-6)		1 (0-4)		4 (1-7)		1036	86.9	3 (1-7)		2 (0-5)		4 (1-8)	
Exposure to infection outside the hospital				0.000		0.000		0.000				0.326		0.203		0.352
Yes	267	8.6	4 (1-7)		3 (0-5)		5 (2-8)		137	11.5	2 (0-7)		1 (0-5)		4 (1-7.5)	
No	2829	91.4	2 (0-6)		1 (0-4)		4 (1-7)		1055	88.5	3 (1-7)		2 (0-5)		5 (1-8)	

TABLE 2. Factors that affect the depression, anxiety and stress of the second and third waves. (Continue)

Variables	Wave 2					Wave 3										
	n	%	Depression Median (Q1-Q3)	p value	Anxiety Median (Q1-Q3)	p value	Stress Median (Q1-Q3)	p value	n	%	Depression Median (Q1-Q3)	p value	Anxiety Median (Q1-Q3)	p value	Stress Median (Q1-Q3)	p value
Living in the highest surveillance area			0.000		0.000		0.000				0.000		0.000		0.000	
Yes	502	16.2	4 (1-7)		3 (1-5)		5.5 (2-9)		253	21.2	4 (1-8)		3 (1-6)		6 (2-9)	
No	2594	83.8	2 (0-5)		1 (0-4)		3 (1-7)		939	78.8	3 (1-6)		2 (0-5)		4 (1-7)	
Health behavior																
Having underlying disease			0.008		0.000		0.000				0.012		0.000		0.003	
Yes	981	31.7	3 (1-6)		2 (0-5)		4 (1-8)		433	36.3	4 (1-7)		3 (0-6)		5 (2-8)	
No	2115	68.3	2 (0-5)		1 (0-4)		3 (1-7)		759	63.7	3 (1-6)		2 (0-4)		4 (1-7)	
Sleep problems				0.000		0.000		0.000				0.000		0.000		0.000
No	1170	37.8	1 (0-3)		0 (0-2)		1 (0-5)		387	32.5	1 (0-4)		1 (0-2)		2 (0-5)	
Yes	1926	62.2	4 (1-7)		3 (1-5)		5 (2-8)		805	67.5	4 (1-8)		3 (1-6)		6 (3-9)	
Physical exercise				0.000		0.000		0.000				0.000		0.000		0.000
Exercise normally	546	17.6	1 (0-5)		1 (0-3)		2 (0-6)		197	16.5	2 (0-5)		1 (0-3.5)		3 (1-6)	
Less exercise than usual	645	20.8	2 (0-5)		1 (0-4)		4 (1-7)		278	23.3	3 (1-7)		2 (0-5)		5 (1-8)	
More exercise than usual	48	1.6	2.5 (0.25-4)		1 (0-3.75)		3.5 (1-6)		21	1.8	4 (0.5-6)		1 (0-5)		4 (1-8.5)	
No exercise at all	1857	60.0	3 (0.5-6)		2 (0-5)		4 (1-7)		696	58.4	3 (1-7)		2 (0-6)		5 (2-8)	
Drinking alcohol when stressed				0.000		0.000		0.000				0.000		0.000		0.000
Yes	199	6.4	4 (1-7)		3 (1-6)		6 (2-9)		60	5.0	9 (2-12)		5 (2-8)		8 (4.25-14)	
No	2897	93.6	2 (0-6)		1 (0-4)		4 (1-7)		1132	95.0	3 (1-6.75)		2 (0-5)		4 (1-7)	
Readiness to handle the COVID-19 situation																
The potential of the residence for quarantine				0.000		0.000		0.000				0.000		0.001		0.000
Yes	1532	49.5	2 (0-5)		1 (0-4)		3 (0-7)		570	47.8	2 (0-6)		1 (0-4)		4 (1-7)	
Not sure	625	20.2	3 (1-6)		2 (0-4)		4 (1-7)		208	17.4	4 (1-7)		2 (0-5)		5 (2-8)	
No	939	30.3	3 (1-6)		2 (0-5)		5 (1-8)		414	34.7	4 (1-7)		2 (0-6)		5 (2-8)	
Readiness to work at home				0.217		0.000		0.036				0.842		0.946		0.636
Yes	1511	48.8	2 (0-6)		2 (0-5)		4 (1-7)		548	46.0	3 (1-7)		2 (0-5)		5 (1-8)	
No	1585	51.2	2 (0-6)		1 (0-4)		4 (1-7)		644	54.0	3 (1-7)		2 (0-5)		5 (2-7)	
Awareness of social distancing				0.000		0.007		0.001				0.773		0.869		0.974
Yes	2671	86.3	2 (0-6)		1 (0-4)		4 (1-7)		1059	88.8	3 (1-7)		2 (0-5)		5 (1-8)	
No	425	13.7	3 (1-7)		2 (0-5)		5 (1-8)		133	11.2	4 (1-6.5)		2 (0-5)		4 (1-8)	
Having difficulty executing social distancing				0.000		0.000		0.000				0.000		0.000		0.000
Yes	711	23.0	4 (1-7.5)		3 (0-6)		5 (2-9)		284	23.8	5 (2-9)		3 (1-7)		6 (2.75-11)	
No	2385	77.0	2 (0-5)		1 (0-4)		3 (1-7)		908	76.2	3 (0-6)		1 (0-4)		4 (1-7)	

