Posttraumatic Stress, Anxiety, and Depression in COVID-19 Survivors

KK Wu, D Lee, AM Sze, VN Ng, VW Cho, JP Cheng, MM Wong, SF Cheung, OT Tsang

CME

Abstract

Objectives: This study aims to examine the rates of anxiety, depression, and posttraumatic stress disorder (PTSD) after hospital discharge among COVID-19 survivors and to determine the associated risk factors.
Methods: Adult COVID-19 survivors discharged from hospitals between March 2020 and March 2021 were asked to complete a questionnaire at 4 weeks after discharge. The Chinese version of the 22-item Impact of Event Scale – Revised (IES-R) was used to measure symptoms of PTSD. The 9-item Patient Health Questionnaire (PHQ-9) was used to assess symptoms of major depressive disorder. The 7-item Generalised Anxiety Disorder Scale (GAD-7) was used to measure symptoms of generalised anxiety disorder. The rates of anxiety, depression, and PTSD among discharged patients were determined, as were associations between psychosocial factors and outcome measures and predictors for moderate-to-severe symptoms of anxiety, depression, and PTSD.
Results: 96 men and 103 women aged 18 to 81 years returned the completed questionnaire. 12.1% to 20.1% of them reported symptoms of PTSD, anxiety, or depression. Higher symptom severity was associated with higher perceived life threat, lower emotional support, lower disease severity upon admission, and longer hospital stay. Women had more PTSD symptoms than men, particularly when knowing someone under quarantine.
Conclusion: COVID-19 survivors with higher perceived life threat, lower emotional support, lower disease severity upon admission, and longer hospital stay were associated with higher severity of symptoms of PTSD, anxiety, and depression. Timely intervention should provide to at-risk survivors.

Key words: *Anxiety disorders; COVID-19; Depressive disorder; Patient Health Questionnaire; Stress disorders, post-traumatic*

KK Wu, Department of Clinical Psychology, Princess Margaret Hospital, Hong Kong
D Lee, Department of Clinical Psychology, Princess Margaret Hospital, Hong Kong
AM Sze, Department of Clinical Psychology, Princess Margaret Hospital, Hong Kong
VN Ng, Department of Clinical Psychology, Princess Margaret Hospital, Hong Kong
VW Cho, Department of Clinical Psychology, Caritas Medical Centre, Hong Kong
JP Cheng, Department of Clinical Psychology, Yan Chai Hospital, Hong Kong
MM Wong, Department of Medical & Geriatrics/ Intense Care Unit, Caritas Medical Centre, Hong Kong
SF Cheung, Department of Medicine, Yan Chai Hospital, Hong Kong
OT Tsang, Hospital Authority Infectious Disease Centre, Princess Margaret Hospital, Hong Kong

Address for correspondence: *Dr Kitty Wu, Department Manager (Clinical Psychology), Kowloon West Cluster, Princess Margaret Hospital, Hong Kong. Email: wukyk@ha.org.hk*

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Introduction

As of 20 August 2021, Coronavirus Disease 2019 (COVID-19) has infected >209.9 million people and caused >4.4 million deaths worldwide.[1] Patients with COVID-19 during mandatory hospitalisation may witness emergency resuscitation procedures and death and may experience fears and stigmatisation after hospital discharge. Psychological distress and mental health issues associated with infectious diseases have been well-documented. In 2003, severe acute respiratory syndrome (SARS) infected 8000 people and caused >900 deaths worldwide.[2] 10% to 35% of SARS survivors reported to have features of anxiety and/or depression at 1-month post-discharge.[3-5] SARS had a higher mortality rate and more severe symptoms and required intensive care unit treatment. The arterial oxyhaemoglobin saturation was a sensitive indicator to predict patient's psychological impact. Emotional support may enhance psychological resilience of SARS survivors.[4,5]

For COVID-19, a larger proportion of infections are mild or asymptomatic. According to the Situation Report 46 of the World Health Organization on 6 March 2020, 80% of infections were mild or asymptomatic, 15% were severe infections and required oxygen, and 5% were critical infections and required ventilation.[6] In Hong Kong, as of 20 August 2021, there were 12 050 confirmed cases, with a death toll of 212.[7] All confirmed patients received isolated hospital surveillance and/or treatment until discharge.

