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Original Article

Psychological distress assessment among patients with suspected and confirmed COVID-19: A cohort study

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KEYWORDS

Mental health;
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Background: Global pandemic resulted from the coronavirus disease-19 (COVID-19) demands mental health concerns on the affected population. We examine the time-course shift of psychological burden among suspected and confirmed COVID-19 patients.

Methods: Participants with suspected or confirmed COVID-19 were included in the cohort. Consecutive surveys were conducted upon hospital admission, discharge, and during outpatient follow-up by adapting the 5-item brief symptom rating scale (BSRS-5) assessing psychological symptoms including anxiety, depression, hostility, interpersonal sensitivity, and insomnia. The sixth measure to observe suicidal ideation was also included.

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Results: A total of 109 eligible patients participated in the study, in which 83.49% reported no distress upon hospital admission, while 2.75%, 3.66%, and 10.1% patients were assessed as being with severe, moderate and mild psychological distress, respectively. Overall, age, sex, and history of contact did not significantly differ between patients with and without psychological distress. Multivariate logistic regression revealed that patients admitted during April–May (OR: 7.66, 95% CI: 1.46–40.28) and presented with symptoms including sore throat (OR: 4.24, 95% CI: 1.17–15.29) and malaise (OR: 5.24, 95% CI: 1.21–22.77) showed significantly higher risk of psychological distress. Cough symptom interestingly showed lower risk of emotional distress (OR: 0.25, 95% CI: 0.08–0.81). Subsequent surveys upon hospital discharge and during outpatient follow-up revealed steadily declining distress among all cohort.

Conclusion: At least 16.5% of our cohort reported psychological distress upon hospital admission, with distinct time-dependent decline. Access to mental health support, alongside with promoting positive activities for good mental health are pivotal for those directly affected.

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Introduction

The Corona Virus Disease-19 (COVID-19) was initially identified in Wuhan, China in December 2019, and emerged as global pandemic with over 21.6 million confirmed cases, and a total of 0.77 million deaths globally as of August, 2020.^{1,2} The high burden of unknown, possibly fatal-disease, as well as the need for isolation to contain transmission are having an immense impact on both physical and mental health in affected population.³ The potential fallout on mental health is likely to be profound on those directly affected by the disease as well as people at risk of exposure.⁴ During the severe acute respiratory syndrome (SARS) epidemic in 2003, mental health casualties include 30% increase of suicide in elderly,⁵ 50% recovered patients who remained anxious,⁶ and 29–39% health-care workers who experienced emotional distress.^{4,7} In the long run, those survived were also at risk of post-traumatic disorder and depression.^{8,9} A nation-wide mental health survey proposed that the major psychological impact of COVID-19 pandemic is likely to be increased social isolation and loneliness, which are strongly associated with anxiety, depression, self-harm, and suicide attempts in the future,¹⁰ therefore immediate measures to report the rate of mental health issues as well as its mechanism and possible interventions are of great necessity.

In this study, we aim to assess suspected and confirmed COVID-19 patients upon hospital admission, discharge, and during outpatient follow-up to evaluate the time-course shift of psychological burden. We expected that adequate mental health care and comprehensive evaluation protocol during in-hospitalization for patients staying in isolation room have positive impact towards ease of psychological burden. The result is expected to provide insight on the rate of psychological distress as well as the progression on the immediately affected population, and raise potential intervention to limit prolonged burden.

Method

Study cohort

Adult patients (≥ 20 years old) with suspected or confirmed COVID-19 admitted to Taipei Municipal Wanfang Hospital, Taipei, Taiwan from 1 Jan to 31 May 2020 were included in the cohort. Suspected COVID-19 cases are those with history of overseas travel and/or contact history to confirmed COVID-19 patients, presenting with clinical symptoms requiring hospitalization that the attending physicians deemed COVID-19 screening necessary. All patients were notified to the Taiwan Centers for Disease Control (CDC) and remained tightly monitored by the government. Each suspected or confirmed positive patient stayed in a single-bedded negative pressure isolation room with strict infection control procedures. The healthcare workers changed outer layer of the personal protective equipment between visiting subsequent rooms to avoid cross contamination. Suspected patients were excluded for COVID-19 if the initial viral polymerase chain reaction (PCR) tests were negative. Confirmative viral PCR tests may be repeated if the attending physicians deemed it necessary. Confirmed cases are patients with established COVID-19 diagnosis based on the criteria from WHO interim. Criteria for hospital discharge were absence of fever for at least 3 days, improvement in both lungs on chest radiography, if any, and three consecutive nasal-swab samples negative for viral RNA obtained at least 24 h apart plus an additional sputum sample negative for viral RNA. The corroborating evidence was reviewed by the CDC to issue a de-isolation permit for each patient before discharge.