TABLE 3. General Linear Regression for Wave 2 and Wave 3.

Depression Attributes	B(95%CI)	Std	Sig.	Anxiety Attributes	B(95%CI)	Std	Sig.	Stress Attributes	B(95%CI)	Std	Sig.
Wave 2											
Age (years)				Age (years)				Age (years)			
<30	0.640 (0.047-1.234)	0.3028	0.034	<30	0.396(-0.114to0.907)	0.2604	0.128	<30	0.460(-0.159to1.079)	0.3158	0.145
31 - 40	0.694 (0.240-1.149)	0.2317	0.003	31 - 40	0.760(0.373to1.148)	0.1977	0.000	31 - 40	0.905(0.435to1.375)	0.2398	0.000
>41 (Ref)				>41 (Ref)				>41 (Ref)			
Working hour (hours)				Working hour (hours)				Working hour (hours)			
<8 (Ref)				<8 (Ref)				<8 (Ref)			
8-9	0.429(0.129-0.729)	0.1531	0.005	8-9	0.130(-0.127to0.386)	0.1307	0.321	8-9	0.248(-0.063to0.558)	0.1586	0.119
>9	0.926(0.489-1.363)	0.2230	0.000	>9	0.730(0.356to1.103)	0.1906	0.000	>9	1.078(0.625to1.531)	0.2312	0.000
Exposure to infection outside the hospital	0.822 (0.327-1.317)	0.2525	0.001	Working in the office	0.457(0.177to0.738)	0.1433	0.001	Working in the office	0.633(0.292to0.974)	0.1738	0.000
Living in the highest surveillance area	0.802(0.424-1.180)	0.1930	0.000	Exposure to infection outside the hospital	0.598(0.174to1.023)	0.2165	0.006	Exposure to infection outside the hospital	0.945(0.430to1.460)	0.2627	0.000
Having underlying disease	0.407(0.094-0.720)	0.1596	0.011	Living in the highest surveillance area	0.604(0.282to0.927)	0.1646	0.000	Living in the highest surveillance area	1.013(0.622to1.405)	0.1997	0.000
Having sleep problems	2.125(1.833-2.418)	0.1491	0.000	Having underlying disease	0.378(0.111to0.644)	0.1360	0.005	Having underlying disease	0.386(0.062to0.709)	0.1649	0.019
Physical exercise				Having sleep problems	1.717(1.468to1.965)	0.1269	0.000	Having sleep problems	2.644(2.342to2.946)	0.1540	0.000
Exercise normally (Ref)				Physical exercise				Physical exercise			
Less exercise than usual	0.289(-0.161-0.740)	0.2298	0.208	Exercise normally (Ref)				Exercise normally (Ref)			
More exercise than usual	0.777(-0.381-1.935)	0.5908	0.189	Less exercise than usual	0.075(-0.309to0.458)	0.1956	0.703	Less exercise than usual	0.336(-0.129to0.801)	0.2373	0.157
No exercise at all	0.678(0.296-1.061)	0.1952	0.001	More exercise than usual	0.898(-0.088to1.884)	0.5029	0.074	More exercise than usual	0.963(-0.233to2.159)	0.6101	0.115
Drinking alcohol when stressed	0.626(0.057-1.194)	0.2899	0.031	No exercise at all	0.352(0.027to0.678)	0.1662	0.034	No exercise at all	0.592(0.197to0.987)	0.2016	0.003
The potential (eligibility) of the residence for quarantine				Drinking alcohol when stressed	0.775(0.292to1.259)	0.2468	0.002	Drinking alcohol when stressed	1.029(0.442to1.616)	0.2994	0.001
Yes	-0.361(-0.684to-0.038)	0.1649	0.029	Readiness to work at home	0.368(0.128to0.607)	0.1223	0.003	The potential (eligibility) of the residence for quarantine			
Not sure	-0.136(-0.535to0.264)	0.2037	0.506	Awareness of social distancing	-0.756(-1.100to-0.412)	0.1755	0.000	Yes	-0.540(0.1713to-0.876)	0.1713	0.002
No (Ref)				Having difficulty doing social distancing	0.944(0.660to1.227)	0.1448	0.000	Not sure	-0.117(0.2104to-0.530)	0.2104	0.577
Awareness of social distancing	-1.093(-1.497to-0.689)	0.2061	0.000					No (Ref)			
Having difficulty doing social distancing	1.372(1.040to1.705)	0.1698	0.000					Readiness to work at home	0.311(0.020to0.601)	0.1484	0.036
								Awareness of social distancing	-1.201(-1.618to-0.783)	0.2130	0.000
								Having difficulty doing social distancing	1.184(0.840to1.528)	0.1756	0.000

