

## Research Article

# A Survey of Negative Emotions and Related Factors of Hospitalized COVID-19 Positive Patients

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## Abstract

**Background:** The coronavirus disease 2019 (COVID-19) has been a pandemic and lead to negative emotions. The aim of this study was to explore risk factors of the negative emotions of COVID-19 positive patients.

**Methods:** Patients diagnosed with COVID-19 were recruited and a self-designed questionnaire was used to collect their general information. The Huaxi Emotional-distress Index (HEI) was used to assess their emotions and multiple linear regression analysis was conducted to identify the related factors.

**Results:** A total of 166 COVID-19 positive patients were included. According to the score of HEI, patients were divided into four sub-groups including: 90 patients without bad mood, 31 patients with mild bad mood, 18 patients with moderate bad mood, and 27 patients with severe bad mood. Multiple linear regression analysis showed that the severity of illness they felt, transfer due to COVID-19, family members or friends were infected by COVID-19 were significant independent risk factors for their bad mood.

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**Conclusion:** The mental health of hospitalized COVID-19 positive patients was affected and effectively and adequate mental health care should be provided to help ameliorate their psychological stress and better overcome the disease.

**Keywords:** COVID-19; Negative emotions; Huaxi emotional-distress Index

## Introduction

In December 2019, the coronavirus disease 2019 (COVID-19) hit Wuhan City severely and later spread in China and over the world [1,2]. Many patients were diagnosed and later died due to the lack of vaccine, the information of the virus, effective treatment etc. During that time, schools, public transports, markets were closed as the safety measures of limiting the spread of the disease virus.

Patients during such epidemic were under much pressure and easily suffered psychological problem such as anxious, depressive or sleep disturbance [3,4]. Early detection and early intervention were able to ameliorate some of the psychological burden especially in the acute phase. However, psychological symptoms were usually under-recognized and it is important to screen patients' depression and anxiety in clinical [3]. Huaxi emotional-distress Index (HEI) was a self-developed scale which can help physician quickly and exactly assess one's negative emotions in clinical practice [5]. Compared to other traditional emotional scales, the HEI only has 9 easily understandable items which takes a very short evaluation time but with good reliability and validity. Thus, it is particularly suitable for the screen of emotional problems of COVID-19 positive patients in the isolation ward.

Many factors were reported to be related to their mood problems, and it was important to identify those risk factors, such as one's coping style or the social support etc. [6]. Patients with negative coping style usually worry more about their current health status and may be more likely to suffer psychological stress or develop mental disorders [7]. Also, facing and suffering such severe infectious disease, more effective and adequate social support from friends, relatives etc. may also help patients keep better mood status [8]. It was found that social support from one's relatives or friends were a source of greater social support [9]. So, in this study, we tried to collect the related information about their subjective evaluation of their own health status as well as the health status of their family member or friends in a very short time after they got hospitalized.

Due to the unclear psychological problems or stress for those COVID-19 positive patients at that time, we first wanted to explore the psychological status of those patients by using HEI. Secondly, we wanted to explore the potential risk factors for their bad mood. Thus, early detection and early intervention will be provided to those patients during such infectious epidemic.

## Participants and Methods

### Participants

This was a cross-sectional study which recruited inpatients in 23 Wards and 24 Wards of the East District of Wuhan People's Hospital from February 7, 2020 to April 7, 2020. All of them were diagnosed as patients with COVID-19. Exclusion criteria: patients who were under 18 years old; severely ill patients such as those who received tracheal intubation; patients who were unable to communicate effectively; patients who combined with mental illness previously. This study was approved by the ethics committee of our hospital and complies with the requirements of the Declaration of Helsinki.

### Methods

The general information questionnaire was used to collect the information about the patient's hospitalization ID, age, gender, education level, marital status, residential status, the severity of illness they felt, transfer due to COVID-19, whether family members or friends were infected by COVID-19, whether family members or friends died due to COVID-19, and the current severity of the COVID-19 epidemic they felt.