Mental health evaluation and support program

In concern to the importance of mental health support in both suspected and confirmed patients, we initiated a periodic mood disturbance survey for our hospitalized

patients to immediately address and commence intervention. Visit and consultation with social workers, psychologists, or psychiatrists were arranged if deemed necessary by the attending physicians, or when requested by the patients. Social interaction and as nearly-normal as possible daily activity were encouraged, by communicating the patients' interest and providing them books, study materials, oil painting, as well as entertainment including play-station games. Patients were allowed to communicate with their family and friends through phone calls and video chats. Patients are encouraged to maintain physical activities by simple daily exercise and Wii games. The mental health evaluation and support program were integrated components of the holistic management initiatives for COVID-19 which were guided by the COVID-19 Operation Committee of Wanfang Hospital.

Data collection

Consecutive surveys for psychologic distress were conducted at three time points: within 24 h after hospital admission, the day before or the same day of discharge, and outpatient follow-up 7 days after discharge. The surveys were conveyed using the video call when the patients were kept in negative pressure isolation, face-to-face when they were to be discharged, and phone call during outpatient follow-up.

We retrospectively analyzed the psychological distress of patients admitted for suspected or confirmed COVID-19. The Joint Institutional Review Board of Taipei Medical University approved the study and waived the informed consent (N202007039).

Survey tools

We adapted the 5-item brief symptom rating scale (BSRS-5), a self-administered questionnaire to assess psychological symptoms including anxiety, depression, hostility, interpersonal sensitivity, and trouble on falling asleep (insomnia). For suicide prevention, Taiwan adds the sixth additional measurement asking the subject about any urge of suicide attempts.¹¹ The score for each item ranges from 0 to 4, with 0 being not at all; 1, a little bit; 2, moderately; 3, quite a bit; and 4, extremely. A total score of more than 14, or any score of 2 or more on the suicidal ideation part indicates severe mood disorder, while scores between 10–14 and 6–9 indicate moderate and mild mood disorders, respectively.¹² This adapted BSRS-5 is commonly used in Taiwan for rapid psychological disorder screening with high validity and reliability among general community population as well as patients with psychiatric or medical diseases.^{11–15}

Statistical analysis

First, the demographic data were expressed as means and standard deviations (sd) for continuous variables, and counts and percentages for categorical variables. To determine the difference between the patients with and without psychological distress, the *t*-test for the continuous variables, and *Chi*-square test (or *Fisher* exact test) for the

distributions of categorical variables were used, as appropriate. Next, univariate and multivariate analyses i.e. generalized linear models (GLM) using the "logit" link function and the psychological distress (BSRS-5 ≥ 6) as the response variable having a binomial distribution,¹¹ were applied to identify the associations between the psychological distress and potential risk factors, including all clinical demographics, main reasons to alert COVID-19, and clinical presentations among patients suspected or confirmed of COVID-19. The associations were expressed as the odds ratios (OR) and 95% confidence intervals (95% CI). Last, the GLM using the "identity" link function and BSRS-5 as the response variable having a normal distribution, and the generalized estimating equations (GEE) were conducted to assess the time trend of psychological distress at hospital admission, discharge and during outpatient follow-up. Statistical analyses were performed using SAS version 9.4 (SAS, NC, USA). The significance level was set at 0.05.

Results

Among the 131 patients admitted for suspected or confirmed COVID-19 during the study period, 22 patients with previously documented dementia and old cerebral vascular accidents rendering them unable to engage with the survey questions were excluded in the study. A total of 109 patients participated in the study (Table 1). One patient lost to follow-up after discharge and the rest 108 patients completed all three consecutive surveys. Among all participating cohort, the mean age was 37.06 years-old (SD \pm 18.22) and 60 were male (55.05%). The most prevalent accompanying chronic physical diseases were hypertension (15.6%), dyslipidemia (9.17%), chronic obstructive pulmonary disease/asthma (9.17%), and diabetes mellitus (7.34%). Four patients (3.7%) were confirmed with COVID-19 and had appropriate management according to the Taiwan CDC protocol.