TABLE 3. General Linear Regression for Wave 2 and Wave 3. (Continue)

Depression Attributes	B(95%CI)	Std	Sig.	Anxiety Attributes	B(95%CI)	Std	Sig.	Stress Attributes	B(95%CI)	Std	Sig.
Wave 3											
Working in the office	1.212(0.617to1.806)	0.3034	0.000	Working in the office	0.943(0.430to1.455)	0.2614	0.000	Working in the office	1.119(0.513to1.725)	0.3093	0.000
Caring for COVID-19 patients directly	0.766(0.057to1.474)	0.3615	0.034	Caring for COVID-19 patients directly	0.835(0.223to1.447)	0.3122	0.007	Living in the highest surveillance area	1.102(0.512to1.691)	0.3006	0.000
Live in the highest surveillance area	1.051(0.473to1.629)	0.2947	0.000	Living in the highest surveillance area	0.627(0.128to1.127)	0.2547	0.014	Having underlying disease	0.829(0.309to1.349)	0.2654	0.002
Having underlying disease	0.637(0.126to1.149)	0.2610	0.015	Having underlying disease	1.025(0.583to1.467)	0.2256	0.000	Having sleep problems	2.584(2.062to3.106)	0.2663	0.000
Having sleep problems	2.324(1.811to2.838)	0.2618	0.000	Having sleep problems	1.854(1.410to2.298)	0.2265	0.000	Physical exercise			
Physical exercise				Physical exercise				Exercise normally (Ref)			
Exercise normally (Ref)				Exercise normally (Ref)				Less exercise than usual	0.975(0.203to1.748)	0.3941	0.013
Less exercise than usual	0.651(-0.107to1.409)	0.3867	0.092	Less exercise than usual	0.548(-0.109to1.204)	0.3348	0.102	More exercise than usual	0.155(-1.724to2.034)	0.9586	0.872
More exercise than usual	0.055(-1.791to1.902)	0.9421	0.953	More exercise than usual	0.037(-1.563to1.636)	0.8161	0.964	No exercise at all	1.004(0.326to1.682)	0.3460	0.004
No exercise at all	0.770(0.104to1.436)	0.3399	0.023	No exercise at all	0.792(0.215to1.370)	0.2945	0.007	Drinking alcohol when stressed	2.553(1.426to3.681)	0.5755	0.000
Drinking alcohol when stressed	3.293(2.187to4.399)	0.5643	0.000	Drinking alcohol when stressed	2.107(1.173to3.042)	0.4769	0.000	The potential (eligibility) of the residence for quarantine			
The potential (eligibility) of the residence for quarantine				Having difficulty doing social distancing	0.929(0.445to1.412)	0.2467	0.000	Yes	-0.603(-1.145to-0.061)	0.2766	0.029
Yes	-0.660(-1.193to-0.127)	0.2721	0.015					Not sure	-0.022(-0.720to0.675)	0.3559	0.950
Not sure	-0.487(-1.173to0.199)	0.3501	0.164					No (Ref)			
No (Ref)								Having difficulty doing social distancing	1.334(0.765to1.904)	0.2906	0.000
Having difficulty doing social distancing	1.468(0.909to2.026)	0.2849	0.000								