At the 6-month follow-up of 1733 COVID-19 patients discharged from hospitals in Wuhan, China, they

were still troubled with fatigue or muscle weakness (63%), sleep difficulties (26%), and anxiety or depression (23%).[8] This study aims to examine the rates of anxiety, depression, and posttraumatic stress disorder (PTSD) after hospital discharge among COVID-19 survivors and to determine the associated risk factors.

Methods

This study was approved by the Kowloon West Cluster Research Ethics Committee (reference: 157-06). Informed consent was obtained from each participant. Adult COVID-19 patients discharged from acute hospitals in Kowloon West Cluster between March 2020 and March 2021 were asked to complete a questionnaire at 4 weeks after discharge.

Patient demographic and psychosocial data were collected. Patients were asked whether they knew someone who had COVID-19 and was under quarantine, and their perceived emotional support and level of perceived life threat related to COVID-19.

The Chinese version of the 22-item Impact of Event Scale – Revised (IES-R) was used to measure symptoms of PTSD.[9-11] It has test-retest reliability of 0.51 to 0.94. Its subscales (avoidance, hyperarousal, and intrusion) have high internal consistency (Cronbach alpha, 0.79-0.91) and were moderately correlated to the General Health Questionnaire (r = 0.51-0.68). A cut-off score of 2 in any subscale indicates moderate-to-severe distress. The internal reliability alpha for the avoidance, hyperarousal, and intrusion subscales for the present sample was 0.91, 0.87, and 0.85, respectively. The IES-R score was used as a dependent variable of PTSD symptoms.

The 9-item Patient Health Questionnaire (PHQ-9) was used to assess symptoms of major depressive disorder (based on the DSM-IV) in the past 2 weeks.[12,13] Higher scores indicate more severe depressive symptoms. A cutoff score of 10 indicates moderate-to-severe depressive symptoms. The internal reliability alpha for PHQ-9 for the present sample was 0.88.

The 7-item Generalised Anxiety Disorder Scale (GAD-7) was used to measure symptoms of generalised anxiety disorder in the past 2 weeks.[14,15] Higher scores indicate more severe anxiety symptoms. A cutoff score of 10 indicates moderate-to-severe anxiety symptoms. The internal reliability alpha for GAD-7 for the present sample was 0.94.

The rates of anxiety, depression, and PTSD among discharged patients were determined. Multivariate analysis of variance was used to determine the effect of discrete predictor variables on outcome measures. Pearson correlation was used to determine the association between psychosocial factors and outcome measures. Variables with the greatest effect on outcome measures were determined using multiple regressions. Age, disease severity upon admission, length of hospital stay, rating on perceived threat and emotional support were independent variables.

Results

Of 727 participants, 199 (27%) aged 18 to 81 years returned the completed questionnaire. 96 were men and 103 were women. Compared with non-respondents, respondents were younger (44.83 vs 51.48 years, $F(1, 725) = 24.05$, $p < 0.001$ and had shorter hospitalisation (14.75 vs 17.21 days, $F(1, 725) = 5.31$, $p = 0.02$. Respondents and non-respondents were comparable in terms of symptoms severity and use of oxygen during treatment. Patient demographic and clinical data, COVID-19-related psychosocial variables, and symptoms of PTSD, anxiety, and depression are shown in Table 1.

40 (20%) respondents had moderate-to-severe depressive symptoms (a cutoff score of ≥10). 27 (14%) respondents had moderate-to-severe anxiety symptoms (a cutoff score of ≥10). 24 (12%) respondents had moderate-to-severe symptoms of posttraumatic stress disorder (a cutoff score of ≥2 in any subscale); nine (5%) respondents had full PTSD, with all three subscale scores above the cutoff score.

Multivariate analysis of variance showed a significant difference between sex in the combined dependent variables of PHQ-9, GAD-7, and IES-R (Wilk's = 0.953, $F(3, 193) = 3.172$, ES = 0.05, $p = 0.03$)

In univariate F tests, women had significantly higher scores than men in PHQ-9, GAD-7, and IES-R (Table 2). Those who knew someone under quarantine had significantly higher scores in PHQ-9 and GAD-7 than those who did not know (Table 2). There was a significant interaction effect between sex and knowing someone under quarantine in IES-R ($F(1,195) = 4.127$, ES = 0.02, $p = 0.04$). Women who knew someone under quarantine scored higher in IES-R than women who did not know (3.66±2.12 vs 2.11±1.86, $t(101) = 2.75$, $p = 0.007$). However, there was no significant difference in IES-R score between men who knew someone under quarantine or not (1.67±2.12 vs 1.73±2.00, $p = 0.92$).