All 109 subjects were categorized into two groups based on the total score of 0–5 and ≥ 6 , indicating none and presence of psychological distress, respectively. A total of 91 (83.49%) and 18 patients (16.51%) reported none and presence of psychological distress upon hospital admission, respectively. Among those with psychological distress, 3 (2.75%), 4 (3.66%), and 11 (10.1%) patients were assessed as being with severe, moderate and mild psychological distress, respectively. Overall, age, sex, chronic physical diseases and history of contact did not significantly differ in both groups, however, the patients with psychological distress reported less cough (Table 1). Social workers interviewed the 18 subjects reporting physiological distress, and the three patients with severe psychological distress reporting moderate suicidal ideation were assigned for consultation with psychologist. Follow up psychiatric consultation was arranged for one patient.

Univariate logistic regression analysis (Table 2) revealed that patients admitted during April–May, as well as the presence of general malaise showed higher risk to psychological distress (OR: 4.60, 95% CI: 1.12–18.95; and OR: 3.50, 95% CI: 1.01–12.11, respectively). Further analysis applying multivariate models revealed that patients admitted during April–May showed significantly higher risk of psychological

Table 1 Clinical characteristics of 109 patients admitted for suspected or confirmed COVID-19 stratified by presence of psychological distress.

Characteristics	Psychological distress upon hospital admission						p value
	All		None		Presence		
			0–5 points		≥6 points		
			n (%)		n (%)		
	n = 109		n = 91 (83.49)		n = 18 (16.51)		
COVID-19							
Excluded	105	(96.33)	88	(96.70)	17	(94.44)	0.520
Confirmed	4	(3.67)	3	(3.30)	1	(5.56)	
Length of hospital stay (day)							
Mean, SD	5.39,	6.69	5.29,	6.78	5.89,	6.35	0.728
Age (year)							
mean, sd	37.06,	18.22	37.95,	18.51	32.61,	16.42	0.258
<30	48	(44.04)	36	(39.56)	12	(66.67)	0.096
30–59	45	(41.28)	40	(43.96)	5	(27.78)	
≥60	16	(14.68)	15	(16.48)	1	(5.56)	
Sex							0.278
Female	49	(44.95)	43	(47.25)	6	(33.33)	
Male	60	(55.05)	48	(52.75)	12	(66.67)	
Body mass index							
Mean, SD	24.05,	5.55	24.29,	5.75	22.83,	4.32	0.311
Underweight	11	(10.09)	8	(8.79)	3	(16.67)	0.875 ^a
Normal	50	(45.87)	42	(46.15)	8	(44.44)	
Overweight	21	(19.27)	18	(19.78)	3	(16.67)	
Chronic physical diseases							
Hypertension	17	(15.60)	15	(16.48)	2	(11.11)	0.733 ^a
Dyslipidemia	10	(9.17)	9	(9.89)	1	(5.56)	1.000 ^a
COPD/asthma	10	(9.17)	8	(8.79)	2	(11.11)	0.669 ^a
Diabetes mellitus	8	(7.34)	8	(8.79)	0	(0.00)	0.348 ^a
Coronary artery disease	4	(3.67)	4	(4.40)	0	(0.00)	1.000 ^a
Malignancy	3	(2.75)	3	(3.30)	0	(0.00)	1.000 ^a
Atrial fibrillation	2	(1.83)	1	(1.10)	1	(5.56)	0.304 ^a
Chronic viral hepatitis	2	(1.83)	2	(2.20)	0	(0.00)	1.000 ^a
Autoimmune disease	2	(1.83)	1	(1.10)	1	(5.56)	0.304 ^a
Old cerebral vascular accident	1	(0.92)	1	(1.10)	0	(0.00)	1.000 ^a
Chronic kidney disease	1	(0.92)	0	(0.00)	1	(5.56)	0.165 ^a
Idiopathic pulmonary fibrosis	1	(0.92)	1	(1.10)	0	(0.00)	1.000 ^a
Clinical Presentations							
Cough	76	(69.72)	67	(73.63)	9	(50.00)	0.046
Pneumonia	57	(52.29)	49	(53.85)	8	(44.44)	0.466
Fever or chills	56	(51.38)	47	(51.65)	9	(50.00)	0.898
Sore throat	37	(33.94)	29	(31.87)	8	(44.44)	0.303
Rhinitis	36	(33.03)	31	(34.07)	5	(27.78)	0.604
Shortness of breath	18	(16.51)	14	(15.38)	4	(22.22)	0.493 ^a
Muscle ache	15	(13.76)	13	(14.29)	2	(11.11)	1.000 ^a
Malaise	14	(12.84)	9	(9.89)	5	(27.78)	0.054 ^a
Others	15	(13.76)	12	(13.19)	3	(16.67)	0.711 ^a
Diarrhea	5	(4.59)	3	(3.30)	2	(11.11)	0.190 ^a
Headache	5	(4.59)	4	(4.40)	1	(5.56)	1.000 ^a
Nausea or vomiting	4	(3.67)	4	(4.40)	0	(0.00)	1.000 ^a
Chest pain	3	(2.75)	2	(2.20)	1	(5.56)	0.421 ^a
Anorexia	2	(1.83)	1	(1.10)	1	(5.56)	0.304 ^a
Arthralgia	1	(0.92)	1	(1.10)	0	(0.00)	1.000 ^a
Taste changes	1	(0.92)	0	(0.00)	1	(5.56)	0.165 ^a
Olfactory dysfunction	0	(0.00)	0	(0.00)	0	(0.00)	
Main reason to alert COVID-19							0.582 ^a
Overseas traveling	74	(67.89)	61	(67.03)	13	(72.22)	