TABLE 4. Ranking of the list of factors affecting stress and the list of factors affecting daily life.

Lists	Wave 2		Wave 3	
	N	Percent of Cases	N	Percent of Cases
Factors affecting stress				
Daily expenses	1783	57.9%	730	61.3%
Changes in daily living patterns	1655	53.7%	698	58.6%
Cost of equipment for disease prevention	1405	45.6%	527	44.2%
Health	1402	45.5%	547	45.9%
Changes of work pattern	1296	42.1%	547	45.9%
Rules and regulations during the COVID-19 pandemic	1262	41.0%	471	39.5%
News and information regarding the epidemics	1254	40.7%	609	51.1%
Higher prices of consumer products	1246	40.4%	542	45.5%
Feeling of anger and dissatisfaction towards lawbreakers, illegal immigration, and those who gather in the casino	1168	37.9%	522	43.8%
Relationship with family members	864	28.0%	400	33.6%
Relationship with colleagues	731	23.7%	321	27.0%
Factors affecting daily life				
Income	1614	54.3%	694	59.5%
Transportation	1576	53.1%	607	52.0%
Protective equipment for COVID-19 prevention	1099	37.0%	385	33.0%
Food	1002	33.7%	562	48.2%
Look after family members or children	841	28.3%	359	30.8%
Accommodation for quarantine and on duty during COVID-19 pandemic	344	11.6%	189	16.2%
Lack of information, knowledge, and how to deal with COVID-19 pandemic	147	4.9%	55	4.7%

Mental health status of staff

The staff at Siriraj Hospital scored significantly lower in the second wave than in the third wave across all three subscales. When the data from the human resources department from the first wave were compared, it was discovered that the scores for depression, anxiety, and stress – Mean (SD) = 4.24 (4.08), 3.33 (3.57), 5.52 (4.43), respectively – were higher than those in the second wave. This trend of the scores declining in the second wave but increasing in the third wave contradicted the previous studies' findings that the scores would continuously decline in consecutive waves.^{5,10,11} However, these previous

studies were conducted among the general population, in contrast to this study, which aimed at results among medical staff. It was hypothesized that the score was higher in the third wave than in the second wave, because in the third wave a more life-threatening mutant strain of COVID-19 that originated in the United Kingdom was spreading in Thailand and resulted in more deaths of infected patients. During this period, Siriraj Hospital was heavily burdened with the care of patients infected with COVID-19, which placed a tremendous psychological strain on the medical staff.