In this study, the Huaxi emotional-distress Index (HEI) was used to assess patients' bad mood. The negative emotions in this study refer to anxiety such as nervousness, worry, irritability and depression, despair and even suicidal thoughts. The scale was developed by West China Hospital of Sichuan University to screen for inpatients' bad mood. As the first self-developed assessment tool in China, it can screen and evaluate the emotional problems of non-psychiatric patients in general hospitals accurately, fast and comprehensively [5]. The Cronbach's alpha for internal consistency was 0.900, the sensitivity and specificity were 0.880 and 0.766 separately [5]. The HEI scale consists of 4 dimensions and 9 items including: first dimension was for depressive symptoms (items 1,2,7,8), second dimension was for anxiety symptoms (items 3,4,5), third dimension was for acute anxiety (item 6), fourth dimension was for suicide risk (item 9). This scale conducted the Likert 5-level scoring method, 0 means "not at all", 1 means "occasionally", 2 means "part of the time", 3 means "most time", and 4 means "all time". According to the suggested criteria, the total score is less than 8 points means no bad mood; 9 points to 12 points means the presence of mild bad emotions; 13 points to 16 points means the presence of moderate bad emotions; 17 points and above means the presence of severe bad emotions.

The survey was conducted by the voluntarily psychiatric nurse after the patient got hospitalized in the ward. The investigator enters the isolation ward after taking protective measures to explain the research purpose and specific requirements of the investigated patient, then conducted person-to-person investigation of each patient. The nurse conducted the quality control immediately that she carefully checked every questionnaire to guarantee the accuracy and completeness of the content.

### Statistics

All data were statistically analyzed by SPSS 21.0 software. The categorical data was described by frequency and constituent ratio, and group comparisons of them were performed by  $\chi^2$  (chi-square) test or Mann-Whitney U test or Kruskal-Wallis test. Non-normal distribution measurement data was described by median M (Q1,Q3), and Mann-

Whitney U test or Kruskal-Wallis test was used for the group comparison. Univariate analysis was used to explore the statistically significant factor related to their current mood. Multivariate Logistic regression analysis was further conducted explore how the related factor contributed to their mood. A p value less than 0.05 was considered as statistically significant.

## Results

### Demographic information of all participants

A total of 166 hospitalized COVID-19 positive patients were included and 90 patients were male (54.2%). The median age of the patients was 65 years (IQR 56-72). According to the HEI score, we divided them into four subgroups including: 90 patients without bad mood (54.2%), 31 patients with mild bad mood (19%), 18 patients with moderate bad mood (11%), and 27 patients with severe bad mood. (16%) (Table 1).

### Comparison of factors between subgroups

According to whether suffered bad mood or not, the subjects were divided into no bad mood group and bad mood group. Rank sum test (Mann-Whitney U test) and  $\chi^2$  test were performed to explore the difference between groups. We found that the proportion of 4 items showed a significant statistical difference between the two groups, including the severity of illness they felt, transfer due to COVID-19, whether family members or friends were infected by COVID-19, whether family members or friends died due to COVID-19 ( $p < 0.05$ ) (Table 2).

### Logistic regression analysis

Factors significant showed grouped difference were included in the multivariate logistic regression model. The logistic regression analysis results showed that, after adjustment, the severity of illness they felt, transfer due to COVID-19, whether family members or friends were infected by COVID-19 were the independent risk factors for the patient's bad mood (Table 3).

## Discussion

### The outbreak has brought a significant mental health burden

In the current study, a total of 166 hospitalized COVID-19 positive patients were included. The median age was 65 years and about half of hospitalized patients suffered bad emotions. Those patients were elder ones with median age of 65 years old which was consistent that most suffers of COVID-19 were older people [10,11].

This indicated that the outbreak of the disease has brought them a significant mental health burden. Patients experienced bad mood may have a higher probability of suffering severe mental illness [12]. Mental health care service should be more addressed for them. Logistic regression analysis showed that the severity of illness they felt, transfer to another hospital due to COVID-19 and family members or friends were infected by COVID-19 were significant associated with bad mood after adjustment for potential confounders.