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Table 1 (continued)

Characteristics	Psychological distress upon hospital admission						p value
	All	None		Presence			
		0–5 points		≥6 points			
		n (%)		n (%)			
	n = 109	n = 91 (83.49)		n = 18 (16.51)			
Contact history	27	(24.77)	24	(26.37)	3	(16.67)	0.148 ^a
Others	8	(7.34)	6	(6.59)	2	(11.11)	
Occupation							
Service industry	30	(27.52)	27	(29.67)	3	(16.67)	
Student	17	(15.60)	14	(15.38)	3	(16.67)	
Office staff	9	(8.26)	9	(9.89)	0	(0.00)	
Manufacturing industry	8	(7.34)	4	(4.40)	4	(22.22)	
Healthcare	5	(4.59)	5	(5.49)	0	(0.00)	
Tourism	4	(3.67)	3	(3.30)	1	(5.56)	
Other	12	(11.01)	11	(12.09)	1	(5.56)	
None	24	(22.02)	18	(19.78)	6	(33.33)	

SD, standard deviation, COPD; chronic obstructive pulmonary disease.

^a By Fisher exact test.

distress (OR: 7.66, 95% CI: 1.46–40.28). In addition, the presence of symptoms including sore throat and general malaise were associated with higher risk of distress (OR: 4.24, 95% CI: 1.17–15.29; and OR: 5.24, 95% CI: 1.21–22.77, respectively), while cough symptom interestingly showed lower risk of emotional distress (OR: 0.25, 95% CI: 0.08–0.81). Subsequent surveys upon hospital discharge and during outpatient follow-up revealed steadily declining distress among all cohort (Table 3 and Fig. 1).

Among the four confirmed positive patients, all were uncomplicated cases requiring no supplemental oxygenation or any critical care. Patient 1 and patient 2 were a 25-year-old woman and a 28-year-old man, hospitalized for a total of 25 and 26 days, respectively. Upon hospital admission, patient 1 reported slight anxiety and trouble on falling asleep, while patient 2 reported severe anxiety, hostility, and inferiority, as well as moderate depression and insomnia. Moreover, patient 2 revealed moderate suicidal ideation. The social workers and a psychologist interviewed patient 2 with video calls for several times during hospital stay, and follow up with psychiatrist was arranged. Upon hospital discharge, both patients 1 and 2 reported milder psychological distress of all five mood areas assessed. The distress was resolved on outpatient follow-up.