Factors affecting the staff's mental health

Demographic information factors showed significant associations only in the second wave. Staff who were younger scored higher on depression, anxiety, and stress than those older. Furthermore, staff who worked longer hours had significantly higher mental health scores in the second wave, consistent with previous research.¹² In the third wave, there was no significant correlation between mental health status and demographic information. It is likely that as the severity of COVID-19 increases (Wave 3), even older staff members and staff with fewer working hours were also emotionally affected.

Health behaviors were significantly associated with mental health status in both waves. Staff with underlying diseases and sleep problems had significantly higher scores for depression, anxiety, and stress than those without such a history in both waves, which was consistent with previous research.^{13,14} Alcohol consumption when under stress also showed association with depression, anxiety, and stress in both waves. This finding is consistent with previous studies reporting that excessive alcohol consumption during lockdown was associated with depression and mental health problems.¹⁵ In addition, this study found that no exercise at all affected all emotion subscales in both waves, while less exercise than usual (less frequency) was associated only with anxiety and stress solely in the third wave. This finding is in line with synthesizing further empirical findings, which found that anxiety, sadness, and depression can be reduced by physical exercise; and that intensity and frequency of exercise can maintain mental health.¹⁶

No significant association was found between frontline work and mental health status in both waves, consistent with previous research.³ Interestingly, this study found that staff who worked in the office had significantly higher anxiety and stress scores in either the second or third waves than staff who did not work in the office. It is possible that the Faculty of Medicine at Siriraj Hospital implemented policies requiring non-patient staff to work from home, resulting in some experiencing social isolation and changing their work patterns. As a consequence, some staff experienced conflict with family members, which led to stressful situations.^{17,18} In terms of depression, there was a significant correlation only in the third wave, when the outbreak was considered more lethal. A previous study in China, gathering data during a severe outbreak, found that staff whose jobs did not involve COVID-19 patients had higher levels of depression and anxiety than those who were involved with COVID-19 patients.² However, only the third wave of the study revealed a significant association between depression and anxiety

and directly caring for COVID-19 patients. During this wave, hospitals were likely overwhelmed with severely infected patients, placing significant physical and mental pressure on staff in direct contact.¹⁹ In both waves, it was also found that staff who resided in the zones with the highest surveillance rates were more likely to have significantly higher emotional scores than staff who did not reside in such areas. These zones were also affected by lockdown measures that made transportation, access to supplies, and treatment of the disease difficult, all of which can affect mental health status.^{20,21} Only in the second wave were staff with a history of infection exposure outside the hospital more likely to have significantly higher scores for depression, anxiety, and stress than those without history. It is possible that the second wave of the pandemic was relatively restricted to certain areas, so the hospital's ability to treat patients was unaffected.

Staff with difficulty executing social distancing were significantly more likely to have higher levels of depression, anxiety, and stress than staff without difficulty in both waves. This is consistent with previous research showing that people who perceive themselves as effective at social distancing have lower levels of depression, anxiety, and stress.⁷ Furthermore, this study discovered that staff whose residences lacked the potential to self-quarantine were more likely to have higher depression and stress levels in both waves. It is interesting to note that factors such as awareness of social distancing and readiness to work from home did not correlate with mental health status in wave 3, in contrast to the results in wave 2, which showed a correlation. This suggests that unawareness of social distancing skills and not being able to work from home can have a negative impact on staff's anxiety and stress during the initial wave.