### Negative thinking may be related to the bad mood

In the current study, we found that patients who always felt worse about their health status was at high risk of having bad mood. This may also indicate that those COVID-19 positive patients with bad mood may be more likely to conduct a negative coping style or have catastrophic thinking when faced some problems.

Factors	No bad mood (N=90)	mild bad mood (N=31)	moderate bad mood (N=18)	severe bad mood (N=27)	p value
Age*	66 (56-74)	64 (53-69)	62 (48-70)	66 (60-70)	0.790 <sup>a</sup>
Gender**					
Male	51 (56.7%)	15(48.4%)	11(61.1%)	13 (48.1%)	0.716 <sup>b</sup>
Female	39 (43.3%)	16(51.6%)	7(38.9%)	14 (51.9%)	
Education level**					
<9 years	37 (41.1%)	14 (45.2%)	6 (33.3%)	17 (44.6%)	
9-12 years	30 (33.3%)	9 (29.0%)	6 (33.3%)	52 (31.3%)	0.128 <sup>a</sup>
>12 years	23 (25.6%)	8 (25.8%)	6 (33.3%)	40 (24.1%)	
Marital status**					
Married	79 (87.8%)	27 (87.1%)	16 (88.9%)	23 (85.2%)	0.982 <sup>c</sup>
Unmarried	11 (12.2%)	4 (12.9%)	2 (11.1%)	4 (14.8%)	
Residential status**					
Not alone	84 (93.3%)	28 (90.3%)	17 (94.4%)	27 (100.0%)	0.466 <sup>c</sup>
Alone	6 (6.7%)	3 (9.7%)	1 (5.6%)	0 (0.0%)	
The severity of illness they felt**					
not severe	37 (41.1%)	6 (19.4%)	4 (22.2%)	2 (7.4%)	
severe	53 (58.9%)	25 (80.6%)	14 (77.8%)	25 (92.6%)	0.002 <sup>b</sup>
Transfer due to COVID-19**					
No	18 (20%)	2 (6.5%)	1 (5.6%)	1 (3.7%)	0.065 <sup>c</sup>
Yes	72 (80%)	29 (93.5%)	17 (94.4%)	26 (96.3%)	
Whether family members or friends were infected by COVID-19**					
No	20 (22.2%)	4 (12.9%)	2 (11.1%)	0 (0.0%)	0.022 <sup>c</sup>
Yes	70 (77.8%)	27 (87.1%)	16 (88.9%)	27 (100.0%)	
Whether family members or friends died due to COVID-19**					
No	86 (95.6%)	29 (93.5%)	15 (83.3%)	22 (81.5%)	0.046 <sup>c</sup>
Yes	4 (4.4%)	2 (6.5%)	3 (16.7%)	5 (18.5%)	

**Table 1:** Comparisons of demographic and clinical information of patients among groups.

a: Kruskal-Wallis test, b:  $\chi^2$  (chi-square) test, c: Fisher's test, \*: described by median M (Q1, Q3), \*\*: described by percentage.

Factors	Without bad mood group (N=90)	With bad mood group (N=76)	p value
Age	66 (56-74)	64 (56-69)	0.459
Gender			
Male	51 (56.7%)	39 (51.3%)	0.491
Female	39 (43.3%)	37 (48.7%)	
Education level			
< 9 years	37 (41.1%)	37 (48.7%)	
9-12 years	30 (33.3%)	22 (28.9%)	0.371
>12 years	23 (25.6%)	17 (22.4%)	
Marital status			
Married	79 (87.8%)	66 (86.8%)	0.857
Unmarried	11 (12.2%)	10 (13.2%)	
Residential status			
Not alone	84 (93.3%)	72 (94.7%)	0.959
Alone	6 (6.7%)	4 (5.3%)	
The severity of illness they felt			
not severe	37 (41.1%)	12 (15.8%)	
severe	53 (58.9%)	64 (84.2%)	<0.001
Transfer due to COVID-19			
No	18 (20%)	4 (5.3%)	0.005
Yes	72 (80%)	72 (94.7%)	