Patient 3 was an otherwise healthy 25-year-old man, discharged after 29 days of hospitalization, and re-admitted four days later due to palpitation and chest pain complaints with positive reversion of viral PCR result. On the first hospital admission, he reported slight irritable and depressed mood, as well as moderate anxiety, which resolved on the day of hospital discharge. On re-admission, he described slight hostility and depressed mood, which were worsened during the hospital stay. Although the patient soon became free of physical symptoms, the nasal swab viral PCR tests were persistently positive. He became annoyed for prolonged isolation with indefinite schedule for de-isolation. We performed another assessment on the 21st

day of re-admission and he reported moderate anxiety and insomnia, severe hostility and inferior feeling, as well as very severe depression. He denied ideation of suicide. A psychiatric consultation was arranged and non-pharmaceutical management in the form of emotional support was commenced, according to the patient's preference. The patient reported a relief of psychological distress (BSRS-5 = 1) at discharge and outpatient follow-up (BSRS-5 = 0).

Patient 4 was a 60-year-old woman with history of resected right breast ductal carcinoma *in situ* stage IA. She reported mild anxiety and moderate insomnia on the day of hospital admission. She had no respiratory nor constitutional symptoms. During hospitalization, at least two additional assessments were performed, in which she still reported slight anxiety but the trouble of falling asleep has improved. She also expressed slight depression and the feeling of inferiority, which gradually diminished upon the first negative PCR result and resolved completely on the day of hospital discharge and follow-up.

Discussion

This is the first study, to our knowledge, to conduct a time-course surveys among hospitalized patients with suspected or confirmed COVID-19. In summary, patients were assessed at least three consecutive surveys during hospital admission, on discharge, and during outpatient follow-up. Five elements of the BSRS-5 including anxiety, depression, hostility, interpersonal sensitivity, and trouble on falling asleep, as well as additional survey on suicidal ideation were assessed. The prevalence of psychological distress (defined as BSRS-5 ≥ 6) among general population in Taiwan was reported to be 8.33%.¹⁵ Our result showed that 16.5% of our cohort, consisted of 16.2% and 25% of suspected and confirmed cases, respectively, reported psychological distress upon hospital admission. The number is slightly

Table 2 Risk factors for psychological distress upon hospital admission (adapted 5-item brief symptom rating scale ≥ 6 points) among 109 patients with suspected or confirmed COVID-19.

	Psychological distress			Univariate analysis			Multivariate analysis		
	Cohort	n	(%)	OR	(95% Wald CL)	p value	aOR	(95% Wald CL)	p value
COVID-19									
Excluded	105	17	(16.19)	1					
Confirmed	4	1	(25.00)	1.73	(0.17, 17.59)	0.645			
Sex									
Female	49	6	(12.24)	1					
Male	60	12	(20.00)	1.79	(0.62, 5.19)	0.282			
Age (years)									
<30	48	12	(25.00)	1					
30–59	45	5	(11.11)	0.38	(0.12, 1.17)	0.091			
≥ 60	16	1	(6.25)	0.20	(0.02, 1.68)	0.138			
Body mass index									
Normal	50	8	(16.00)	1					
Underweight	11	3	(27.27)	1.97	(0.43, 9.07)	0.385			
Overweight	21	3	(14.29)	0.88	(0.21, 3.68)	0.856			
Obese	27	4	(14.81)	0.91	(0.25, 3.36)	0.891			
Any chronic physical diseases									
No	77	13	(16.88)	1					
Yes	32	5	(15.63)	0.91	(0.30, 2.81)	0.872			
Hypertension									
No	92	16	(17.39)	1					
Yes	17	2	(11.76)	0.63	(0.13, 3.05)	0.569			
Dyslipidemia									
No	99	17	(17.17)	1					
Yes	10	1	(10.00)	0.54	(0.06, 4.51)	0.566			
COPD/asthma									
No	99	16	(16.16)	1					
Yes	10	2	(20.00)	1.30	(0.25, 6.68)	0.756			
Hospital admission time									
January–February	51	5	(9.80)	1			1		
March	43	8	(18.60)	2.10	(0.63, 6.99)	0.225	2.43	(0.68, 8.70)	0.172
April–May	15	5	(33.33)	4.60	(1.12, 18.95)	0.035	7.66	(1.46, 40.28)	0.016
Cough									
No	33	9	(27.27)	1			1		
Yes	76	9	(11.84)	0.36	(0.13, 1.01)	0.052	0.25	(0.08, 0.81)	0.021
Pneumonia									
No	52	10	(19.23)	1					
Yes	57	8	(14.04)	0.69	(0.25, 1.90)	0.467			
Fever									
No	53	9	(16.98)	1					
Yes	56	9	(16.07)	0.94	(0.34, 2.57)	0.898			
Sore throat									
No	72	10	(13.89)	1			1		
Yes	37	8	(21.62)	1.71	(0.61, 4.79)	0.307	4.24	(1.17, 15.29)	0.028
Rhinitis									
No	73	13	(17.81)	1					
Yes	36	5	(13.89)	0.74	(0.24, 2.28)	0.605			
Shortness of breath									
No	91	14	(15.38)	1					
Yes	18	4	(22.22)	1.57	(0.45, 5.48)	0.478			
Muscle ache									
No	94	16	(17.02)	1					
Yes	15	2	(13.33)	0.75	(0.15, 3.65)	0.722			
General malaise									
No	95	13	(13.68)	1			1		
Yes	14	5	(35.71)	3.50	(1.01, 12.11)	0.048	5.24	(1.21, 22.77)	0.027