Impact of the COVID-19 situation

The two most common factors contributing to stress among the staff in both waves were daily expenses and changes in daily living patterns. Staff also reported that income and transportation were the two most important factors affecting daily life in both waves. It is possible that the lockdown affected individual staff finances, restricting travel and shutting down services, including medical services, leading medical staff to cut back on both regular and overtime hours. This resulted in decreased income²² whilst raising expenditures for protective equipment, non-public transportation²³, food delivery, etc. Staff stress was thus impacted by changes in lifestyle to the new normal.²⁴ In the third wave, news and information about the pandemic increased in importance as a factor affecting stress, up to third rank, replacing the cost of

protective equipment that had previously ranked third in the second wave. Given how easily accessible news and information is in the modern era, people with anxiety desired to know what was happening with the pandemic. Previous research has found that news consumption's frequency, duration, and variety of media are all positively correlated with feelings of depression and anxiety.²⁵ Acquiring false information also exacerbates distress.²⁶ For factors affecting daily life, protective equipment for COVID-19 prevention remained important but dropped from third rank (37.0%) in the second wave to fourth rank (33.0%) in the third wave, being replaced by food consumption (33.7% to 48.2%) as food prices had risen during the pandemic's long duration.²⁷ It is worth noting that protective equipment had the greatest impact on daily life, according to data gathered by the Siriraj Hospital Human Resources Department during the first wave of the pandemic because when the outbreak started, there was a shortage of equipment due to limited supply and higher prices driven by high demand. In the COVID-19 situation, protective equipment was crucial for hospital operations.^{28,29}

Implications, Strengths and Limitations, and Suggestions for future study

The practical implications of this study highlight the need for hospital administrators to prioritize and care for staff mental health during a pandemic situation, especially when the outbreak worsens. They should pay special attention to staff members with health problems, at risk of contracting COVID-19, or having difficulties in dealing with preventive measures, notably office staff who would be working remotely. Psychological support channels such as hotlines and educational programs on stress management should be created. Aid for physical health, including promoting quality sleep and exercise is also required. Furthermore, hospital administrators should proactively assist staff and establish support channels to alleviate the impact on their daily lives, including financial challenges. During the early stages of an outbreak, adequate protective equipment and education for staff on disease prevention and social distancing should be prepared. During more serious outbreaks, reliable news sources should be emphasized along with a reasonable level of news consumption.

In terms of the study's strengths and limitations, its strengths include the large number of respondents, the comprehensive examination of various factors, and the effectiveness of the DASS-21 assessment, known for its acceptable quality. However, since this is a newly emerging pandemic, many of the questions used in

this study did not validate the psychometric property. Furthermore, as an online survey advertised via social media and staff group, the inability to calculate the response rate, the possible bias through peer-sharing links with specific groups or duplicate submissions, and the possible limitations in access to the survey link raise concerns regarding the representativeness of the sample. Given the dual roles of staff in university hospitals—providing healthcare services and teaching—it's crucial to exercise caution when applying the study's finding to non-university-based hospitals.

For further study, qualitative research using in-depth interviews should be conducted in order to gain a thorough understanding of the factors affecting medical staff. A longitudinal study tracking the mental health and well-being of medical staff over time could also provide insight into the long-term effects and changes. Additionally, comparative analysis between different healthcare settings could provide valuable understanding of the differences among medical staff in various contexts. However, the findings of this study should be useful in understanding the factors that affect medical staff and as information for planning to support medical staff should other pandemics occur in the future.

CONCLUSION

The mental health of medical staff was more severe in the third, more critical wave. Health behaviour, infection risk, social distancing challenges, and office work were associated with mental health in both waves. Social distancing awareness and work-from-home readiness were correlated only in the initial second wave, whilst caring for COVID-19 patients impacted solely in the more critical third wave. Finance, lifestyle changes, and protective equipment were commonly stressed in both waves. COVID-19 news played a more important role in the severe third wave.

Author contributions

Nattha Saisavoey contributed to the conception, study design, data collection, and essential revision of the manuscript. Rungarun Anupansupsai designed the study, interpreted and analyzed the data; critically reviewed and wrote the manuscript. Suroj Supavekin conceptualized the study and reviewed the manuscript. Woraphat Rattapha, Juthawadee Lortrakul, and Somboon Hataiyusuk also designed the study and reviewed the manuscript. All authors were involved in the final approval of the manuscript and agreed to be accountable for all aspects of the work.

Conflict of interest

No potential conflict of interest with respect to this article was reported.

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