Whether family members or friends were infected by COVID-19			
No	20 (22.2%)	6 (7.9%)	0.011
Yes	70 (77.8%)	70 (92.1%)	
Whether family members or friends died due to COVID-19			
No	86 (95.6%)	66 (86.8%)	0.044
Yes	4 (4.4%)	10 (13.2%)	

**Table 2:** Comparison of factors between subgroups with and without bad mood.

Variables	OR	95% CI	p
The severity of illness they felt	2.942	1.340-6.461	0.007
Transfer due to COVID-19	3.924	1.113-13.837	0.033
Whether family members or friends were infected by COVID-19	2.931	1.067-8.050	0.037
Whether family members or friends died due to COVID-19	3.010	0.823-11.011	0.096

**Table 3:** Logistic regression analysis for bad mood of patients.

This was regarded as a form of negative repetitive thinking and ineffective problem solving method [13]. Moreover, such maladaptive pattern of thinking was a kind of cognitive distortions and always increased the risk for the development and the perpetuation of mood disorders [14]. Thus, those negative old patients used to be more sensitive for their social support and afraid of neglect, and they may be more likely to suffer from sleep disturbance or mood problems [15]. The positive coping strategy should be taught and practiced for patients with such characters which may help them keep good mood [16].

### Risks factors for the negative emotions

In this study, we also found that less access to healthcare and higher frequency of transferring to other hospital may contribute to of negative emotions COVID-19 positive patients. As reported, better social support in such epidemic may help reduce patients' psychological stress and help them maintain better mental health status [3]. However, those isolated patients' social support was mostly provided by health workers and psychologists in their ward [17]. When patients transferred between different hospitals, this may potentially cause the uncertain of continuous treatment, maintenance of doctor-patient relationship or worsen of their disease. This may be harmful to their mood or make them at high risk of suffering from psychological problem [18]. Later, a stratified management strategy was established. Mild ill patients were admitted to Fangcang shelter hospitals, and severe ill patients were admitted to designated hospitals. The beds were available for patients and the situation of multiple transfers has also been significantly solved. This may help alleviate the bad mood of COVID-19 positive patients.

Also, those patients who had a higher frequency of family member or friends got infected by COVID-19 were more likely to suffer from bad mood. Firstly, those patients may think that their family or friends may be infected by themselves and felt sorry or guilty. Especially during the early stage of the epidemic, they may under heavy psychological stress about spreading the virus to their family members or close friends [19]. This may increase the risk of having psychological symptoms since some brain regions were related to the feel of guilt were abnormally active and played a key role in the progress of depression [20]. Secondly, the patients usually stayed in

an isolation ward, and family and friends cannot visit. They may get less social support from them. As previous reported, inadequate social support was a significant predictor of depressive symptoms [21] and perceptions of inadequate support was usually associated with one's psychological symptoms [22]. Thirdly, those patients may also suffer the stress from social isolation. Previous research revealed a neural mechanism underlying isolation-induced anxiety and depressive behaviors. They found that lack of social interaction may cause anxious or depressive behavior by inducing the reduction of several neuroplasticity-related genes in some brain specific regions such as prefrontal cortex or hippocampus [23]. So, patients who having family member or friends infected may experience the lack of social interaction, and possible guilt which may contribute to their bad emotions during hospitalization. Mental health workers should pay more attention to their inner feelings and problems especially in the early stage of such epidemic to bad mood to prevent the occurrence of bad mood or mental illness.

### Conclusion

The mental health of the hospitalized COVID-19 positive patients was affected and effectively and adequate mental health care should be provided for them. Our results found that the severe of the illness they felt, more transfers between hospitals and having family members or friends been infected by COVID-19 were significant associated with their bad mood. This suggested that this population, especially those with such risk factors, should accept early psychological intervention. We believe that by teaching them positive coping style, improving the health care system and providing social support will help ameliorate their psychological stress and better overcome the disease.

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### Data Availability Statement

The data that support the findings of this study will be available from the corresponding author on reasonable request.

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