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Table 2 (continued)

	Psychological distress			Univariate analysis			Multivariate analysis		
	Cohort	n	(%)	OR	(95% Wald CL)	p value	aOR	(95% Wald CL)	p value
Other symptoms									
No	94	15	(15.96)	1					
Yes	15	3	(20.00)	1.32	(0.33, 5.24)	0.696			
Main reason to alert COVID-19									
Overseas traveling	74	13	(17.57)	1					
Contact history	27	3	(11.11)	0.59	(0.15, 2.24)	0.436			
Others	8	2	(25.00)	1.56	(0.28, 8.64)	0.608			

OR, odds ratio; CL, confidence limits; aOR, adjusted odds ratio; COPD, chronic obstructive pulmonary disease.

Table 3 The trend of psychological distress at hospital admission, discharge and outpatient follow-up for 108 patients with suspected or confirmed COVID-19.

Parameter		Estimated value	Std err	95% confidence interval		Z	Pr > Z
Time	Hospital admission			0			
Time	Hospital discharge	-1.5354	0.2724	-2.0692	-1.0016	-5.64	<0.0001
Time	Follow-up	-2.4001	0.2903	-2.9691	-1.8312	-8.27	<0.0001
Intercept		2.7064	0.3174	2.0844	3.3284	8.53	<0.0001

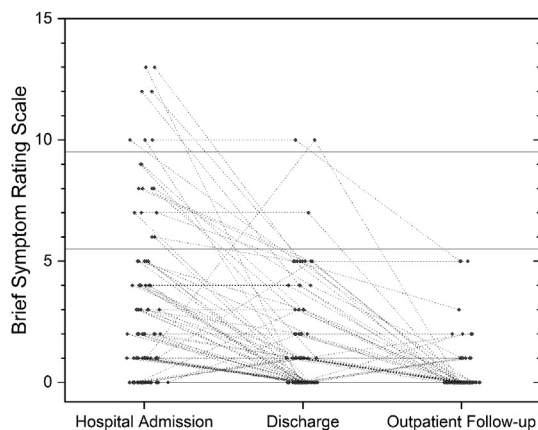


Figure 1 The 5-item brief symptom rating scale (BSRS-5) of 109 patients of suspected or confirmed COVID-19 at admission, before discharge, and during outpatient follow-up.

higher compared to a previous study indicating 12% of the general Taiwanese population reported psychiatric distress over the impact of COVID-19 pandemic.¹⁶ Upon hospital discharge and outpatient follow-up, the psychological burden showed a distinct time-dependent decline.