Higher perceived life threat related to COVID-19 and less emotional support were associated with more severe symptoms of PTSD, anxiety, and depression (Table 3). Young age and lower disease severity upon admission were associated with higher GAD-7 score, whereas longer hospital stay was associated with higher IES-R score (Table 3). Correlation was significant between age and disease severity upon admission (r = 0.20, $p = 0.002$), between age and perceived life threat ($r = 0.16$, $p = 0.03$), and between disease severity upon admission and length of hospital stay ($r = 0.20$, $p = 0.003$). Disease severity upon admission, perceived life threat, and emotional support were predictors for PHQ-9, GAD-7, and IES-R scores, whereas length of hospital stay was also a predictor for IES-R score (Table 3).

Discussion

In the present study, 12% to 20% of respondents reported

Table 1. Patient demographic and clinical data, COVID-19-related psychosocial variables, and levels of anxiety, depression, and posttraumatic stress disorder

Parameter	Value*
Education level (n = 197)	
Primary or below	22 (12)
Secondary	82 (41)
Tertiary or above	93 (47)
Family monthly income, HK$ (n = 198)	
≤15 000	47 (24)
15 000-24 999	59 (30)
25 000-39 999	44 (22)
≥40 000	48 (24)
History of psychiatric illness	7 (3.5)
Disease severity upon admission (n = 199)	
Stable, not requiring oxygen	186 (93)
Severe, requiring <3L/m oxygen	10 (5)
Critical, requiring intensive care unit admission and >3L/m oxygen or ventilator	3 (2)
Length of hospital stay, days	14.75 ± 9.76 (2-75)
Knowing someone under quarantine	29 (15)
Perceived life threat related to COVID-19 (n = 198)	
Not at all	53 (27)
Slightly threatening	72 (36)
Somewhat threatening	40 (20)
Very threatening	24 (12)
Extremely threatening	9 (5)
Emotional support, No. of people they could talk and share their worries (n = 197)	
None	11 (6)
1-2	86 (43)
3-4	60 (30)
≥5	40 (20)
Patient Health Questionnaire-9 score	5.14 ± 5.21
Cutoff score of ≥10	40 (20)
Generalised Anxiety Disorder Scale-7 score	3.94 ± 4.89
Cutoff score of ≥10	27 (14)
Impact of Event Scale – Revised score	2.03 ± 2.00
Cutoff score of ≥2 in any subscale	24 (12)
Intrusion	0.74 ± 0.75
Cutoff score of ≥2	18 (9)
Avoidance	0.61 ± 0.68
Cutoff score of ≥2	12 (6)
Hyperarousal	0.67 ± 0.74
Cutoff score of ≥2	18 (9)

* *Data are presented as No. (%) of respondents, mean ± standard deviation (range), or mean ± standard deviation*

moderate-to-severe symptoms of PTSD, anxiety, or depression. Similarly, 10% to 18% of SARS patients reported symptoms of PTSD, anxiety, and depression.[4,5]

Higher perceived life threat emerged was the most significant predictor for symptoms of PTSD, anxiety, and depression, followed by lower emotional support. Having someone to talk to and share worries is a buffer for coping with life adversities. Knowing someone under quarantine increased stress levels. Further investigation on the relationship with the infected and the number of

Table 2. Associations of sex and knowing someone under quarantine with scores of Patient Health Questionnaire-9, Generalized Anxiety Disorder-7, and Impact of Event Scale-Revised

Outcome measure	Sex		F	Knowing someone under quarantine		F
	Male	Female		Yes	No	
Patient Health Questionnaire-9	4.48±6.81	7.31±7.68	7.51 (p = 0.007)	6.95±5.13	4.83±5.10	4.23 (p = 0.041)
Generalized Anxiety Disorder-7	3.46±6.42	5.91±7.24	6.40 (p = 0.012)	5.70±4.83	3.66±4.80	4.42 (p = 0.037)
Impact of Event Scale-Revised	1.70±2.61	2.88±2.94	8.94 (p = 0.003)	2.67±1.97	1.92±1.95	3.57 (p = 0.06)

Table 3. Multiple regression analyses for predictors of anxiety, depression, and posttraumatic stress disorder