A previous study reported a considerably low prevalence on psychiatric disorder among the general population in Taiwan, which may reflect a possible under-treatment.¹⁷ During a pandemic, mental health is one of the crucial factors that will influence the way any given person responds to a pandemic, including COVID-19. Uninterrupted mental health care services should be attained, even for the subthreshold and mild psychological responses, as they may lead to heightened stress reaction.¹⁸ Studies of public

psychological states in China during the COVID-19 pandemic reported a rate of 6–35% and 17–20% population who experienced anxiety and depression, respectively,^{19,20} in which as high as 28.8% were moderate to severe anxiety symptoms, and 8.1% moderate to severe stress level.²¹ For those directly affected, increased social isolation, as well as worries and uncertainties about a pandemic may translate into a range of emotional reactions including distress, both in the acute and long-term phases.^{10,22} A recent study reported over 34% and 28% hospitalized patients had anxiety and depression during admission, respectively, which was correlated with less social support.²³ Additionally, female gender,^{19,24} younger age,¹⁹ accompanying chronic disease, and previous psychiatric history population²⁵ were found to be more susceptible to present with anxiety and depression.

More importantly, due to the proven negative impact of social stigma on patients contracted a transmissible disease during a pandemic,²⁶ Taiwan government strictly protect the identity and regulate the privacy of all suspected and confirmed cases. Of those suspected cases, mood disturbances were prominently reported upon suspect notification and generally relieved following definite negative diagnosis result. Therefore, we proposed that rapid diagnosis confirmation may benefit in lowering emotional burden. In addition, sufficient knowledge and consensus on epidemic prevention, as well as accessible and accurate source of information contributed to better psychological well-being²⁷ and control of COVID-19 in Taiwan.²⁸

The subjects involved in our study were limited to uncomplicated patients with mild clinical symptoms, thus may not reflect the entire spectrum of psychological distress of COVID-19 patients. Although emotional distress has been correlated with the lack of social support, this was also not

measured in our study. Therefore, further study to include patients with distinct disease severities, along with evaluation of social support are deemed necessary. In addition, qualitative analyses, instead of quantitative, are warranted to further probe the underlying source of emotional disruption.

Mitigating risks of emotional distress among vulnerable group, as well as enabling access to mental health support, privacy protection, alongside with promoting positive activities for good mental health are pivotal. For those directly affected, an effective communication should be established to deliver an adequate information about their current situation and progress, which may relieve the emotional burden from being a disease suspect and socially isolated. Moreover, rapid diagnosis confirmation may benefit in alleviating the worries among suspected patients.

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Declaration of competing interest

The authors have no conflicts of interest relevant to this article.

References

- Dong E, Du H, Gardner L. An interactive web-based dashboard to track COVID-19 in real time. *Lancet Infect Dis* 2020;20(5):533–4.
- WHO. *WHO statement regarding cluster of pneumonia cases in Wuhan, China*. 2020.
- Purcell E, Gould D, Chudleigh J. Impact of isolation on hospitalised patients who are infectious: systematic review with meta-analysis. *BMJ Open* 2020;10(2):e030371.
- Chua SE, Cheung V, McAlonan GM, Cheung C, Wong JW, Cheung EP, et al. Stress and psychological impact on SARS patients during the outbreak. *Can J Psychiatry* 2004;49(6):385–90.
- Yip PS, Cheung YT, Chau PH, Law YW. The impact of epidemic outbreak: the case of severe acute respiratory syndrome (SARS) and suicide among older adults in Hong Kong. *Crisis* 2010;31(2):86–92.
- Tsang HW, Scudds RJ, Chan EY. Psychosocial impact of SARS. *Emerg Infect Dis* 2004;10(7):1326–7.
- Nickell LA, Crighton EJ, Tracy CS, Al-Enazy H, Bolaji Y, Hanjrah S, et al. Psychosocial effects of SARS on hospital staff: survey of a large tertiary care institution. *CMAJ* 2004;170(5):793–8.
- Brooks SK, Dunn R, Amlot R, Rubin GJ, Greenberg N. A systematic, thematic review of social and occupational factors associated with psychological outcomes in healthcare employees during an infectious disease outbreak. *J Occup Environ Med* 2018;60(3):248–57.
- Ko CH, Yen CF, Yen JY, Yang MJ. Psychosocial impact among the public of the severe acute respiratory syndrome epidemic in Taiwan. *Psychiatry Clin Neurosci* 2006;60(4):397–403.
- Holmes EA, O'Connor RC, Perry VH, Tracey I, Wessely S, Arseneault L, et al. Multidisciplinary research priorities for the COVID-19 pandemic: a call for action for mental health science. *Lancet Psychiatry* 2020;7(6):547–60.
- Lee MB, Liao SC, Lee YJ, Wu CH, Tseng MC, Gau SF, et al. Development and verification of validity and reliability of a short screening instrument to identify psychiatric morbidity. *J Formos Med Assoc* 2003;102(10):687–94.
- Chen HC, Wu CH, Lee YJ, Liao SC, Lee MB. Validity of the five-item Brief Symptom Rating Scale among subjects admitted for general health screening. *J Formos Med Assoc* 2005;104(11):824–9.
- Lu IC, Yen Jean MC, Lei SM, Cheng HH, Wang JD. BSRS-5 (5-item Brief Symptom Rating Scale) scores affect every aspect of quality of life measured by WHOQOL-BREF in healthy workers. *Qual Life Res* 2011;20(9):1469–75.
- Lung FW, Lee MB. The five-item Brief-Symptom Rating Scale as a suicide ideation screening instrument for psychiatric inpatients and community residents. *BMC Psychiatry* 2008;8:53.
- Lee JI, Lee MB, Liao SC, Chang CM, Sung SC, Chiang HC, et al. Prevalence of suicidal ideation and associated risk factors in the general population. *J Formos Med Assoc* 2010;109(2):138–47.
- Chen YY, Wu KC, Gau SS. Mental health impact of the COVID-19 pandemic in Taiwan. *J Formos Med Assoc* 2021 Jul;120(7):1421–3. <https://doi.org/10.1016/j.jfma.2020.12.002>.
- Chien IC, Chou YJ, Lin CH, Bih SH, Chou P. Prevalence of psychiatric disorders among National Health Insurance enrollees in Taiwan. *Psychiatr Serv* 2004;55(6):691–7.
- Kang L, Ma S, Chen M, Yang J, Wang Y, Li R, et al. Impact on mental health and perceptions of psychological care among medical and nursing staff in Wuhan during the 2019 novel coronavirus disease outbreak: a cross-sectional study. *Brain Behav Immun* 2020;87:11–7.
- Wang Y, Di Y, Ye J, Wei W. Study on the public psychological states and its related factors during the outbreak of coronavirus disease 2019 (COVID-19) in some regions of China. *Psychol Health Med* 2020:1–10.
- Huang Y, Zhao N. Generalized anxiety disorder, depressive symptoms and sleep quality during COVID-19 outbreak in China: a web-based cross-sectional survey. *Psychiatry Res* 2020;288:112954.
- Wang C, Pan R, Wan X, Tan Y, Xu L, Ho CS, et al. Immediate psychological responses and associated factors during the initial stage of the 2019 coronavirus disease (COVID-19) epidemic among the general population in China. *Int J Environ Res Public Health* 2020;17(5).
- Brooks SK, Webster RK, Smith LE, Woodland L, Wessely S, Greenberg N, et al. The psychological impact of quarantine and how to reduce it: rapid review of the evidence. *Lancet* 2020;395(10227):912–20.
- Kong X, Kailian Z, Tang M, Kong F, Zhou J, Diao L, Wu S, et al. Prevalence and factors associated with depression and anxiety of hospitalized patients with COVID-19. *medRxiv* 2020. <https://doi.org/10.1101/2020.03.24.2004307>.
- Ozdin S, Bayrak Ozdin S. Levels and predictors of anxiety, depression and health anxiety during COVID-19 pandemic in Turkish society: the importance of gender. *Int J Soc Psychiatry* 2020;66(5):504–11.

25. Yao H, Chen JH, Xu YF. Patients with mental health disorders in the COVID-19 epidemic. *Lancet Psychiatry* 2020;7(4):e21.
26. Person B, Sy F, Holton K, Govert B, Liang A, National Center for Infectious Diseases SCOT. Fear and stigma: the epidemic within the SARS outbreak. *Emerg Infect Dis* 2004;10(2):358–63.
27. Ko NY, Lu WH, Chen YL, Li DJ, Wang PW, Hsu ST, et al. COVID-19-related information sources and psychological well-being: an online survey study in Taiwan. *Brain Behav Immun* 2020;87:153–4.
28. Hsu CH, Lin HH, Wang CC, Jhang S. How to defend COVID-19 in Taiwan? Talk about people's disease awareness, attitudes, behaviors and the impact of physical and mental health. *Int J Environ Res Public Health* 2020;17(13).