Dependent variable	B	SE(B)	β	SR^2	r	R^2	Overall, F (5,192)
Patient Health Questionnaire-9						0.20	9.72 (p < 0.001)
Age	-0.04	0.02	-0.12	0.01	-0.08		
Disease severity upon admission	-2.20	1.08	-0.14	0.02 (p = 0.043)	-0.10		
Length of hospital stay	0.05	0.04	0.10	0.01	0.10		
Perceived life threat	1.78	0.31	0.39	0.14 (p < 0.001)	0.38 (p < 0.001)		
Emotional support	-0.90	0.39	-0.16	0.02 (p = 0.02)	-0.16 (p = 0.012)		
Generalized Anxiety Disorder-7						0.21	10.46 (p < 0.001)
Age	-0.05	0.02	-0.16	0.03 (p = 0.014)	-0.12 (p = 0.043)		
Disease severity upon admission	-2.59	1.01	-0.17	0.03 (p = 0.011)	-0.14 (p = 0.027)		
Length of hospital stay	0.06	0.03	0.13	0.02	0.11		
Perceived life threat	1.53	0.28	0.35	0.12 (p < 0.001)	0.34 (p < 0.001)		
Emotional support	-1.07	0.36	-0.19	0.04 (p = 0.003)	-0.19 (p = 0.004)		
Impact of Event Scale-Revised						0.27	14.47 (p < 0.001)
Age	-0.01	0.01	-0.08	0.01	-0.02		
Disease severity upon admission	-0.81	0.39	-0.13	0.02 (p = 0.041)	-0.07		
Length of hospital stay	0.03	0.01	0.13	0.02 (p = 0.043)	0.14 (p = 0.027)		
Perceived life threat	0.81	0.11	0.46	0.20 (p < 0.001)	0.46 (p < 0.001)		
Emotional support	-0.39	0.14	-0.17	0.03 (p = 0.006)	-0.19 (p = 0.004)		

people affected by the patient can better understand their associations with stress levels, as when close relatives or the whole family are infected and under quarantine, stress levels are more likely to be even higher.

Lower disease severity upon admission was associated with a higher anxiety level, whereas longer hospital stay was associated with a higher posttraumatic stress level. Prolonged mandatory hospitalisation until all symptoms were clear contributes to psychological distress and warrants early psychological screening and support services. The distress and vulnerability were particularly higher in women survivors who knew

someone under quarantine. Further exploration of the role of women in the family or the personal relationship with the infected person might shed light on the impacts of COVID-19 on women's health.[16,17] Although younger age and lower disease severity upon admission were associated with higher anxiety, older patients had higher perceived life threat and disease severity. Further studies on the interference of age for perceived life threat, disease severity upon admission, and length of hospital stay on psychological distress is warranted.

There are limitations to the present study. The occurrence of anxiety, depression and PTSD symptoms was self-reported and not based on the diagnostic criteria. The occurrence rates are not prevalence estimates of the clinical conditions, particularly the sample may be biased toward those with sufficient time, better motivation and literacy to participate in the study. Our findings should be substantiated by clinical interviews for diagnosis. The cross-sectional design of the study cannot determine the causal relationship between COVID-19 and the occurrence of anxiety, depression, and PTSD symptoms. The response rate was low (27%), and respondents were younger and had shorter hospital stay than non-respondents. Thus, our findings may not be representative of all COVID-19 survivors. The small sample size (particularly those with a history of psychiatric illness) limits the statistical power to determine associations between variables. As strict quarantine policy has been adopted in Hong Kong, studies to examine other factors that have psychological impacts on COVID-19 survivors such as stigmatisation, financial stress, social distancing, and strict quarantine policy are warranted, as are repeat studies to determine how the psychological impacts change over time.

Conclusion

12% to 20% of COVID-19 survivors reported moderate-to-severe symptoms of PTSD, anxiety, or depression. Higher symptom severity was associated with higher perceived life threat, lower emotional support, lower disease severity upon admission, and longer hospital stay. Timely intervention should provide to at-risk survivors.

Contributors

All authors designed the study, acquired the data, analysed the data, drafted the manuscript, and critically revised the manuscript for important intellectual content. All authors had full access to the data, contributed to the study, approved the final version for publication, and take responsibility for its accuracy and integrity.

Conflicts of interest

All authors have disclosed no conflicts of interest.

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Data Availability

All data generated or analysed during the present study are available from the corresponding author on reasonable request.

Ethics approval

The study was approved by the Kowloon West Cluster Research Ethics Committee (reference: 157-06). Informed consent was obtained from each participant.

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